

Plant biodiversity of Golestan National Park, Iran

H. Akhani



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یوسف گم گشته باز آید به کنعان غم مخور

کلبه احزان شود روزی "گلستان" غم مخور

*Back to Kinan, lost Yusuf cometh,
suffer not grief
One day, the sorrowful cell becometh the "Golestan"
suffer not grief*

Hafis (1320-1389)

Golestan (گلستان) means in Persian etymology
"the country of flowers"

Dedicated to the memory of late Per Wendelbo (1927-1981), the admirable Norwegian botanist and the pioneer of botanical research in the Iranian protected areas, and to Karl-Heinz Rechinger, the Austrian botanist, editor and main author of the magnificent "Flora Iranica". Both have carried out basic research on the flora of Golestan National Park.

**Dissertation zur Erlangung des Doktorgrades der Fakultät für Biologie
der Ludwig-Maximilians-Universität München**

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INTRODUCTION

The very diverse environmental conditions and the rich variety of natural resources made it possible for the Iranians to create a great and flourishing civilization. Iran is a large country with a total surface of 1,648,000 square kilometer, an area nearly as large as Italy, Austria, Switzerland, Germany, France and the British Isles, all combined. Altitude ranges from 26 meters below sea-level, on the shores of the Caspian Sea, to 5,774 meters at the summit of Mt. Damavand, which is higher than any peak west of the Hindukush in Eurasia (Firuz 1974). The climatic conditions of the country are also very diverse; the annual precipitation, for example, ranges from ca. 2000 mm in Bandare Anzali (coast of Caspian Sea in N Iran) to less than 100 mm in many places located in central and southeast Iranian deserts. So, Iran can well be designated as a country of extremes.

The rich flora and fauna of the country is one of the most fascinating ones among the Southwest Asian countries. Today one still finds humid forests in parts of the South Caspian coastal plain and the northern slopes of the Alborz Mountains. Drought-adapted woodlands and shrublands cover the mountains in the west and northeast of Iran. The subalpine zones of the Alborz and Zagros mountains are dominated by mountain steppes which are characterized by thorn-cushion formations or grassland. Most of the arid and semi-arid parts of the country and the lower playas are occupied by *Artemisia* steppe or various kinds of halophytic and psammophytic vegetation types. The coastal regions on the Persian Gulf are characterized by *Acacia* and *Prosopis* semidesert shrublands and mangroves (Frey & Probst 1986; Freitag 1986; Akhani & Ghorbanli 1993; Léonard 1991/1992). The varied climatic, topographic and edaphic contrasts between the Iranian plateau and the surrounding highlands caused a rich floral history and high evolutionary potential. The number of known plant species is just above 7000, based on the published numbers and an estimation of the forthcoming volumes of Flora Iranica (Rechinger 1963-1997, Akhani 1994). But, as it is evident from the result of this study, many more species are expected to be found in the future. As a result of diverse vegetation and habitat conditions, the fauna of Iran is also very diverse but less known than the flora. So far 160 species of mammals have been recorded in Iran (Ziaie 1996). Animals like maral (*Cervus elaphus*), Persian fallow deer (*Cervus dama*), brown bear (*Ursus arctos*), black bear (*Selenarctos thibetanus*), cheetah (*Acinonyx jubatus*), leopard (*Panthera pardus*), onager or Asiatic wild ass (*Equus hemionus*), gazelle (*Gazella subgutturosa*, *G. durcas*) and the marsh crocodile (*Crocodylus palustris*) are outstanding examples, showing the habitat and ecosystem diversity in Iran.

In ancient Persian times areas were protected for hunting. Imperial reserves were established near Tehran sometime between 1792 and 1830. The first wildlife reserves were established in 1927. In 1956 the conservation law was passed and the Game Council was created with a policy to set up hunting centers for the protection of endangered species and the control of hunting. The council was replaced by the Department of the Environment in 1973 which is responsible for protected areas in Iran (Firuz & al. 1970, Makhdoum & al. 1993). Today, there are 80 protected areas including 10 National Parks, 4 National Nature Monuments, 25 Wildlife Refuges and 41 Protected Areas which cover approximately 8 million hectares (4.8% of the country) (Makhdoum & al. 1993; Meigouni, unpublished information). Nine of these are UNESCO designated reserves; among them is Golestan National Park¹. Before the establishment of the Park, intertribal conflicts between the Kooklan Turkmans in the north and Kurdish tribes in the south and east virtually precluded any human habitation. Even grazing of domestic stock was risky (Firuz & al. 1970, De Vos & al. 1977). The topographic structure of the area was also another natural barrier to human activities. Therefore, a 'natural' conservation was present in most parts of the area, when human impact on natural ecosystems was growing in most other parts of the Iranian territory at the beginning of this century. The completion of a new road between Gonbad and Bojurd in 1953 provided quick access to formerly virgin forests and damaged several parts of the area. Fortunately this process ceased in 1957 with the establishment of the Iran Game Council and the designation of the area as the "Almeh and Ishaki Protected Area". In 1962 it was named "Almeh Protected Area", in 1963 "Mohammad Reza Shah Park", in 1964 "Mohammad Reza Shah Wildlife Park" and in 1974 "Mohammad Reza Shah National Park". In 1978 the

¹ "GNP" (acronym for Golestan National Park) or "the Park" or "Golestan" are frequently used in this work in order to avoid repetition of "Golestan National Park".

Qorkhod Protected Area -located in the east of the Park with 34,000 hectares- was included into the Park, so the area of the Park increased to 126,000 hectares. After the Iranian Revolution in 1979 its name was changed to Golestan National Park with an exclusion of Qorkhod Protected Area from the Park and a reduction of the area to 91,895 hectares (Firuz & al. 1970; Hasanzadeh-Kiabi & al. 1994).

The unique flora and fauna of the Park have fascinated many western and native scientists during the seventies. Under the auspices of the Department of the Environment and its Director Mr Eskandar Firuz, many collection activities of western scientists have been supported during that time. Frey & Kürschner (1977) have provided a checklist of 90 bryophytes from the Park, 23 of them new to Iran. Also, a preliminary investigation of the vegetation of the Park was provided by Frey (1980). In the second half of the seventies Rechinger & Wendelbo planned to provide a list of the vascular plants (Rechinger 1989: 335). This never materialized, because of the Iranian Revolution, the death of Prof. Wendelbo and more important the great diversity of the flora which was once well described by Wendelbo (1976) as follows: "*The flora must be properly recorded by competent taxonomists. This is basic importance for work on recording the different stages in the development of the vegetation, mapping of vegetation as well as ecological and detailed sociological studies. The naming of plants has to be done in collaboration with a herbarium with a series of specialists on the larger and more difficult groups. No single botanist can manage to cover all these groups and give reliable names*". This clearly shows, why in spite of many visits of the Park by botanists, nobody was able to provide a comprehensive list of all vascular plants. After the Iranian revolution one group of botanists from the Institute of Plant Pests and Diseases, Evin (Dr F. Termeh and Ms F. Matin) and Mr B. Zehzad from Shahid Beheshti University planned to study the flora of the Park. The major parts of the collections by the Evin group were investigated during the preparation of the Flora Iranica accounts (Rechinger 1963-1997). The collections of Mr Zehzad have partially been identified and were studied during this project by the author. A total of ca. 600 species from the Park have already been reported in the published volumes of Flora Iranica and other works, most of which are listed by Zehzad (in Hasanzadeh-Kiabi & al 1994).

My first impression of the Park, during a short excursion in August 1987, motivated me to start studying the flora and the vegetation of the Park. After several collection trips between 1987 and 1989 and the continuation of the research for a dissertation during 1993 to 1998 in Munich, the following aims are stated:

- 1) To provide a comprehensive documentation of vascular plant diversity in the Park, including an annotated list of the vascular plants with their distribution, cover abundances, habitats, altitude range, chorology and endangered status. This part is dealt with in the present dissertation.
- 2) To provide an illustrated identification manual of the vascular flora. The majority of the identification keys and photographs for such a manual are already prepared. But appr. two more years are required to compile the remaining parts and line-drawing illustrations.
- 3) To provide a phytosociological analysis and vegetation mapping of the Park. A total of 570 relevés are provided using the Braun-Blanquet method of plant sociology (Braun-Blanquet 1964). The evaluation of the relevés is in progress.

I should say this work is far from being complete and perfect, given the short amount of time available. Surely there remain many unsolved problems, errors and omissions. As the author is continuing the project for two forthcoming publications (an identification manual of the flora and a phytosociological survey of the area), any criticisms and reidentifications of the plants are warmly welcomed.

1 GENERAL PART

1.1 The study area

Golestan National Park is situated in NE Iran, E of Mazandaran¹, NW of Khorasan and N of Semnan provinces (Figs 1, 6). It extends from 37°16'43" to 37°31'35" northern latitude and from 55°43'25" to 56°17'48" eastern longitude. The area covers 91,895 hectares² with a circumference of 147 km. The outline of GNP tapers when moving from west to east and shows a triangular shape. Robat-e Qarehbil (37°21'N, 56°20'E) is located in the easternmost part of the Park, at the apex of the triangle. Tangerah (37°24'N, 55°47'E) is located in the westernmost part of the area. The extremely busy, so-called "Asian road" which connects north and central Iran with northeast Iran passes through the forest zone and along the southern border of the Park for 35 km. The capital of Tehran is located ca. 600 km SW, Mashhad (the center of Khorasan Province) ca. 300 km E, and Gorgan 145 km W of the area, respectively. Large cities closest to the Park are Gonbad-e Qabus (55 km W) and Bojnurd (115 km E). Several villages surround the Park: Tangerah (the Office Center of the Park), Terjeli, Quch Cheshmeh, Zav, Tamak, Kondeskuh and Dast-e-Shah (now officially known as Dashte- Shad) in the west, Dasht, Cheshmeh Khan, Armadlu, in the south, Robate Qareh Bil in the east. The north of the Park is sparsely settled, due to the unsuitable climatic conditions. Lohondor, Yel-Cheshmeh and Behkadeh are the closest villages in the north (*cf.* Fig. 6).

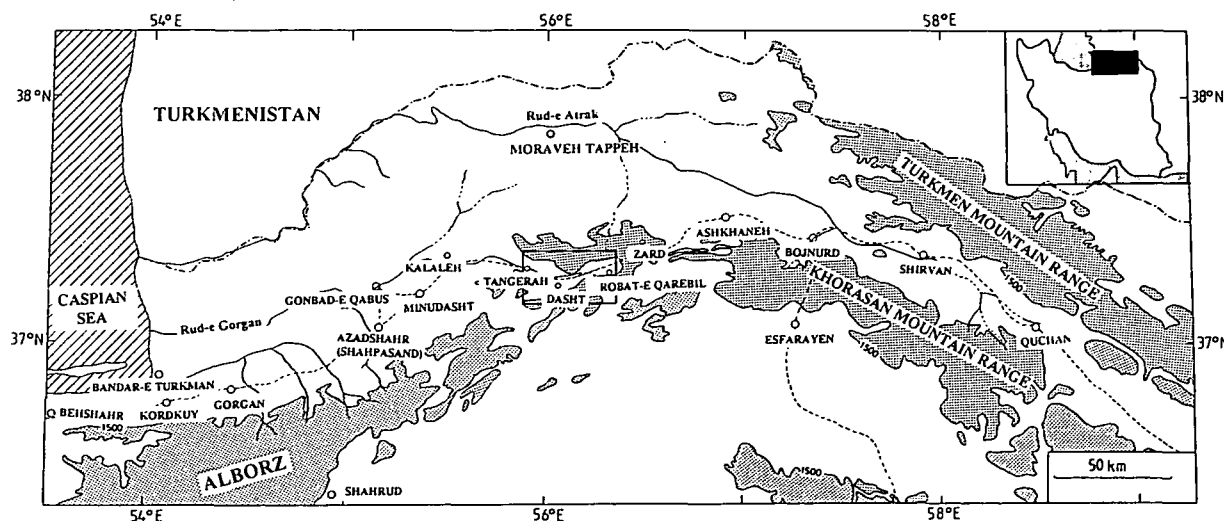


Fig. 1: Map of NE Iran, showing the position of Golestan National Park.

¹ The name of Mazandaran Province is mentioned in the available maps. In the wake of very recent administrative changes in Iran, the foundation of a new province "Golestan" was passed by the Iranian Parliament. Golestan province whose name stems from our area, covers Gorgan and Gonbad Area in the E of former Mazandaran Province.

² The total area of the Park is a matter of controversy. 91,895 hectares is the official figure provided by the Iranian Department of Environment. According to a recent unpublished report by Rawanab Engineering Consultation (REC 1994) the area of the Park is only 83,470 hectares.

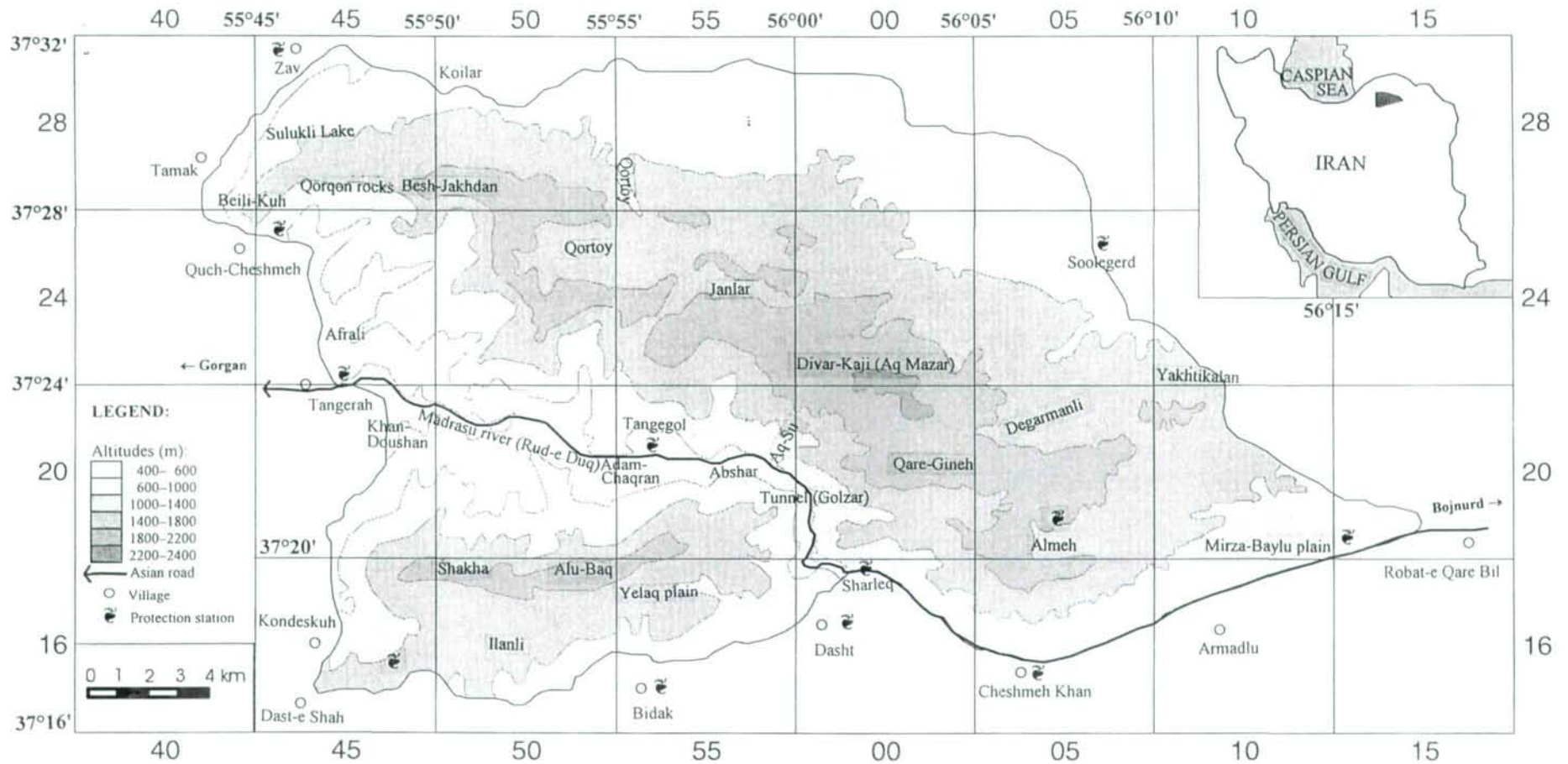


Fig. 2: Relief map of Golestan National Park and the names of places concerning this study. The figures at the middle of each quadrant are MTB figures used for Computer mapping (see chapter 3.1.VI “Material and methods”).

1.2 Topography and water resources

The Park consists mainly of a transitional mountainous area and is located between the eastern extension of the Alborz Mountains and the western extension of the Khorasan-Kopetdagh Mountains (Figs 1, 2). Alu-Baq (2174 m) in the southern sector of the Park belongs to Alborz. Divar-Kaji – as the highest peak of the area with 2411 m above sea level – Beili-Kuh and the steep slopes and escarpments in the northern and eastern parts of the area are western parts of the Qorkhod Mountains which belong to the Khorasan-Kopetdag Range. The deep valley of the river Madrasu (Rud-e Madrasu or Rud-e Duq), along the Asian road separates these two mountain systems. The lowest part of the Park is the west of this valley, located in Tangerang with an elevation of c. 450 m above sea level. The average altitudes of the Park is 1378 m. The two mountain systems approach each other in Tunnel (c. 20 km E of Tangerang) which act as a wall to accumulate damp air-masses, coming from the west, in the basin of Rud-e Madrasu. According to REC (1994), almost half of the area is characterized by a steep gradient over 20°. A small part of the area (9%) is characterized geomorphologically as flat plains as in the Mirza-Baylu plains in the south and a small part near the northeastern border of the Park. These areas are the driest zones of the Park and have the typical facies of *Artemisia* steppes. The slopes of Alu-Baq mountain which stretches along the south of Park are more homogeneous than those of the northern mountains. This is also evident from the more homogeneous and zonal character of the vegetation in the northern slopes of Alu-Baq. The orographic structure of the mountains located in the northern parts of the Park is very complicated. The most fascinating and distinguishing character in this part are the steep slopes and escarpments which stretch like a sickle from W to E. The Qorqon and Adnasad cliffs form the falcate parts of the sickle and the cliffs along the Madrasu valley like Adam-Chaqran, Abshar, Aq-Su and Golzar form the handle of the sickle. The rock cliffs are vertical in many parts. The height of some of them is as high as 500 m as in Adam-Chaqran and the eastern corner of the Qorqon rocks (Fig. 8, E). The northern and eastern parts are less steep than the western and central parts of the Park.

Madrasu, Nekarbandi, Soolegerd, Jakhtikalan, Qortoy and Kara-Maklan are important rivers originating from the Park. Almost all rivers of the Park belong to the Gorgan Rud Basin and flow to the Caspian Sea. The microhabitats and microclimates along the rivers and moist valleys provide good conditions for many aquatic, sub-aquatic and mesophyllous plants and animals. There is no comprehensive list of all water resources originating from the Park. Hasanzadeh-Kiabi & al. (1994) listed 20 rivers, streams and springs, but according to the authors' unpublished data, there are at least 60 such water resources within the area. One of the most important ones which was still unknown in the published maps and official documents is Sulukli lake¹ (Fig. 10, F.). This is a permanent mountain lake located in the forested zone in the northwestern parts of the Park with an elevation of 1380 m. This lake which is difficult to access is situated between the Qorqon cliffs in the south and steep slopes in the northwest of the Park. Therefore it was known only by the local people and some park rangers. The flora and vegetation of this lake is unique and several new or noteworthy records for Iran have been discovered here. The pH and EC (electric conductivity) of some of the water resources of the Park are given in Table 1. As most of the water resources originate from limestone formations or flow through limestone basins, they are characterized as alkaline with a pH above 7. An exception is Sulukli lake with a pH of 6.5.

An interesting geomorphological character of the Park is the occurrence of many subalpine karsts above the Qorqon rocks. Due to microhabitats provided in karstic formations, they have very interesting vegetation patterns. The local name of “Besh-Jakhdan” means in Turkmen “five iceboxes” referring to snow which remains in some of the karsts during the whole year. These karsts have been unknown to most park visitors, even to scientists and official authorities because they are located in remote parts of the Park, which are not easily accessible.

¹ “Sulukli” means in Turkmen etymology “water of leech”, because of the presence of many leeches in this lake. They were used by the local people for blood and rheumatic diseases.

Table 1: pH and EC ($\mu\text{S}/\text{cm}$) of some water resources in Golestan National Park. pH was measured with a commercial pH-meter NEOLAB and the EC by a commercial dissolved solids tester (HANNA INSTRUMENTS)

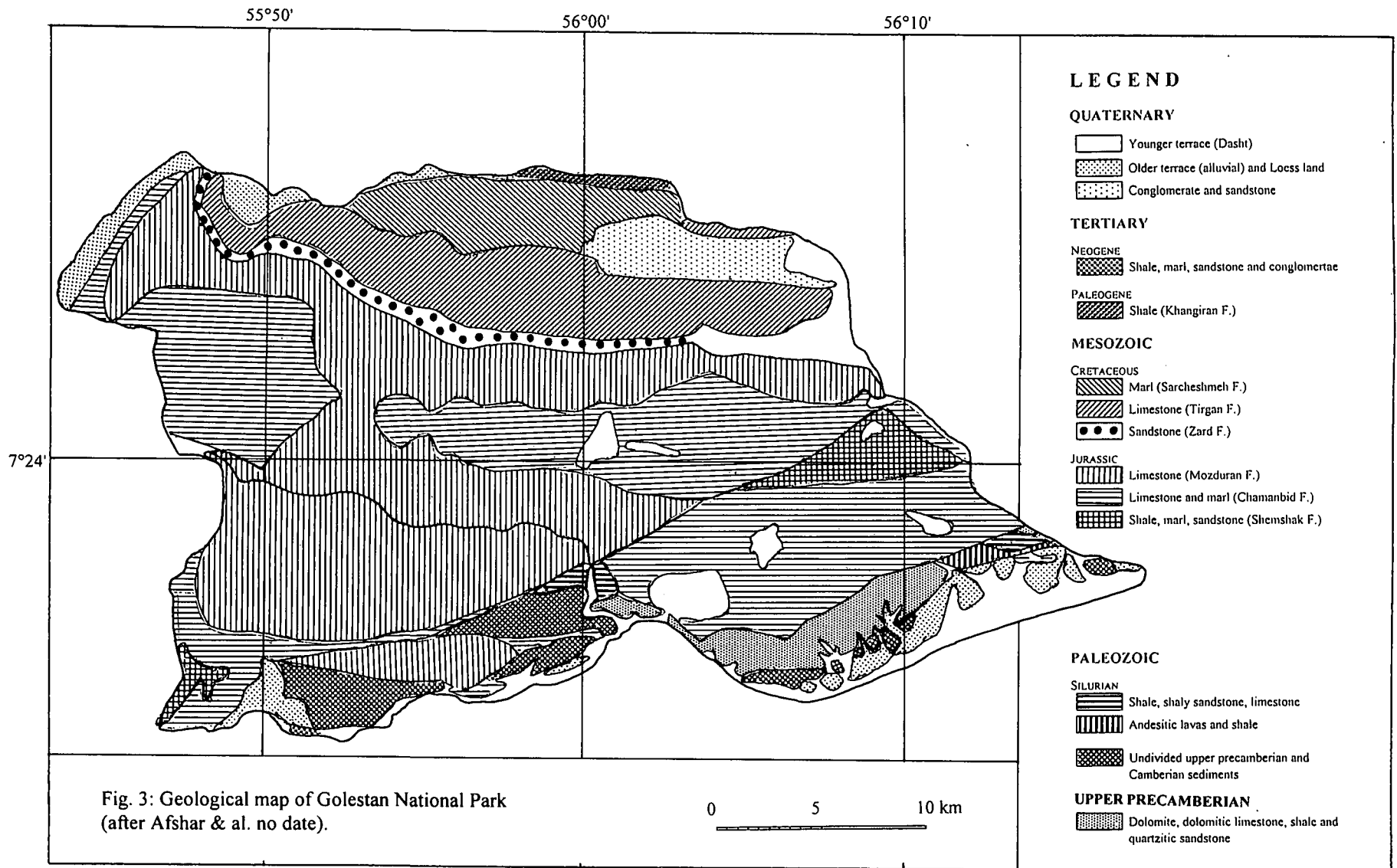
Name of water resource	pH	EC	Date
Khan-Doushan river (1)	7.6	62	13.11.1996
Khan-Doushan (2) (origin of spring)	7.3	67	13.11.1996
Madrasu river (Golshan)	8.0	121	13.11.1996
Madrasu river (5 km W Tangegol)	8.3	179	21.11.1996
Tangegol (1)	8.4	43	16.11.1996
Tangegol (2)	8.2	43	19.11.1996
Sulukli lake (1)	6.5	11	18.11.1996
Sulukli lake (2)	6.6	6	18.11.1996
Sulukli lake (spring)	7.0	60	18.11.1996
Zav river	8.2	47	18.11.1996
Soolegerd (spring)	7.3	69	20.11.1996
Cheshmeh Shur (N. Mirza-Baylu plain)	7.6	1900	15.11.1996
Dasht (spring)	8.2	66	16.11.1996

1.3 Geology

The geological map of the Park is presented in Fig. 3, according to the geological map of Kuh-e-Kurkhud [Qorkhod], scale 1:250,000 (Afshar & al. no date). Additional information from Stöcklin & Setudehnia (1970) on the characterization of geological formations was also included.

I. Upper Precambrian-Palaeozoic: The oldest formations of the Park are Upper Precambrian rocks, exposed at Chond-e-Abbas mountain. It extends from Sharleq to the end of the southern slopes of Almeh valley. In the north of the Robat-e Qarebil a faulted outcrop of the Palaeozoic units represents the northeastern continuation of the Palaeozoic sequence of the Alborz Range (Huber 1977). These formations are partly andesitic lava and partly shale, shaly sandstone or nodular and fossiliferous limestone. The andesitic lavas indicate volcanic activity in the early Silurian (Afshar-Harb 1994). The southern part of Tunnel (Golzar) and a part of the mountains between Mirza-Baylu and Soolegerd belong to the Niur Formation of the Silurian which consists of shale, shaly sandstone and nodular, fossiliferous limestone. Parts of the Paleozoic formations contain salt and gypsum. Therefore the flow of some salt springs from these formations is responsible for the existence of a moderate salt pan in the south of the Mirza-Baylu plain. The eastern extension of Alu-Baq Mountain (Yelaq and Pich-e Solieyman Koshteh) belongs to undivided Infracambrian rocks.

II. Mesozoic: A majority of the central and western parts of the Park is covered by Jurassic limestone formations: 1) The Shemshak Formation covers part of the NE of the Park in the Yakhtikalan pass. Shemshak Formation consists of an alternation of sandstones, siltstones, shales and claystones with thin coal seams. 2) The lower part of Chamanbid Formation covers the major parts of the central parts of the Park, including Divar Kaji Mountain and Qorqon. This formation also occurs as a narrow layer on the southern slopes of Alu-Baq and the southwestern parts of the Park in Dast-e Shah and Kondeskuh. The Chamanbid Formation is characterized by a unit of dark, bituminous, pyritiferous, ammonite-bearing marl and thinbedded limestone occurring in the Kopetdagh Range. 3) The Mozduran Formation covers major parts of the Madrasu river basin in the central parts of the Park and the higher altitudes above the Qorqon rocks. It extends eastwards to Soolegerd. In the south of Alu-Baq, it covers most parts of the Yelaq area. The Mozduran Formation is a feature-forming unit of light-coloured, thickbedded to massive limestone, porous dolomitic limestone and dolomite, widely exposed in the Kopetdagh Range.



Cretaceous sediments cover large parts of the Kopetdagh Range which are exposed in the northern parts of our area with three formations: The Zard Formation (sandstone and conglomerate) locate after the Mozduran Formation as a narrow zone in the north of the Park. Further northwards the Zard Formation is followed by the Tirgan Formation of the lower Cretaceous. It consists of sandstone, marl and gypsiferous marl. The Tirgan Formation is followed further northwards by the Sarcheshmeh Formation which covers large parts of the northern parts of the area. The Sarcheshmeh Formation consists of marls and pencil-shales with intercalations of subordinate orbitolina-bearing limestone.

III. Tertiary: Of the Paleogene rocks, only the Khangiran Formation is found as a narrow belt at the northern border of the Park. It is a silty and marly shale with subordinate thin sandstone layers and occasional limestone concretions. The Neogene formations are exposed in the southwest of the area between Daste- Shah and Yelaq and north of the Dasht road. Those are mostly composed of shale marl, sandstone and conglomerates which are generally red in colour.

IV. Quaternary: Quaternary sediments are restricted to the flat plains in the southern and northeastern parts of the Park, in the Mirza-Baylu plain and along the road between Soolegerd and Lohondor. Three different quaternary formations in the area include the following: Conglomerates and sandstone are found in the northern parts of the Park. The alluvial older terrace and loess lands cover the foothills of Chonde-Abbas. Also parts of the Mirza-Baylu plain and south Ilanli are covered by loess land. Major parts of the southern border of the Park south of the Mirza-Baylu plain and the northeastern border of the area around Soolegerd consist of younger alluvial terraces. Younger terraces also occur in the flat plains northwest of Divar-Kaji (around Morqzar spring) and the Almeh flats. Alluvial plains in the Mirza-Baylu plain are partly solonchak.

Structurally Golestan National Park is formed by an E-W anticline. The core of the anticline is covered by middle Jurassic sediments, the northern side by upper Jurassic sediments followed by the lower Cretaceous and the southern side by upper Jurassic limestone. The subsequent faulting caused the emergence of the older sediments (Hasanzadeh -Kiabi & al 1994).

1.4 Soil

No detailed pedological study on the soils of GNP is available. The present soil maps are either very preliminary and inaccurate as in Hasanzadeh-Kiabi & al (1994), or cover only parts of the area as in Rezaei & al. (1993) and Mollahzadeh & al. (1995). pH, percent of calcium carbonate (CaCO_3) and percent of soil particles from 0-30 (-50) cm depth are diagrammatically shown in Fig. 4, according to Dorostkar 1974, Seid Bagheri 1974 (unpublished) and Rezaei & al. 1993. As it is evident, most of the samples are from easily accessible localities at the margin of the Park. Therefore, it is strongly recommended to carry out further studies at the center of the area. Based on the above mentioned works the most characteristic soil features of the Park are summarized below:

The steppe plains southeast and east of the Park (No. 19) have been studied by Rezaie & al (1993). The soils near Robate- Qarebil are rich in rocky and calcareous particles. The soil is deep to shallow without remarkable profile. The percentage of organic carbon varies from 0.33 to 0.87, and rarely up to 1.34 in the soil surface. The pH is reported from 7.5 to 8.5. Calcium carbonate content ranges from 12 to 48 percent, sometimes up to 62 percent in the lower layers. The electric conductivity ranges from 0.42 to 19 (rarely to 82) mMho/cm. These soils which are characteristic of xeric and aridic climates are classified into the colluvial and desertic or calcaric regosols.

Large parts of the Mirza-Balyu plain are covered by dark brown, calcic brown and brown soils which are known as calcaric cambisols and haplic calcisol-calcaric cambisols (Nos. 17, 18). The dark brown soils are usually clay soils with rather low salinity ($\text{EC} = 0.46 - 4.29$ mMho/cm), sometimes rich in organic matter on the

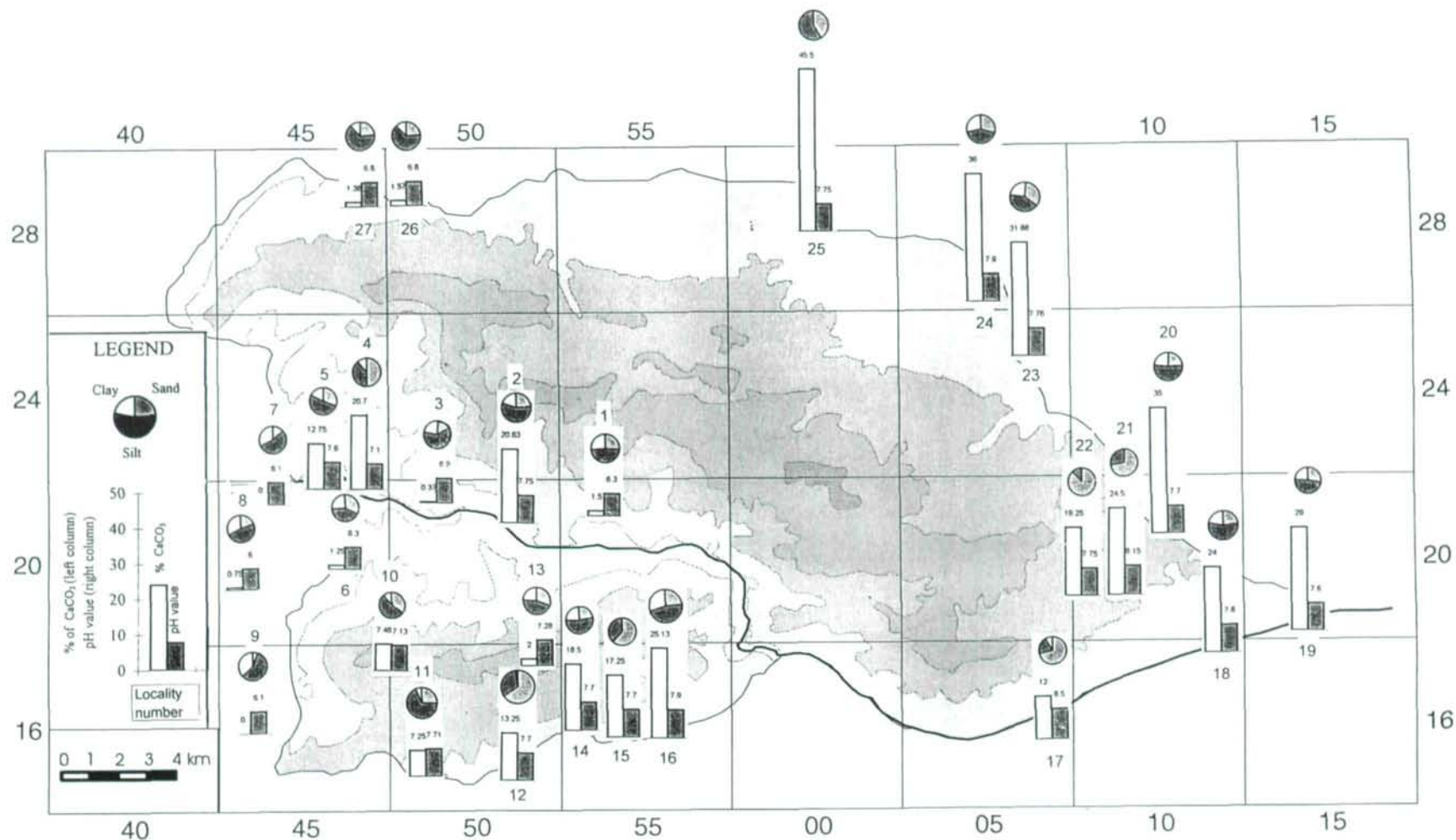


Fig. 4: pH, percent of calcium carbonate (CaCO₃) and proportion of soil particles from 0-30 (-50) cm soil depth sampled from 27 localities in Golestan National Park (after Dorostkar 1974, Seid Bagheri 1974 and Rezaei & al 1993). Localities: 1: Tangegol, Savar-Baqi; 2: Adam-Chaqran & Bozaqan; 3: Tangerang: Golestan; 4: Tangerang: Golshan, Mazarli; 5: Near Golshan; 6: Near Khan-Doushan; 7: W Tangerang, Gol-Loweh (probably outside the Park); 8: Tangerang, Gol-Loweh, Kondeskuh; 9: Tangrah: Kondeskuh (probably outside the Park); 10: Cheshmeh-e Daste-Shah; 11: Ilanli (5 km to Dast-e Shah); 12: Derazi; 13: Alu-Baq slopes; 14: Between Dasht and Derazi; 15: Qez-Qaleh; 16: Kuh-e Heli (? Ili or Yelaq, ? 2 km from Dasht); 17: Mirza-Baylu plain; 18: Mirza-Baylu; 19: Robot-e Qare-Bil; 20: Between Soolegerd and Mirza-Baylu; 21 & 22: Almeh road; 23: Soolegerd; 24: Soolegerd; 25: Between Soolegerd & Lohondor; 26 & 27: Koilar and Gorg-Meydan area

soil surface and with a pH from 7.7 to 8.6. The soils near the road are moderately saline (EC from 5.07 to 18.7 mMho/cm) with 18%-39% calcium carbonate. The amount of calcium carbonate increases from 31 to 77.5 percent around Soolegerd and further northwards to Lohondor (Nos. 23-25). In No. 25 the soil texture is silt-loam, without clay. In the northwest of the Park (open woodland with dense patches of grasses, Nos. 26, 27), there is a clear reduction of calcium carbonate (1.57 and 1.38%), a low pH (6.8), no salinity and 2.09% organic material, with silt-loam texture on the soil surface. In the deeper layer (30-80 cm from the soil surface) the calcium carbonate increases to 7.75% and the pH to 7.6, respectively.

The available data from the forest zone in the west of the Park (near Tangerang and Loweh forest) show very low calcium carbonate contents (even to zero), low acidity (pH=6-6.3) and the soil texture is characterized by a high percent of clay (Nos. 3, 6, 7, 8, 9). These soils are classified as brown forest with well developed A, B and C profiles. The forest near the road close to the rocky outcrops shows a higher percentage of calcium carbonate and a higher pH (Nos. 1, 2, 4, 5). In the southwest of the Park, the southern slopes of Alu-Baq and on Shakha mountain (Nos. 10, 11, 13) the calcium carbonate content increases but is still very low in comparison with samples from the southern steppe or the *Juniperus* woodland (Nos. 12, 14, 15, 16).

Most parts of high rocky mountains and hills lack any soil or possess very thin soil layers. Such soils are very rich in gravel and scree with high calcium carbonate content. These soils often belong to lithosols or colloidal soils or calcaric rigosols. A real sandy soil has been observed at the top of a hill at the beginning of the Almeh valley in a small dune which is covered predominantly by psammophytic species.

1.5 Climate

It is very difficult to provide a reliable climatic scheme of the area because of two reasons: First, the area is a transitional zone between two completely different climates i.e. temperate sub-humid and cold-arid. Often the climate changes drastically within a few hundred meters moving from W to E, N to S or vice versa along a small topographic gradient. Second, there is no active climatic station within the Park. At the beginning of the seventies two stations were founded in Tangerang and Soolegerd in order to record precipitation. The activities of these stations ceased during the Revolution and therefore we have only partial precipitation data from the stations within the Park. Fortunately there are several stations around the Park, in many cases with good recordings of climatic data from the Iranian Meteorological Organization and the Office of Water Resources of Mazandaran Province. In Fig. 5 the climatic diagrams from 8 stations between Gorgan and Bojnurd are provided based on the last available data up to 1990, using the method of Walter (see Walter & Breckle 1983). The mean annual precipitation from 13 stations in and close to the Park are diagrammatically presented in Fig. 6. The most important climatic features are shortly summarized below:

Precipitation: As it is shown in Fig. 6, mean annual precipitation ranges between 142 mm in Dasht-e Kalpush, located in the south of the Park, and 866 mm in Tangerang, located in the center of the Park. Based on vegetation evidence and field observations some areas of higher elevations on the southern slopes of Alu-Baq mountain and the northwestern parts of the Park receive more precipitation. These areas are foggy during a long time. The vegetation in Alu-Baq shows considerable differences to other forested zones of the Park, and is characterized by a dense fern ground cover (Fig. 7, F). Frey (1980) mentioned that the occurrence of the liverworts *Cololejeunea rossettiana* and *Cephaloziella rubella* evidently shows a permanent humid climate at the highest elevation of Alu-Baq. The discovery of *Hordelymus europaeus* (Akhani & Scholz 1999) and the occurrence of *Rhynchospora maximus* and *Orchis coriophora* are indicators of high humidity in the SW of the Park. Therefore it seems that the general rule of a reduction of precipitation when moving from W to E is not always true. For example Minudasht, which is located 120 km E of Gorgan, receives more precipitation (872 mm) than Gorgan (618 mm). Apparently the steep slopes act as a sudden barrier between the humid hyrcanian air masses from the west, and the continental air masses from the east. This conditions result in high precipitation along the northern slopes of Alu-Baq and above the Qorqon rocks, perhaps more than 1000 mm/year.

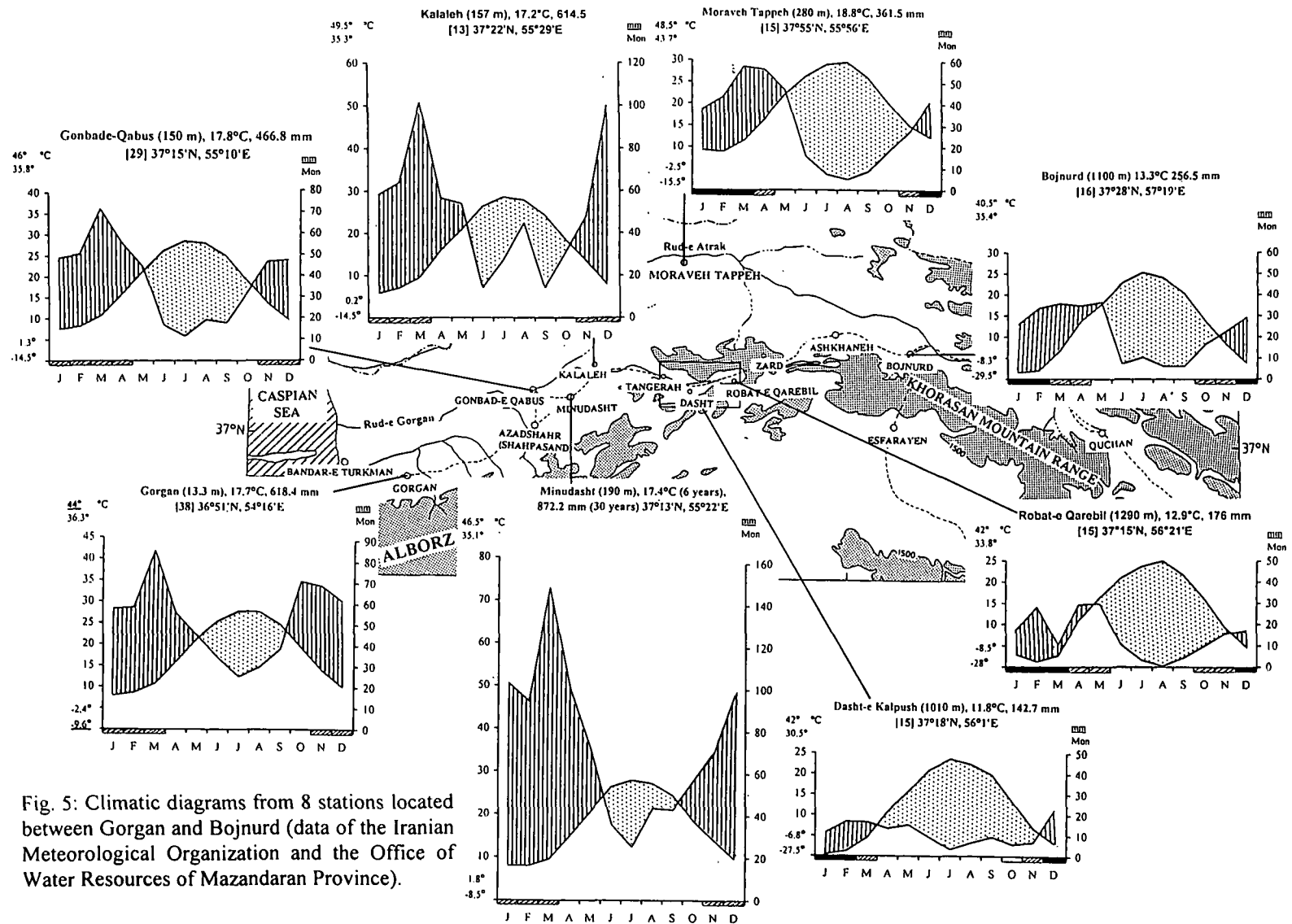


Fig. 5: Climatic diagrams from 8 stations located between Gorgan and Bojnurd (data of the Iranian Meteorological Organization and the Office of Water Resources of Mazandaran Province).

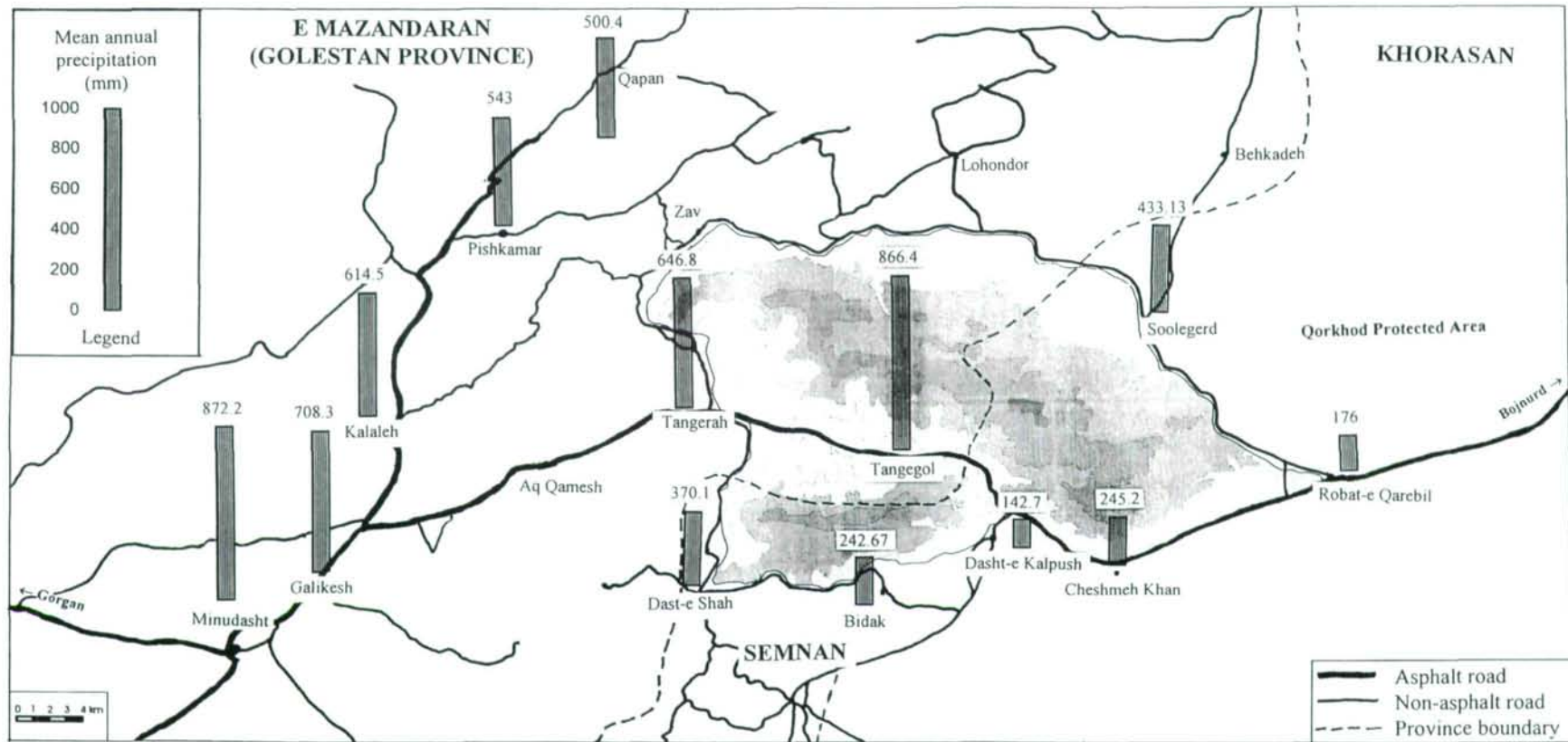


Fig. 6. Map of the surrounding places and roads around Golestan National Park with annual precipitation of 13 stations in the area

In nearly all stations most of the precipitation occurs from late autumn to early spring. Clearly the winter months (January, February and March) are the moistest months of the year. As it is evident from the climatic diagrams of Minudasht and Kalaleh, these stations are characterized by unusual precipitation patterns. Both stations - which are very close together- are characterized by a principal maximum in autumn (November and December), a second maximum in March and a minimum in June and July. There is a remarkable summer rainfall in August. This pattern is more or less similar to Central Alborz as was shown by Khalili (1973). The south and the east of the Park receive less than 250 mm annual rainfall. This condition is similar to central Iranian *Artemisia* steppes. NE and North-Central parts of the Park fall between the two above described extremes and receive 300 to 500 mm annual rainfall. The vegetation is dominated in higher elevations by *Juniperus* woodland or mountain steppes of grasses and thorn-cushions and *Acer monspessulanum* thickets (mixed with many roseaceous shrubs) in the valleys.

There is considerable snow fall during the cold months, particularly in higher elevations. Unfortunately no records about the snow period are available. Based on field observations and data obtained from local people, high elevations over 2000 m in south and central parts of the Park are covered by snow nearly during the whole winter and in many years from late autumn to the middle of spring (see Fig 7, B & D). Mountains over 1500 m are covered by snow for a minimum of 1-2 months.

Temperature: Temperature records are available only from a few stations near the Park. Dasht-e Kalpush with 11.8°C and Robat-e Qarebil with 12.9°C mean monthly temperature comprise the lower values and Moraveh Tappeh with 18.8°C, Gonbad-e Qabus with 17.8°C, Qapan with 17.34°C and Minudasht with 17.4°C the higher values, respectively. The mean temperature of the warmest month differs from 30.5°C in Dasht-e Kalpush, and 33.8°C in Robat-e Qarebil, in the east and south of the Park and 35.1°C and 35.3°C in Minudasht and Kalaleh, respectively in the W of the Park. Stations located further north and west have higher values of mean temperature of the warmest month, like Moraveh Tappeh (43.7°C) and Gorgan (36.3°C). The highest reported absolute temperature ranges between 42°C (in the south and east of the Park) and 49.5°C in the west of the Park. The mean monthly temperature of the coldest months ranges from 1.8°C in Minudasht to -8.5°C in Robat-e Qarebil. The lowest reported absolute temperature ranges between -8.5°C in Minudasht and -29.5°C in Bojnurd.

In general, the temperature regime is more or less similar in the various stations, but there is a great difference in the rainfall regime. In all cases the temperature increases from March to a peak in July and August and drops to its lowest point in January and February. The high summer temperatures in the dry zone cause very hot and dry conditions in the east, south and northeast and a sultry weather in the west of the area. Both conditions are unfavorable for the people living in the area. The higher elevations in the southwest of the Park are characterized by pleasant weather during the summer and harsh conditions during winter.

Classification of climate according to Emberger's method: Table 2 shows climatic categories calculated according to Emberger's method (*cf.* Sabeti 1969):

$$Q = \frac{P \times 100}{M^2 - m^2}$$

in which **Q** is Emberger's equation of humidity, **P** is the mean annual precipitation in mm, **M** is the mean maximum temperature of the warmest month of the year, and **m** is the mean minimum temperature of the coldest month of the year in °C. According to this method three different climatic types are present in the stations around the Park: Cold-arid stations (Dasht-e Kalpush, Moraveh Tappeh, Robat-e Qarebil) located in the south, east and north of the Park; temperate semi-arid for the stations located in west and northwest of the Park (Gonbad-e Qabus and Qapan), and temperate sub-humid for the stations located in the west of the Park (Kalaleh and Minudasht). The Emberger's humidity equation of the Kalaleh and Minudasht stations correspond with a temperate sub-humid climate. According to Sabeti (1969), stations like Rasht, Babol, Sari, Fuman, Babolsar, Azadshahr [Shahpasand]

and Qaem-Shahr [Shahi] are classified in this category. Except Azadshahr, all these mentioned stations are located further west far from our area. The temperate sub-humid climate associated with rocky openings along the Madrasu valley provides a unique condition which is preferred by several C4-grasses like *Bothriochloa ischaemum*, *B. bladhii*, *Heteropogon contortus*, *Cleistogenes serotina* and *Pennisetum orientale* (cf. Akhane & Scholz 1999). The climatic condition in Gorgan with cold-subhumid and Bojnurd with cold-semi-arid types seems to be rather different from the conditions in our area. It is very interesting that the stations Robat-e Qarebil and Dasht-e Kalpush are more arid than Bojnurd which is located further east. In addition Kalaleh and Minudasht stations are more humid than Gorgan which is located further west.

Table 2: Climatic conditions of 10 stations around Golestan National Park according to Emberger's method. See Figs 5, 6 for the position of stations. The Q value of Qapan station has been taken from Beirudian (in REC 1994). All other figures are calculated according to the last available meteorological data.

Station	Climatic type after Emberger	
	Q	Climatic type
Bojnurd	21.6	Cold semi-arid
Cheshmeh Khan	23.7	Cold semi-arid
Dasht-e Kalpush	16.1	Cold arid
Gonbad-e Qabus	36.5	Temperate semi-arid
Gorgan	47.1	Cold sub-humid
Kalaleh	48.3	Temperate sub-humid
Minudasht	71	Temperate sub-humid
Moraveh-Tappeh	19	Cold arid
Qapan	49.8	Temperate semi-arid
Robat-e Qarebil	16.4	Cold-arid

1.6 Cryptogamic plants and fungi

Among the cryptogamic plants only the pteridophytes are dealt with in this dissertation. The bryophyte flora and vegetation of the Park have been studied by Frey & Kürschner (1977, 1979). They reported 90 bryophyte taxa (78 mosses and 13 liverworts), 23 new for Iran. According to these publications *Brachytheciaceae* (16 species) and *Pottiaceae* (15 species) are well represented in the area. Outstanding examples of bryophytes are the hyrcanian endemics "*Pseudoleskeella laxiramea*, *Palamocladium euchloron* and *Leucodon immersus*". Also the occurrence of *Cololejeunea rossettiana* and *Cephaloziella rubella* in the damp zone of Kuh-e Alu Baq shows the continuous humidity in this part of the Park. The author has collected ca. 200 bryophyte specimens to be studied in the future. Among these is an interesting aquatic liverwort *Ricciocarpos natans* collected from Sulukli Lake.

The fungi of the Park have been partially investigated by the staff of the Botanical Department of the Plant Pests and Diseases Research Institute (Tehran, Evin) and other mycologists, but the author had little access to their publications. Eckblad (1976) reported 4 gastromycetes from the Park, among the 23 known species in Iran: *Geastrum melanocephalum*, *G. recolligens*, *Lycoperdon molle* and *L. perlatum*. A fifth species is *Myriostoma coliforme* which has been collected by the author (Akhane 9595-1, determined by Dr. R. Treu). Hallenberg (1980) described several new root-inhabiting basidiomycetes of the family *Corticaceae* from the Park: *Conferticium insidiosum* (as new genus), *Galzinia longibasidia*, *Oliveonia subfibrillosa*, *Peniophora pseudonuda*, *Phlebia caspica*, *Sistotrema resinicystidium*, *S. suballantosporum* and *Trechispora dimitica*. Furthermore he presented a comprehensive list of 275 wood-inhabiting *Aphyllphorales* (*Basidiomycetes*) and *Heterobasidiomycetes* from Iran (Hallenberg 1981), many of them occurring in the Park. The author is not aware about

other groups of fungi. One rust fungus *Uromyces limonii* has been determined by Dr. D. Triebel on leaves of *Limonium gmelinii* (Akhani 12229).

There is no study on the lichens. About 50 lichen specimens have been collected by the author. These were submitted to Prof. Dr. H. Hertel (Munich) for identification.

1.7 Wildlife

Golestan National Park was originally designated as a protected area because of its diverse wildlife. The occurrence of large mammals like Urial sheep (*Ovis ammon*), maral or red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*), goitered gazelle (*Gazella subgutturosa*), Persian ibex (*Capra aegagrus*), wild boar (*Sus scrofa*), brown bear (*Ursus arctos*), leopard (*Panthera pardus*) and birds like pheasant (*Phasianus colchicus*) and chukar (*Alectoris chukar*) in the Park have attracted hunters for various interests (commercial uses, sport and trophies). In spite of the great interest of wildlife biologists in the fascinating animal life of the Park, we have only few scientific investigations on the size and fluctuation of populations, their biology and management. Hasanzadeh-Kiabi (1978) estimated the number of major prey and predator species in the Park during 1976 to 1978 as follows:

Brown bear (<i>Ursus arctos</i>)	22 – 24	
Cheetah (<i>Acinonyx jubatus</i>)	3	(? extinct in GNP)
Chukar (<i>Alectoris chukar</i>)	35,00 – 5,000	
Fox (<i>Vulpes vulpes</i>)	60	
Gazelle (<i>Gazella subgutturosa</i>)	250 – 300	(present status appr. 150-200)
Hare (<i>Lepus capensis</i>)	8,000 – 12,000	
Jackals (<i>Canis aureus</i>)	50	
Leopard (<i>Panthera pardus</i>)	16 – 22	
Maral (<i>Cervus elaphus</i>)	1,900 – 2,100	(present status appr. 1000-1500)
Pheasants (<i>Phasianus colchicus</i>)	1,500 – 1,600	
Roe deer (<i>Capreolus capreolus</i>)	600 – 700	
Wild cats (<i>Felis catus</i>)	100	
Persian ibex (<i>Capra aegagrus</i>)	4,000 – 4,500	
Wild boar (<i>Sus scrofa</i>)	1,500 – 5,000	(De Vos & Sassani 1977)
Wild sheep or Urial sheep (<i>Ovis ammon</i>)	10,000 – 11,000	
Wolf (<i>Canis lupus</i>)	22 – 29	

The wild sheep, Persian ibex, gazelle and maral are the most attractive animals for hunters. Unfortunately the populations of these animals drastically shrank after the revolution. The habitat potential of the Park warrants the rehabilitation of their populations, when the conservation practises are improved. Today we find populations of Persian ibex on steep rocky slopes from Adam Chaqran to Tunnel, Chonde Abbas, Soolegerd and Qorqon (Fig. 37, E, see Hasanzadeh-Kiabi 1975). Urial sheep has the largest population size of the mammals in the area (Fig. 37, C-D). This animal prefers gentle or steep slopes dominated by *Juniperus excelsa*, and can be found in the Almeh valley, Soolegerd and the northern parts of the Park. The small population of gazelles in the *Artemisia* steppe on Mirza-Baylu plain and some individuals in the northeast of the Park (around Soolegerd) are of great interest, because they can easily be seen by the tourists (Fig. 10, A). However, this small population (ranging from 150-200, cf. De Vos 1974, Hasanzadeh-Kiabi & al. 1994) is highly threatened. They usually leave the Park when searching for food or under unsuitable weather conditions (like heavy snow) to cross non-protected areas, where they are easily shot. The maral population in the Park has been investigated by Hasanzadeh-Kiabi (1978). Using two methods, he estimated the population size of maral in the Park during 1976-1978 at around 2000. The over-hunting during 1979-1985 has reduced their population to ca. 1000-1500 (Hasanzadeh-Kiabi & al. 1994). The major predators in maral are leopards and wolves. Wild boar perhaps belongs to the non-threatened large

mammals. However, their population size varies strongly from year to year (1500-5000). According to De Vos & Sassani (1977) a combination of a poor mast crop and heavy snow results in very low reproductive rates in some years. These authors also investigated the possible effect of high winter concentrations of wild boar on a low reproduction of oak. They indicated that the low reproduction of oak (*Quercus castaneifolia*) is not caused by the consumption of the acorns by wild boar, but rather by the inadequate shade tolerance of the seedlings, i.e. oak does not reproduce well under its own overstorey. The author is not aware of other investigations of the wildlife of the Park.

According to the present knowledge (Hasanzadeh-Kiabi & al. 1994) a total of 69 species of mammals, belonging to 21 families and 50 genera as well as 149 species of birds belonging to 42 families and 89 genera have been reported from the Park. 8 fish species including one introduced species are known in Madrasu river. There are several other rivers in the Park which need to be studied for fishes and aquatic animals. There is no figure available on the number of reptiles, amphibians and invertebrates.

Among the invertebrates, the insects are of great interest, not only because of their role in the pollination of many plants and their role in plant diseases and gall production, but also from a biodiversity point of view. The collection and investigation of the insects of the Park belongs to the major research activities of the Entomological Department of the Plant Pests and Diseases Research Institute, Tehran, Evin. Unfortunately I had no paper or report available during the preparation of the present dissertation. The presence of many termite hills in the Mirza-Baylu plain is of high biological interest. According to Shokry & Alamdary (1988) one termite species (either *Anacanthotermes turkestanicus* or *A. ahangerianus*) lives mostly in subsaline soils and *Artemisia* steppes in the Park (Fig. 9, G).

2 VEGETATION

2.1 Background and method

Frey (1980) presented an overall view of the distribution of forests and scrubs in the Park and further eastwards to Šīrvān [Shirvan]. Based on the physiognomical and ecological features (*cf.* Frey & Probst 1977), he provided the vegetation map for the southern and central parts of the Park (see also Frey & Kürschner 1977). For a phytosociological study of the Park, I have provided 570 relevés, nearly all in the Park (see Fig. 11), using the Braun-Blanquet method of phytosociology (Braun-Blanquet 1964, Dierschke 1994). The distribution maps for ca. 880 species presented in this work (chapter 7), are based on the vegetation samples and herbarium specimens, using the computer programme FLOREIN (1996) (see chapter 3.1 “Material and methods”). For each species the habitat (based on the relevés and field notes) and the number of records (based on the relevés and herbarium specimens) are given. The dots in the maps show the distribution and cover abundance (Häufigkeit) of the species (see legend in chapter 7 “Distribution maps”). If a species has been reported from several records in a given location, the highest recorded cover abundance is shown in the maps. As there are only few plant sociological investigations on the Iranian vegetation units, the classification and analysis of the relevés constitute a separate research project to be treated in the future. Here, I present a general scheme of the main vegetation units with a selection of photographs (see Figs 7-10). The units described below are a combination of Frey’s ecological-physiognomical classification and the author’s relevé and field studies. Some physiognomical units described by Frey are odd and rather impractical for the user (for example: “mixed cold-deciduous and evergreen scrub of the lowland and montane region”). Therefore the author prefers to use the name of the dominant or common species like *Artemisia* steppe, *Acer monspessulanum* scrub, *Quercus macranthera* forest etc. Such names constitute no sociological ranking. They are only used for a characterization of the major habitats mentioned in the annotated list of the flora (see chapter 3.3). In order to see the boundary and distribution of the vegetation units, the reader can refer to the distribution maps of the dominant species.

2.2 Closed forests

2.2.1 Closed lowland forest (= Cold-deciduous lowland forest or Hyrcanian lowland forest *sensu* Frey 1980). Fig. 7, A & C.

In our area the closed lowland forest is restricted to the lower altitudes along Madrasu river and the northwestern border of the Park. The indicators of this kind of forest are *Parrotia persica* (Map 432) *Zelkova carpinifolia* (Map 663) and *Diospyros lotus* (Map 346). The optimal altitudes of all these trees range from 450 to 1000 m, although *Parrotia* was found to occur in an altitude up to 1440 m in the Qorqon forest and *Zelkova* in altitudes of 1550 m in the Yelaq flats. In altitudes over 1000 m they occur sporadically as small shrubs with low coverage. The preliminary analysis of the relevés shows that:

1) The Park belongs to the marginal range of the above mentioned trees. Only in a few relevés they have been recorded with high coverage. *Parrotia persica* was found in 33 relevés, but only in 9 samples with a coverage over 25%. This figure is even lower for *Zelkova*: only 3 of the 28 relevés show a coverage over 25%.

2) They often occupy different habitats. It seems they are not sociologically combined to each other.

Parrotia persica grows in forests with well developed soil or on alluvial soils along the river. *Quercus castaneifolia*, *Carpinus betulus*, *Crataegus microphylla*, *Acer cappadocicum*, *Mespilus germanica*, *Prunus divaricata*, *Danaë racemosa*, *Acer velutinum*, *Fraxinus excelsior* and *Rubus dolichocarpus* belong to the most important trees and shrubs that were recorded with *Parrotia*. Among the herbal and ground associated species are: *Brachypodium sylvaticum*, *Primula heterochroma*, *Euphorbia amygdaloides*, *Viola alba* (s.l.), *V. sieheana*.

Clinopodium umbrosum, *Lamium album*, *Vincetoxicum scandens*, *Galium odoratum*, *Scutellaria tournefortii*, *Bromus benekenii*, *Festuca drymeia*, *Lathyrus laxiflorus* etc.

Zelkova carpinifolia prefers drier habitats, on rocky outcrops or in closed forests with less soil development. It is often associated with *Quercus castaneifolia*. The other associated species are *Prunus divaricata*, *Carpinus betulus*, *Paliurus spina-christi*, *Rhamnus pallasii*, *Acer cappadocicum*, *Carpinus orientalis*, *Colutea buhsei*, *Dactylis glomerata*, *Brachypodium sylvaticum*, *Viola alba*, *V. sieheana*, *Convolvulus cantabrica*, *Polygonum convolvulus*, *Cleistogenes serotina*, *Alliaria petiolata*, *Bothriochloa ischaemum*, *Clinopodium umbrosum*, *Stipa bromoides*, *Bromus gedrosianus*, *Carex divulsa*, *Euphorbia amygdaloides*, *Hypericum perforatum* etc.

Diospyrus lotus is a hygrophilous species, and exclusively grows in habitats along rivers or alluvial plains with high water table. It was mainly found along the rivers and streams and often associated with *Acer velutinum*. Other woody plants and herbs associated with *Diospyrus* are: *Prunus divaricata*, *Acer cappadocicum*, *Carpinus betulus*, *Quercus castaneifolia*, *Crataegus microphylla*, *Parrotia persica*, *Viola sieheana*, *Brachypodium sylvaticum*, *Lamium album*, *Parietaria officinalis*, *Scutellaria tournefortii*, *Carex sylvatica*, *Clinopodium umbrosum*, *Geum urbanum*, *Hesperis hyrcana*, *Carex divulsa*, *Dipsacus strigosus*, *Euphorbia amygdaloides*, *Viola alba*, *Circaea lutetiana*, *Oplismenus undulatifolius*, *Alliaria petiolata*, *Calystegia sylvatica*, *Poa masenderana* etc.

The inclusion of *Carpinus orientalis* as one of the characteristic species of the closed lowland forest - as stated by Frey (1980) - is not satisfactory, because this is a xerophilic species which in lower altitudes is usually restricted to open rocky outcrops. Only in a few places, it was found together with *Parrotia persica* and *Carpinus betulus* on steep rocks, along the northwestern borders of the Park.

The occurrence of *Pterocarya fraxinifolia* as one of the lowland forest elements in west of the Park (Frey 1980 and in litt.), is doubtful. I have never seen this species during the field studies nor seen any herbarium specimen. If the species really grows in the Park, it may have a very local distribution. The valleys bordering the west of the Park between Tangerang and Kondeskuh, and between Tangerang and Quch-Cheshmeh should be searched for this species.

2.2.2 Cold-deciduous montane forest (Hyrcanian montane forests)

Frey (1980) distinguished three montane forest communities in Alu-Baq Mountain [Kūh-e 'Alū Bāg]: *Carpinus-Quercus castaneifolia* community, *Acer-Fraxinus-Ulmus*-community and *Carpinus-Quercus macranthera* community. Based on my studies, the closed montane forests of the Park can be divided into eight zones or communities:

I. Submontane forest (*Carpinus betulus-Quercus castaneifolia* zone), Fig. 7, B & C: This zone follows lowland forests and consists mainly of *Carpinus betulus* (Map 332), and *Quercus castaneifolia* (Map 417) in elevations of 1000 m to 1500 m. This forest is the most dominant forest type in the Park and covers large parts of virgin Qorqon forests, the northern slopes of Alu-Baq and the sub-montane plains above Beili-Kuh. The following species are the most important ones associated with this type of forest:

Trees and shrubs: *Carpinus betulus*, *Quercus castaneifolia*, *Acer cappadocicum*, *Crataegus microphylla*, *Mespilus germanica*, *Prunus divaricata*, *Rubus dolichocarpus*, *Tilia platyphyllos* subsp. *caucasica*, *Ulmus glabra*, *Fraxinus excelsior*, and *Danaë racemosa*.

Herbs and ground layer: *Viola alba*, *Brachypodium sylvaticum*, *Euphorbia amygdaloides*, *Geum urbanum*, *Primula heterochroma*, *Viola sieheana*, *Lamium album*, *Scutellaria tournefortii*, *Tamus communis*, *Vicia crocea*, *Galium odoratum*, *Sanicula europaea*, *Vincetoxicum scandens*, *Bromus benekenii*, *Circaea lutetiana*, *Festuca drymeia*, *Lathyrus laxiflorus*, *Carex sylvatica*, *Festuca gigantea*, *Carex divulsa*, *Clinopodium umbrosum*, *Dryopteris caucasica*, *Hypericum androsaemum* and *Poa nemoralis*.

II. *Carpinus betulus-Ilex spinigera* stands, Fig. 7, D: In altitudes between 1400 and 1700 m, is a narrow forest zone whose understory is characterized by interrupted patches of prostrate ever-green *Ilex spinigera* (Figs, 7, D; 16, A). *Ilex* has been repeatedly observed with *Carpinus betulus* in the forests south of Alu Baq, Beili-Kuh, Char-Tongi and parts of the Qorqon area (Map 72). In some places *Ilex* produces impenetrable patches. The following species have mainly been recorded in this zone:

Trees and shrubs: *Carpinus betulus*, *Ilex spinigera*, *Acer cappadocicum*, *Quercus castaneifolia*, *Sorbus torminalis*, *Mespilus germanica*, *Rubus dolichocarpus*, *Tilia platyphyllos* subsp. *caucasica*, *Ulmus glabra* and *Acer campestre*.

Herbs and ground layer: *Dryopteris caucasica*, *Festuca drymeia*, *Galium odoratum*, *Potentilla micrantha*, *Sanicula europaea*, *Brachypodium sylvaticum*, *Euonymus latifolia*, *Polygonatum orientale*, *Primula heterochroma*, *Scutellaria tournefortii* and *Vicia crocea*.

III. *Sorbus torminalis-Fraxinus excelsior-Carpinus betulus*-zone, Fig. 7, E-F: This is one of the most fascinating forest types of the Park on the northern slopes of Shakha and Alu-Baq Mountain and above the Qorqon rocks in altitudes from 1500-2000 m. This forest type is very rich in tree species and has a dense ground cover dominated by ferns or grasses. The forests are humid almost during the whole of the year whether as cloud, fog, rain or snow fall. Even during the summer of 1995, which was a relatively dry year in the area, we encountered continuous fog and rainfall. We have no climatic data on the precipitation in this elevation, but judging from the vegetation we can estimate the annual rainfall to amount to ca. 1000 mm or more. The very dense fern cover dominated by *Dryopteris caucasica* (Fig. 7, D; Map 8) together with *Athyrium filix-femina* and the discovery of *Hordelymus europaeus*, *Rhynchocorys maxima* and *Orchis coriophora* in this forest demonstrate its high moisture. Frey (1980) gives the occurrence of the liverworts *Cololejeunea rossettiana* and *Cephaloziella rubella* in Kuh-e Alu-Baq as bryological evidences for continuous humidity. *Sorbus torminalis* (Map 598, Fig. 7, C) is the most characteristic element in these forests. Other trees and shrubs like *Carpinus betulus*, *Fraxinus excelsior*, *Acer campestre*, *Tilia platyphyllos*, *Ulmus glabra*, *Cerasus avium*, *Crataegus microphylla*, *Quercus castaneifolia*, *Mespilus germanica* and *Cornus australis* are associated with this type of vegetation.

The ground vegetation is very dense. The northern slopes are dominated by *Dryopteris caucasica*, *Iranecio othonnae*, and the flat area and the southern slopes by *Festuca drymeia* and *Poa nemoralis*. Other species like *Bromus benekenii*, *Euonymus latifolia*, *Galium odoratum*, *Potentilla micrantha*, *Polygonatum orientale*, *Sanicula europaea*, *Viola alba*, *Geum urbanum*, *Rubus caesius*, *Clinopodium umbrosum*, *Heracleum gorganicum*, *Lathyrus laxiflorus*, *Paeonia wittmanniana*, *Primula heterochroma*, *Cephalanthera caucasica*, *Hordelymus europaeus*, *Neottia nidus-avis* are among the most frequent herbal species.

IV. *Acer hyrcanum-Fraxinus excelsior* zone: On the steep northern slopes of Kuh-e Alu-Baq, in an elevation of ca. 2100-2200 m, just under the mountain summit, there is an interesting narrow zone of *Acer hyrcanum* and *Fraxinus excelsior*, with some individuals of *Acer campestre*, *Cerasus avium*, *Sorbus torminalis*, *Quercus macranthera*, *Rhamnus cathartica* and *Ulmus glabra*. The trees are comparatively shorter than other trees in the area (ca. 10-15 m tall), with narrow trunks (often up to 20 cm diameter). The leaves of *Fraxinus* are somewhat larger than normal *Fraxinus excelsior* growing in the same area. Thus further studies may reveal its different status. The ground vegetation is dense and dominated by *Iranecio othonnae*, *Hordelymus europaeus*, *Dryopteris caucasica*, *Sedum stoloniferum*, *Bromus benekenii* and *Heracleum gorganicum*.

V. Pure *Carpinus orientalis* community on steep slopes, Fig. 8, A: Although *Carpinus orientalis* is often a low shrub growing on rocky outcrops with open vegetation, it forms rather pure forests on steep slopes (often between 25-45°) with brown to red soils. The ground vegetation is very poor (often less than 10%) and only a few other woody species (*Quercus castaneifolia* and *Colutea buhsei*) are associated with this forest. This forest type has been seen in Dast-e Shah (Fig. 8, A), Cheshmeh-e Alu-Baq, Golzar, Gerieh Sar and Ayar-Qashi in altitudes from 1000 m to 2000 m. *Stellaria holostea*, *Alyssopsis mollis* and *Arrhenatherum elatius* are among the few associated ground vegetation.

VI. *Quercus macranthera* forest, Fig. 7, G-H: *Quercus macranthera* is a xerophilic species and dominates the subalpine forests from 1900 to 2250 m in our area (Map 418). This forest type occurs as mosaic stands along the Divar-Kaji mountain from Janlar to Qare-Gineh. However, there are no climatic data and no climatic station in this altitude, but we can suppose that frost is always present during the winter months. Precipitation is probably between 400-500 mm, but the fog of the moist hyrcanian air masses provides enough humidity for forest development. The associated trees, shrubs and ground vegetation distinguish this forest from all other forest types in the Park. *Carpinus betulus*, *C. orientalis* and *Quercus castaneifolia* are very rare or absent in most relevés. *Acer monspessulanum* is often associated with *Q. macranthera*. Other woody species include *Cotoneaster ovatus*, *Mespilus germanica* and *Sorbus torminalis*. The following species are important in the herbal layer: *Silene italica*, *Saponaria bodeana*; *Poa nemoralis*, *Stellaria holostea*, *Astragalus kopedaghi*, *Bromus benekenii*, *Cervaria cervariifolia*, *Dactylis glomerata*, *Iranecio othonnae*, *Viola alba*, *Poa golestanensis* (new species, see Akhani & Scholz 1999) and *Arrhenatherum elatius*.

VII. Transition forest between *Quercus macranthera* and other montane communities: In many places there are transition communities between *Quercus macranthera* and other described montane forest zones, mountain steppes and *Juniperus* woodland. Due to the complexity of this type of vegetation, I have avoided to give further floristic information before the relevés are analysed.

VIII. Hygrophilous montane forest stands, Fig. 8, B: There are many springs and streams in the mountainous parts of the Park dominated by hygrophilous trees with particular ground vegetation. Often *Acer velutinum* as main tree element with *Carpinus betulus*, *Alnus glutinosa*, and *Ulmus glabra* colonize in such habitats in altitudes above 1000 m. *Petasites hybridus* forms dense patches around the many forest springs like Golzar, Qorqon, Qarniareq (Map 144). Other species like *Phyllitis scolopendrium*, *Primula heterochroma*, *Veronica beccabunga* and *Alyssopsis mollis* were recorded to occur in such habitats.

2.3 Open woodlands and scrubs

Many plant communities in the area cannot properly be classified into forest, scrub or shrubland. There are many intermediates and transition forms which cause difficulties when trying to use the units of the system proposed by Frey (1980). The open woodlands or scrubs in the Park have different origins: some are climatic communities, some are successional communities, some are transitional communities between forest and steppe, etc. Another problem is to categorize the woodlands and scrubs with multiform species belonging to the genera *Carpinus*, *Quercus*, *Acer* and *Crataegus*. They exhibit various life forms from trees to small shrubs under different ecological conditions. Based on field experience and a preliminary evaluation of vegetation relevés, the open woodlands are provisionally classified into four groups, according to their origin, physiognomy, ecology and main floristic composition:

2.3.1 Open shrublands or scrubs of rocky outcrops and cliffs (= *Carpinus orientalis* scrubs)

These communities are among the most fascinating vegetation units in the Park, occurring on south-facing steep limestone rocky outcrops between Tangerang and Tunnel and between Adam-Chaqran and the Qorqon cliffs. In Kondeskuh and Dast-e Shah, they occur on west and east-facing rocks. There are also some mosaics of such communities in lowland and montane closed forests. The precipitation probably varies between 600-700 (-1000) mm. *Carpinus orientalis* (Map 333) is the main element of these communities. The coverage and the associated species vary strongly according to gradient, aspect, altitude and orographic structure of rocks and cliffs. These communities can be categorized into the following units:

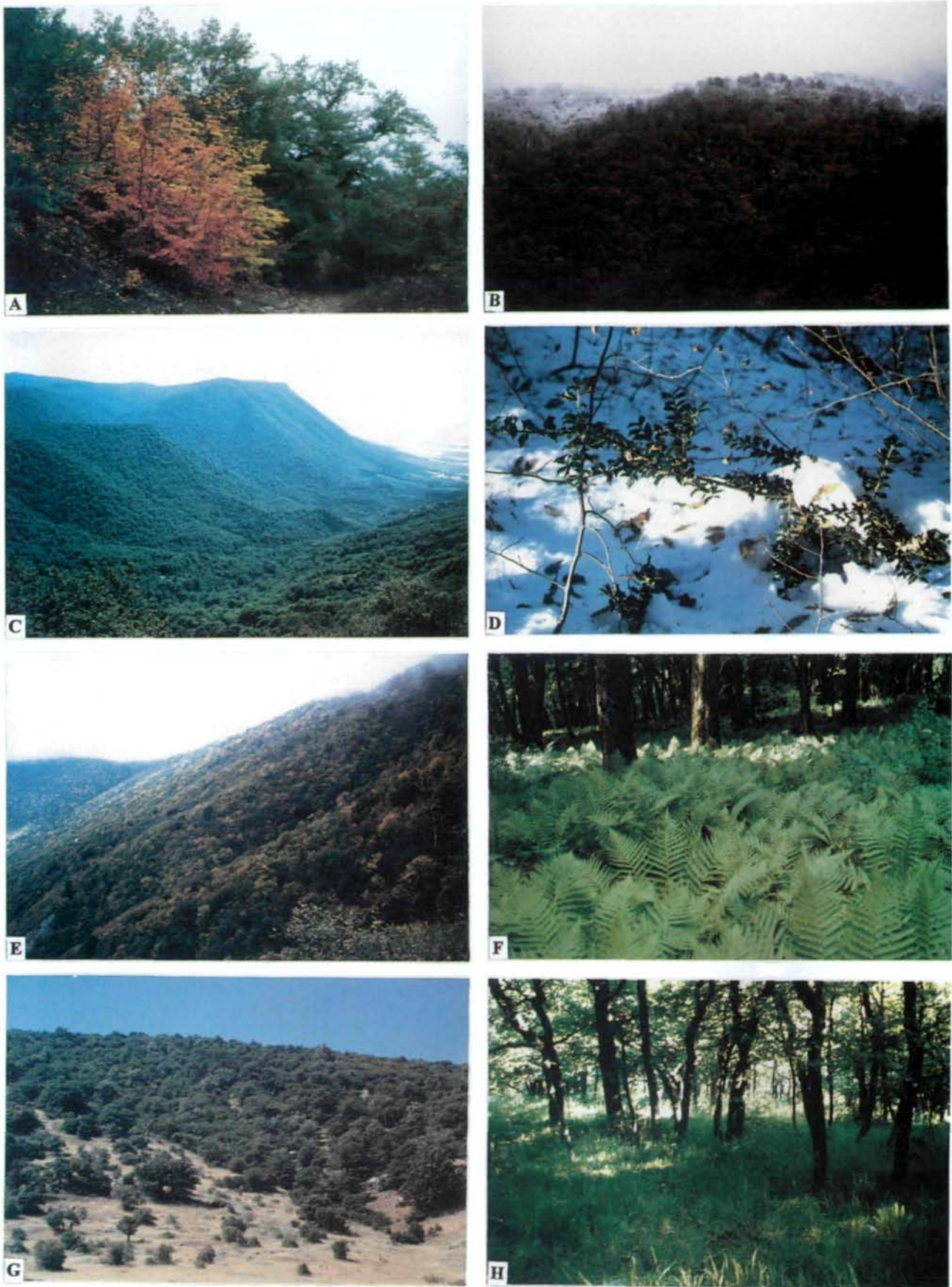


Fig. 7: A, Closed lowland forest (*Parrotia persica*, *Quercus castaneifolia*), NW border of the Park; B, submontane forest (*Quercus castaneifolia*, *Carpinus betulus*), S Tangeqol; C, closed lowland and submontane forests, between Zav and Koilar; D, montane forest (*Carpinus betulus*-*Ilex spinigera*-comm.), above Qorqon; E, montane forest, (*Sorbus torminalis*-*Fraxinus excelsior*-*Carpinus betulus* zone), northern slopes of Alu-Baq; F, understory of montane forest (*Dryopteris caucasica*), Shakha Mountain; G-H, *Quercus macranthera* forest, Janlar (G), Divar Kaji (H).

I. *Carpinus orientalis-Quercus castaneifolia-Bothriochloa*-comm., Fig. 8, D: The steep rocky outcrops (often on S-facing slopes) in altitudes from 600 to 1200 m from Tangegol to Tunnel and between Tangegol and Dast-e Shah are characterized by a unique vegetation which was previously unknown in the literature. *Carpinus orientalis* and *Quercus castaneifolia* (mostly in shrub form) are the main shrubby components with ground cover by thermophilous C₄ grasses like *Bothriochloa ischaemum*, *B. bladhii*, *Cleistogenes serotina*, and in some places *Heteropogon contortus* and *Pennisetum orientale*. Some of these grasses were previously unknown for the Iranian flora (Akhani & Scholz 1999), however, they are common in the area. They need very warm and at least temporarily moist conditions which are available in rocky openings and on steep slopes in the eastern part of the South Caspian forest belt (Fig. 8, D). Other associated shrubs are *Celtis caucasica*, *Rhamnus pallasii*, *Paliurus spina-christi*, *Prunus divaricata*, *Acer monspessulanum*, *Colutea buhsei*, *Crataegus pentagyna* subsp. *pentagyna* and *C. kurdestanica*. The ground cover can be classified into two groups. The first group is formed by species with long flowering period or by late flowering plants, like the C₄-grasses mentioned above and *Stipa bromoides*, *Dactylis glomerata*, *Convolvulus cantabrica*, *Origanum vulgare*, *Alyssopsis mollis*, *Teucrium chamaedrys*, *Heteropappus altaicus*, *Dianthus orientalis* (often subsp. *gorganicus*), *Asperula gorganica*, *Seseli tortuosum* subsp. *kiabii* and *Satureja mutica*. The second group are spring species or early summer species which dry out in summer and autumn like *Bromus gedrosianus*, *B. sterilis*, *Scabiosa micrantha*, *Avena sterilis*, *Hypericum perforatum*, *Lappula barbata*, *Phleum paniculatum*, *Echinops koelzii*, *Melica ciliata* and *Allium rubellum*.

II. Communities on vertical and steep cliffs of the lower and higher elevations (700-2000 m), Fig. 8, E: The vertical and steep cliffs belongs to the most fascinating orographic units in the Park, not only because of their touristic attraction and habitation of Persian Ibex, but also due to their unique flora and vegetation. Rock cliffs provide a more or less continuous sickle-like belt from Beili-Kuh to Golzar. Most cliffs have a south-facing aspect. In some places they are west-faced like in Adnasad or east-faced like around Golzar. Vertical cliffs occur mainly in the forest and scrub zone in the center of the Park which is influenced by hyrcanian humid air masses. A few island cliffs occur also in xeric parts of the Park like the Degarmanli valley and Qore-Darreh. The cliffs are certainly unique habitats where we can look for relic species (cf. Davis 1951). Two such species which were discovered during this study are *Laser rechingeri* (Akhani 1996) and *Eriocyclus ghafooriana* (Akhani 1999). Both of them are without any relatives in SW Asia, with questionable generic position. *Crucianella platyphylla* is a third example in our area, recently described from a locality outside the Park (see notes under the species in annotated checklist and Schönbeck-Temesy & Ehrendorfer 1989). The inaccessible character of cliffs prevents detailed studies. Some places at the bottom or at the top of cliffs have been studied in detail by the author. Furthermore, I found access to the middle of cliffs through step-clefts. Similar to the preceding unit, *Carpinus orientalis* is the main shrub element in cliffs located in humid parts of the Park, often with low coverage. Other accompanying shrubs are: *Celtis australis*, *Ficus carica*, *Rhamnus pallasii*, *Cotoneaster cf. nummularioides*, *Juniperus communis* and *J. sabina*. The herbal species are either specialized cliff crevice elements or species from neighbouring habitats like forests or steep rocky outcrops. The latter group often grows on ledges, clefts or mosaic places with accumulation of some soil. In humid parts of the Park we found *Laser rechingeri*, *Eriocyclus ghafooriana* (off the Park, Fig. 15, J), *Campanula lourica* (Fig. 18, G), *Ceterach officinarum* (Fig. 15, A), *Asplenium ruta-muraria* (Fig. 15, B), *Scrophularia variegata* and *Crucianella platyphylla* (Fig. 24, J) in crevices of vertical cliffs. East of Tangegol and Golzar xerophytic species like *Gypsophila aretioides* (Fig. 19, A), *Parietaria judaica*, *Allium vavillovii* (Fig. 26, F; cf. Akhani 1999), *Stipa arabica*, *Cerasus microcarpa* and *Euphorbia marschalliana* are more common. *Stachys subaphylla* is a xerophytic cliff and rock element which was found in Degarmanli and Soolegerd (Map 480).

III. *Carpinus orientalis-Juniperus communis-Quercus macranthera*-scrubs: The open rocky slopes of higher elevations [(1000-) 1200-2000 m] are covered by a complex of shrubby vegetation whose composition is very complicated. In many places we see *Carpinus orientalis* and *Juniperus communis*, *Quercus macranthera* (higher elevations) and *Q. castaneifolia* (lower elevations). The associated species are very diverse and overlap with surrounding montane communities.

2.3.2 Successional scrub communities

Before the establishment of the protected area and abandonment of the villages, several places along the road between Tangerang and tunnel had been under cultivation or were deforested for timber and charcoal production. After more than 30 years of protection, the regeneration of the forests is ongoing. Today the successional shrub communities can be seen in Tangerang, Khan-Doushan, Takht-i Korda, Tangebol and elsewhere. Unfortunately, in some places the normal succession is being interrupted by illegal harvesting of herbal vegetation. *Paliurus spina-christi*, *Crataegus pentagyna* (sometimes together with *C. kurdestanica*), *Prunus divaricata*, and *Rubus sanctus* belong to the most characteristic species in successional scrubs. Species composition, coverage and ground vegetation depend on the successional stage, altitudes and aspect. In the previously irrigated Khan-Doushan alluvial plain, *Crataegus pentagyna*, *Prunus divaricata* and *Rubus sanctus* are the main components of the shrub layer, with a coverage up to 100%. The ground layer is dominated by *Brachypodium sylvaticum*, *Bothriochloa ischaemum*, *Phleum pratense*, *Imperata cylindrica*, *Hypericum perforatum*, *Agrimonia eupatoria*, *Dactylis glomerata*, *Carex divulsa*, *Heteropappus altaicus*, etc. Towards the slopes, *Paliurus spina-christi* becomes more dominant. In Takhti-e Korda and Tangebol *Paliurus spina-christi* forms impenetrable hedges with up to 100% shrub cover; *Crataegus pentagyna*, *C. kurdestanica* and *Brachypodium sylvaticum* are among the associated species. The succession communities over 1000 m are predominantly covered by the invasive fern species *Pteridium aquilinum* with scattered shrubs like *Prunus divaricata* and *Crataegus pentagyna* (Afrali, Qameshli, Quch-Cheshmeh and Koilar, see Fig. 10, H). See also note under fern communities.

2.3.3 *Acer monspessulanum*, *Crataegus* and *Paliurus* scrub (transition scrub between Hyrcanian forests and mountain and *Artemisia* steppes, meadows and *Juniperus* woodland). (1000-1700 m). Figs. 8, F-H; 33, H-I.

This type of vegetation encircles the forest and scrub vegetation of the hyrcanian area, as a rather continuous belt in southern and northern parts of the Park. Further eastwards the shrubby vegetation is confined to the valleys with suitable microclimate for the development of woodland. Although this type of vegetation belongs phytogeographically to the Irano-Turanian area, the mesic habitats under the shrubs and along the moist valley allow the occupation of some Hyrcanian and Euro-Siberian elements, too. *Acer monspessulanum* subsp. *turcomanicum*, *Crataegus pentagyna*, *C. azarolus* and *Paliurus spina-christi* are the main woody elements. Both separate and mixed thickets of these species are found in the Park.

Acer monspessulanum subsp. *turcomanicum* scrub can be seen on steep rocky slopes, as a transition belt between *Carpinus orientalis* scrub, *Juniperus* woodland and montane steppes. With increasing distance from the forest, maple scrub moves to the valleys. Well developed maple thickets are present in Almeh, Qare-Gineh, Degarmanli and along Yakhtikalan pass (Fig. 8, F).

As mentioned in chapter 2.3.2 *Paliurus spina-christi* is the main element of succession communities of the forest zone. However, between tunnel and Sharleq, in altitudes from 900 to 1100 m, it replaces the forest communities. By vertically moving towards the surrounding slopes, *Paliurus spina-christi* scrub is replaced by *Acer monspessulanum* scrub and by moving horizontally towards the east it is replaced by *Artemisia* steppe. In Sharleq we can see a well developed *Paliurus spina-christi* scrub which is very rich in associated species (Fig. 8, G).

Crataegus pentagyna and *C. azarolus* subsp. *pontica* scrubs (separately or mixed) are well represented in montane plains in Ilanli, south of Alu-Baq and Takhti-e Yelaq (Yelaq plain) (all in southern parts of the area), in elevations from 1350 to 1600 m (Figs. 8, H; 33, H-I). Due to the physical structure of the northern and central parts of the Park, only a small part of the Qortoy valley and Koilar is suitable for communities dominated by *Crataegus*.

The above mentioned thickets are very rich in woody and herbal species. The woody coverage ranges from 5-100%. In some places they provide very dense impenetrable bushes and hedges. The common shrubs include: *Cerasus microcarpa*, *Cerasus pseudoprostrata*, *Cotoneaster ovatus*, *C. nummularioides*, *Rosa* spp., *Malus orientalis*, *Pyrus boissieriana*, *Prunus divaricata*, *Rhamnus pallasii*, *Rh. spathulifolia*, *Colutea buhsei*, *Jasminum fruticans*, *Berberis* spp., *Lonicera floribunda*, *L. bracteolaris*, *L. iberica* and *Cornus australis*. The herbal vegetation often covers up to 100% of the ground. Species like *Festuca valesiaca*, *Stipa pulcherrima*, *St. lessingiana*, *St. zalesskii*, *Dactylis glomerata*, *Elymus elongatiformis*, *Crucianella sintenisii*, *Melica ciliata* (s.l.), *Teucrium chamaedrys*, *Linosyris vulgaris*, *Convolvulus cantabrica*, *Medicago sativa*, *Teucrium polium*, *Anthemis triumfettii*, *Inula salicina*, *Leptorhaphdos parviflora*, *Phlomis herba-venti* and *Verbascum speciosum* are among the most frequent ones.

The above mentioned scrub ecosystems are very sensitive to fire. First, because of the rich herbal vegetation which becomes dry during the hot summer months and second, due to the strong winds caused by the interaction of high pressure air masses from the Hyrcanian area in the west and low pressure air masses of Central Asia in the east. Any small fire may easily spread and develop into an uncontrollable disaster. For example, during the fire in 29-31 August 1995, ca. 1000 hectares of *Crataegus* scrubs in the Yelaq plain have been destroyed (Fig. 37, H-I). See also the chapter "Man and Golestan National Park".

2.3.4 *Juniperus* woodlands

Two types of *Juniperus* woodland occur in the area: "*Juniperus excelsa* open woodland" in many montane steep slopes and "*J. communis* (subsp. *nana* or subsp. *hemisphaerica*) and *J. sabina* scrub" on exposed subalpine summits.

I. *Juniperus excelsa* woodland, Fig. 9, A: Well developed *Juniperus* woodland can be seen in the eastern parts of Aq-Mazar Mountain to Almel and Soolegerd, and further eastwards off the Park on Qorkhod Mountain. In the north of the Park it occurs in the Qortoy valley and the northern slopes of Janlar and Morqzar and in the southern parts of the Park on the southern slopes of the mountains north of Dasht and Bidak. The altitudinal range of *Juniperus* varies from 1000 to 2200 m, but the optimum elevation in our area falls between 1400 and 2200 m. The tree coverage ranges from remotely distanced individual trees to 40% and rarely up to 80%, like on the northern slopes of Divar-Kaji. *Juniperus excelsa* woodland belongs to the most diverse vegetation units in the Park, including many endemic species belonging to the Irano-Turanian area and Khorasan-Kopetdaq province. The associated shrubby species are: *Acer monspessulanum* subsp. *turcomanicum*, *Cerasus microcarpa*, *Berberis* spp., *Rhamnus pallasii*, *Cerasus pseudoprostrata*, *Ephedra major* subsp. *procera*, *Rubia florida*, *Rubia rechingeri*, *Noaea mucronata*, *Hymenocrater calycina* (Fig. 21, G) and *Lonicera floribunda*. The species composition of the ground vegetation strongly depends on the altitude. In the following some important accompanying herbaceous species recorded in juniper woodland are listed: *Festuca valesiaca*, *Acantholimon raddeanum*, *Hypericum scabrum*, *Poa bulbosa*, *Stachys turcomanica*, *Cousinia decipiens*, *Koeleria macrantha*, *Serratula latifolia*, *Teucrium polium*, *Bromus tomentellus*, *Jurinea monocephala* (Fig. 17, F), *Dactylis glomerata*, *Haplophyllum acutifolium*, *Onobrychis cornuta*, *Phlomis cancellata*, *Stipa lessingiana*, *Dianthus orientalis*, *Artemisia* spp., *Astragalus jolderensis*, *Stipa holosericea*, *Teucrium chamaedrys* and *Verbascum speciosum* (Fig. 25, G).

In accordance with Frey (1980: 49), I believe that the *Juniperus* woodland differs greatly from *Pistacia* and *Amygdalus* open scrubs of the central, southern and northeastern parts of Iran. In our area no *Amygdalus* species have been found. According to the Park rangers there are only a few almond shrubs somewhere in the Almel valley, as cultivated remnants. Only some individual trees of *Pistacia atlantica* were found in association with *Juniperus excelsa* in the mountains northwest of Dasht (Map 31).



Fig. 8: **A**, *Carpinus orientalis* forest, Dast-e Shah; **B**, hygrophilous montane forest stands (*Petasites hybridus* as understory), Shakha Mountain; **C**, *Carpinus orientalis* open scrub on steep rocky outcrops, Abshar; **D**, open scrub (*Carpinus orientalis*, *Quercus castaneifolia*-*Bothriochloa* comm.), near Golestan Parking; **E**, Adam-Chaqran cliffs with scattered *Carpinus orientalis* shrubs; **F**, *Acer monspessulanum* subsp. *turcomanicum* scrub, Yakhtikalan Pass; **G**, *Paliurus spina-christi* scrub, Sharleq; **H**, *Crataegus* scrub, Yelaq plain, 9.8.1995 (see also Fig. 37, H-I).

The *Juniperus* woodlands belong to the threatened vegetation types in Iran. They grow very slowly: parts of the *Juniperus* woodland on the northeastern slopes of Divar-Kaji have been damaged by fire, sometime during 1950-1953. After more than 45 years, the vegetation is not yet regenerated (Fig. 37, F).

II. *Juniperus sabina*-*J. communis* scrub, Fig. 9, B: On the subalpine summits of Divar-Kaji, Soltan Hoopi and Gerieh Sar (belongs to Aq-Mazar range), in altitudes from 2000-2400 m, *Juniperus sabina* and *J. communis* form 'carpet-like' prostrate formations (Fig. 9, B). The coverage is up to 100%. *Acer monspessulanum* subsp. *turcomanicum*, *Ephedra major* subsp. *procera*, *Rhamnus cathartica*, *Lonicera iberica* and *Ribes melananthum* belong to the woody associated species. The non-woody associated species include: *Festuca valesiaca*, *Koeleria macrantha*, *Alyssopsis mollis*, *Acantholimon raddeanum*, *A. embergeri* (Fig. 23, H), *Poa bulbosa*, *Stachys turcomanica*, *Thymus kotschyanus*, *Alopecurus textilis*, *Silene viscosa* (Fig. 19, C), *Jurinea monocephala*, *Tanacetum polycephalum*, *Sempervivum iranicum* (Fig. 20, B-C), *Astragalus jolderensis*, *A. mercklinii* (Fig. 20, H), *A. testiculatus*, *Poa densa* and *P. golestanensis*.

2.4 Mountain meadows

2.4.1 Meadows in forest clearings

Examples of such meadows are found in forest encircled karsts located in Besh-Jakhdan and the meadows around Sulukli Lake. In several other places in lowland and montane forests, where the herbal vegetation is harvested annually like Bozaqan, Khan-Doushan, Lateh Khoda Qoli, Lateh Taz and Koilar we can see such meadows which once were cultivated plots. The meadow vegetation in Koilar is very dense and consists mainly of *Poa bulbosa* and *Dactylis glomerata* (Fig. 9, C) and *Vicia variabilis* (Fig. 9 D). Studies on the meadow vegetation in subalpine karsts and swamp meadows around Sulukli Lake show zonal patterns along small topographic and moisture gradients. In most places, the coverage is usually 100%. The most important species include: *Calamagrostis epigejos*, *Carex melanostachya*, *Poa golestanensis*, *Urtica dioica*, *Carex divulsa* subsp. *leersii*, *Convolvulus arvensis*, *Melica transsilvanica* and *Elymus elongatiformis*. In Koilar there are very dense patches of meadows dominated by *Poa bulbosa* or *Vicia variabilis* (Fig. C-D).

2.4.2 Meadows in mountain steppes

In high altitudes from 1600-2100 m, in the steppic zone of the Park, there are many springs and temporary streams (e.g. in Almeh, Morq-Zar, Divar-Kaji). Furthermore rain water or snow melt flow in shallow valleys and ditches places along which meadow vegetation will develop. *Elymus elongatiformis*, *Cephalaria microcephala* and *Carex melanostachya* are the most dominant species in alpine and subalpine meadows in steppic zones of the Park. Other associated species are: *Medicago sativa*, *Crucianella sintenisii* (Fig. 24, K), *Calamagrostis epigejos*, *Poa golestanensis*, *Poa densa*, *Centaurea rhizantha*, *Lithospermum arvensis*, *Galium cf. spurium*, *Allium rubellum*, *Lamium amplexicaule*, *Galium verum*, *Cirsium bornmuelleri*, *Potentilla spec.*, *Euphorbia buhsei*, *E. variegata*, *Carex flacca*, *Hypericum linarioides*, *Helichrysum ocephalum*, *Opopanax hispidus*, *Phragmites australis*, *Convolvulus arvensis*, *Viola occulta* and *Hypericum elongatum*.

2.5 Steppes

The term "steppe" is used here in a very broad sense, after Zohary (1973: 473). It includes xerophytic, non-arboreal vegetation types covered by diffuse, dense or sparse dwarf-shrubs, thorn cushions or hemicryptophytes (excl. forest, alpine and subalpine meadows and halophytic communities). Steppes occurring in the area can well be categorized into mountain steppes (incl. mountain steppes with thorn-cushions and grasses and *Stipa*-steppes), *Artemisia* and *Artemisia-Stipa* steppes.

2.5.1 Mountain steppes with thorn-cushions and grasses and *Stipa*-steppes, Fig. 9, E-F:

Although some thorn-cushion species are associated with open woodlands and scrubs, we usually see well developed thorn-cushion formations with grasses in the Almehr plain (Takhti-e Almehr) and the surrounding gentle slopes (0-30° gradient and 1700 to 2000 m altitude, Fig. 9, E). The thorn-cushion communities that occur in the area differ considerably from those of the southern slopes of the Alborz Mountains which are dominated by tragacanthic *Astragalus* (pers. obs.) and from the alpine massif of Central Alborz with a completely different species pool as described by Klein (1987, 1994). Our area is not rich in thorn-cushions, perhaps because of the moderate climate on one hand, and the competitive advantages of other species (like grasses) in a preserved ecosystem, on the other hand. The grassy mountain steppes with thorn-cushions in Almehr have a dense coverage, ranging from 40 to 100%, but in many relevés 60-80%. *Onobrychis cornuta* and *Acantholimon raddeanum* are the most frequent thorn-cushions, together with some grasses like *Festuca valesiaca*, *Stipa lessingiana*, *Poa densa*, *P. bulbosa*, *Bromus tomentellus* and *Koeleria macrantha*. The plentiful occurrence of grasses is perhaps due to the well developed soils. Some scattered shrubs are also associated with this kind of vegetation like *Ephedra major* subsp. *procera*, *Rosa* spp., *Lonicera bracteolaris*, *Cotoneaster* spp. and *Cerasus microcarpa*. Several other non-grass species include: *Cousinia decipiens*, *Echinops ritrodes* (Fig. 17, A), *Serratula latifolia*, *Verbascum speciosum*, *Erysimum ischnostylum*, *Onobrychis sintenisii*, *Hypericum elongatum*, *H. scabrum*, *Cerasus pseudoprostrata*, *Medicago sativa*, *Euphorbia bungei*, *Haplophyllum acutifolium*, *Phlomis cancellata*, *Ph. herba-venti*, *Stachys turcomanica*, *Astragalus brevidens*, *Lappula barbata*, *Potentilla recta* (s.l.), *Astragalus khoshyelensis* (Fig. 20, D), *A. jolderensis*, *Dianthus orientalis*, *Ferula ovina*, *Galium verum* and *Thesium kotschyinum*.

Stipa steppes occur as a transition belt between woodland and *Artemisia-Stipa* steppe (Koilar and Qortoy) and between woodland and mountain steppes with thorn-cushions and grasses (Almehr). They also occur as mosaic stands in open scrub of *Acer monspessulanum*, *Paliurus spina-christi* and *Crataegus* (Yakhtikalan and Yelaq). In some places they develop dense patches of up to 100% grass cover. *Stipa lessingiana*, *St. pulcherrima* and *St. zalesskii* are dominant species together with *St. holosericea*, *Poa densa*, *P. bulbosa* and *Festuca valesiaca* (Fig. 9, F).

2.5.2 *Artemisia* and *Artemisia-Stipa* steppes

Steppes dominated by *Artemisia* characterize most of the desertic and semi-desertic vegetation units in the northeastern, central and eastern parts of the plains and the undulating gentle slopes of the Iranian territory. In our area, in altitudes from 1000 to 1300 m, there are well developed *Artemisia*-steppes in the Mirza-Baylu plain (Figs. 9, G; 10, A), the lower plains in Bidak and in the Dasht, and plains and gentle slopes in the northern and northeastern parts of the Park (between Soolegerd and Lohondor). The gradient is usually between 0 to 5° and the annual rainfall between 150 and 300 mm, respectively. With increasing elevation, *Artemisia* is replaced by *Juniperus excelsa* woodland (Fig. 9, A). Due to the problems of reliable identification of most species, we cannot provide a good draft of the *Artemisia* communities in our area yet. Three species (*A. cf. kopetdaghensis*, *A. cf. gypsacea* and *A. cf. sieberi*) probably belong to the most dominant species in our area, with coverage ranging from 20 to 50%. Along the northeastern border of the Park, *Artemisia* is usually associated with *Stipa caucasica* and *Festuca valesiaca*. In the subsaline soils of the Mirza-Baylu plain, *Anabasis aphylla* and *Salsola dendroides* (Fig. 19, H) form mixed communities with *Artemisia* (Fig. 10, A). *Artemisia* steppes are often poor in associated perennials. Some important perennials are: *Stipa caucasica*, *St. arabica*, *Krascheninnikovia ceratoides*, *Poa bulbosa*, *Festuca valesiaca*, *Allium rubellum*, *Noaea mucronata*, *Cousinia turcomanica*, *Salsola arbusculiformis* and *Stachys trinervia*. In some years with suitable rainfall, a large number of annuals grow in *Artemisia* steppes. Due to the low precipitation during the study year, only a few annuals were found; the following species are the most common ones: *Bromus danthoniae*, *B. tectorum*, *Androsace maxima*, *Ziziphora tenuior*, *Conringia* spp., *Taeniatherum caput-medusae*, *Camelina rumelica*, *Neotorularia dentata*, *Eremopyrum bonaepartis*, *Helianthemum salicifolium*, *Alyssum linifolium*, *Boissiera squarrosa* and *Alyssum desertorum*.

2.6 Halophytic communities

Saline soils cover only 1% (ca. 1000 hectares) of our area. The south parts of the Mirza-Baylu plain from Chechmeh Khan to Mirza-Baylu and some spots around the salty springs located north and northwest of the Mirza-Baylu plains are suitable places for halophytes. 53 species of 165 halophytes and xerohalophytes known for Iran by Akhani & Ghorbanli (1993) are found in Golestan, beside ca. 5 species which are not mentioned in that contribution. The number of halophytic vegetation units in our area is also remarkable: 6 units of the 10 ecogeographical vegetation types distinguished for the whole of Iran (Akhani & Ghorbanli 1993) are distinguished in our area.

2.6.1 *Tamarix* communitis (*T. androssowii* stand), Fig. 10, C

North of Cheshmeh-Khan, there is a small stand of *Tamarix androssowii*, ca. 0.5 hectares. The total coverage of this stand is up to 100%. *Lycium depressum* (Fig. 25, I) is the only shrubby species, beside *Artemisia aff. fragrans*, *Elymus cf. elongatiformis*, *Phragmites australis*, *Salsola dendroides*, *Atriplex aucheri*, *Lepidium latifolium*, *Suaeda altissima* and *Limonium gmelinii* as herbal accompanying species. I have seen that some shrubs have been cut by the local people. Therefore the protection of this threatened community should be strengthened.

2.6.2 Hydrophilous euryhalophytic communities (*Phragmites australis* comm.)

The halophytic ecotypes of *Phragmites australis* are restricted to around the salt and brackish springs in the north and northwest of the Mirza-Baylu plain and as a narrow strip near Cheshmeh-Khan, behind the above mentioned *Tamarix* stands and the herbaceous perennial and hemicryptophyte halophytic communities. The associated species with *Phragmites* in saline soils are *Glycyrrhiza glabra*, *Trachomitum venetum*, *Suaeda linifolia*, *Cynodon dactylon*, *Puccinellia grossheimii*, *Imperata cylindrica* and *Aster tripolium*.

The non-halophytic communities of *Phragmites* are described under "Hygrophilous and aquatic communities" (2.7.2.).

2.6.3 Halophytic shrub and dwarf shrub communities on salty and dry soils

Two types of halophytic shrub and dwarf shrub communities occur in the lowermost parts of the Mirza-Baylu plain:

I. *Suaeda physophora* comm.: This community is restricted to a small area (ca. 5 hectares), close the road, north of Armadlu with a coverage from 5 to 40 % (Fig. 10, B). The following species have been recorded with *S. physophora*: *Salsola dendroides*, *Salsola tomentosa*, *Suaeda microphylla*, *Artemisia aff. fragrans*, *Kalidium caspicum*, *Reaumuria alternifolia*, *Climacoptera turcomanica* and *Halimocnemis pilifera*. The *Suaeda physophora* community belongs to the rarest halophytic vegetation units in Iran (see notes under the species in annotated list of vascular plants).

II. *Anabasis aphylla* comm., Fig. 10, A: This community, with 2-50% coverage, covers ca. 300 hectares in the southeastern parts of the area, close to Mirza-Baylu Station. The alluvial material originating from surrounding hills provides a poor clay saline soil on which only a few species can survive. The perennial species associated with *Anabasis* include *Artemisia* spp. (2-3 species), *Astragalus ufraensis*, *Agropyron cristatum*, and *Diaphanoptera stenocalycina* (a local endemic species). Annuals include *Eremopyrum bonaepartis*, *E. orientale*, *E. distans*, *Koelpinia linearis*, *Lepidium perfoliatum*, *Boissiera squarrosa* and *Hyoscyamus turcomanicus*. With a suitable rainfall regime, we expect many more annuals to associate with the *Anabasis aphylla* community.

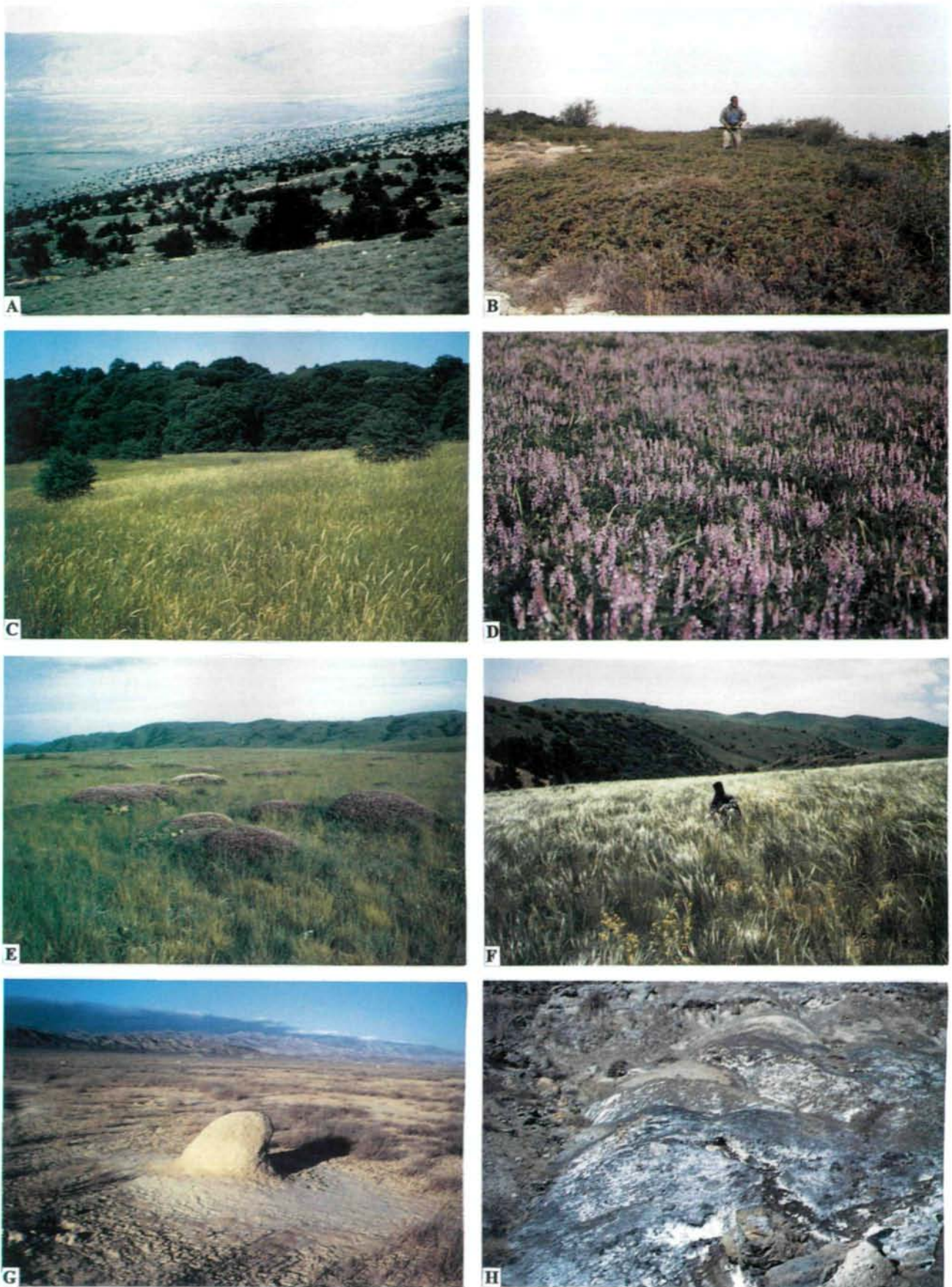


Fig. 9: **A**, *Juniperus excelsa* woodland, Soolegerd; **B**, *Juniperus sabina*-*J. communis* scrub with Mr S. B. Ghafoori (park ranger), Gerieh Sar; **C-D**, meadows in forest clearings, Koilar, *Hordeum bulbosum* (C), *Vicia variabilis* (D); **E**; mountain steppes with thorn-cushions and grasses (*Onobrychis cornuta*, *Poa densa*, *Festuca valesiaca*, *Stipa* spp.), Almehr; **F**, *Stipa* steppe, Almehr; **G**, *Artemisia* steppe and termite hill, Mirza-Baylu plain; **H**, saline spring, northern parts of Mirza-Baylu plain.

2.6.4 Xerohalophytic communities with salt-tolerant xerophytes (*Haloxylon ammodendron* scrub)

Haloxylon ammodendron scrub is restricted to a narrow, ca. 2 km belt, at the beginning of the Almeh valley, at an elevation of 1300-1400m (Figs 10, D-E; 19, G). Some individual shrubs were also observed on the northern side of the Mirza-Baylu plain. The total coverage of the *Haloxylon* community is between 30 and 60% with 5-10% shrub cover. *Lycium kopetdaghi* is the associated shrub together with the following dwarf shrubs and herbs: *Artemisia ciniformis*, *Poa bulbosa*, *Krascheninnikovia ceratoides*, *Stipa caucasica*, *Salsola dendroides*, *Alyssum minus*, *Halothamnus glaucus*, *Bromus danthoniae*, *Boissiera squarrosa*, *Rochelia bungei*, *Scandix stellata*, *Bromus tectorum*, *Galium spurium*, *Rosularia sempervirens*, *Salsola aucheri* and *Ziziphora tenuior*.

Although Saksaul is a common species in desertic areas in C, E and S Iran, its occurrence in the Park, close to species with a different ecological niche (like *Juniperus excelsa* and *Acer monspessulanum* subsp. *turcomanicum*) is a biological curiosity in the Park (Fig. 10, E). The occurrence of some saline springs on the other side of the Almeh valley (Fig. 9, H) indicates the presence of subsaline underground-water at the beginning of the Almeh valley. It seems that the roots of *Haloxylon* have access to this saline water resource. Furthermore a dry microclimate may support the development of a *Haloxylon* community. It is possible that the orographic structure at the beginning of the Almeh valley provides a situation, that allows for the penetration of dry air masses coming from the east while it prevents the penetration of moist air masses coming from the west. The occurrence of a small sand dune at the peak, just above the *Haloxylon* shrubs is strong evidence for such a dry microclimate.

2.6.5 Herbaceous perennial and hemicryptophyte halophytic communities

Herbaceous perennial and hemicryptophyte halophytic communities cover parts of the saline soils near Cheshmeh Khan, surrounded by *Phragmites australis* towards sloping grounds (margins of streams) and *Tamarix androssowii* stands towards the road. Unfortunately, large parts of the area have been disturbed by human activities like overgrazing, harvesting and fire. *Salsola dendroides*, *Limonium gmelinii* and *Artemisia aff. fragrans* belong to the dominant species together with some other halophytes or facultative halophytes (Fig. 10, C).

2.6.6 Annual halophytic communities

Annual halophytic communities are not remarkable in the area, because these communities usually develop in anthropogenic habitats or on high saline and moist soils along the salty lakes and rivers. However, there are some spots in the Mirza-Baylu plain which have been destroyed by shepherds, before conservation of the area. After more than 30 years of protection, the natural vegetation (*Artemisia* steppe) has not been able to develop in these spots which evidently suffer from salinity. Early in the year these spots are covered by annual grasses (like *Bromus* spp., *Eremopyrum* spp.), and in autumn with annual chenopods such as *Suaeda microsperma* and *Climacoptera turcomanica* (Fig. 19, E).

2.7 Hygrophilous and aquatic communities

As discussed under "Topography and water resources" there are many temporary and permanent water resources in the area such as rivers, streams and springs. Although most of such habitats contribute only a limited role to the whole vegetation, they are important ecosystems with regard to biodiversity. The pH and EC of some of water resources were measured (Table 1). The hygrophilous communities of the closed forest and the halophytic formation are briefly discussed under the relevant sections (2.2.1; 2.2.2, VIII; 2.6.2). The two remaining most important hygrophilous and aquatic vegetation types are those in and around Sulukli Lake and those along rivers and streams located in steppe and mountain zones of the Park dominated either by *Phragmites australis* and *Salix aegyptiaca* or both.

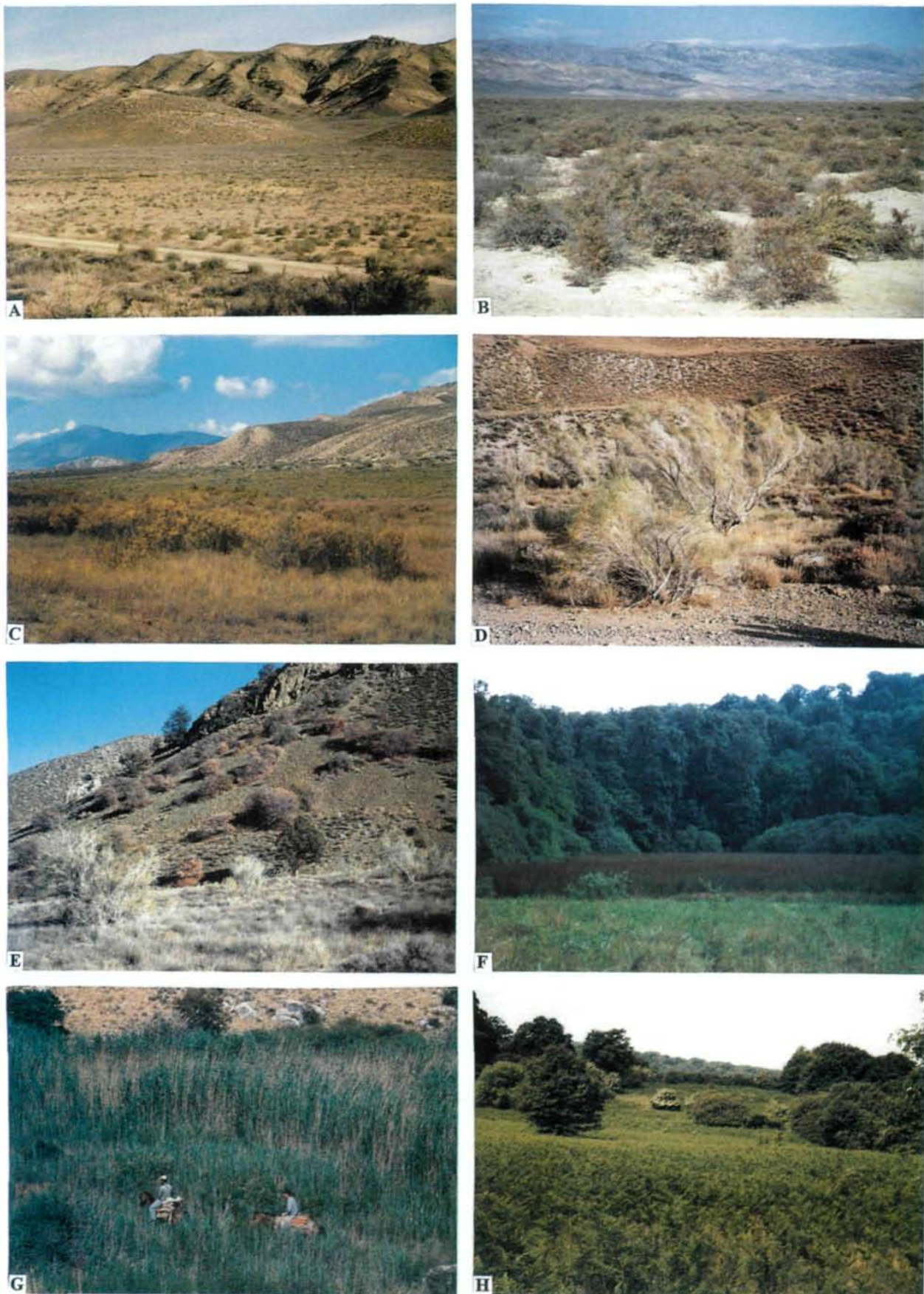


Fig. 10: **A**, Transition between *Artemisia* steppe and *Anabasis aphylla* comm., Mirza-Baylu (a herd of ca. 50 gazelle in background); **B**, *Suaeda physophora* comm., near Armadlu, **C**, *Tamarix androsowii* stand in foreground and herbaceous perennial and hemicryptophytic communities (*Salsola dendroides* comm.) in background; **D**, *Haloxylon ammodendron* scrub (Almeh valley); **E**, scattered *Haloxylon ammodendron* shrubs at the bottom of Almeh valley with *Acer monspessulanum* subsp. *turcomanicum* and *Juniperus excelsa* towards the sloping ground; **F**, Sulukli Lake, *Schoenoplectus lacustris*-*Lemna* comm. surrounded by montane meadows and submontane forest; **G**, *Phragmites australis* comm., Degarmanli river; **H**, *Pteridium aquilinum* comm., Koilar.

2.7.1 Aquatic vegetation at and around Sulukli Lake, Fig. 10, F.

This lake is an isolated mountain lake (1380 m) with the lowest pH (6.5-6.6) and EC (6-11) among all measured water resources (cf. Table 1). The vegetation consists of different aquatic and hygrophilic communities which changes along a moisture gradient from deepest parts of the lake with permanent water to marginal muddy and meadow flats and finally the surrounding closed forest. Four major vegetation zones are distinguished along a transect: (i) *Schoenoplectus-Lemna* zone in parts of the lake with permanent water (Fig. 24, A); (ii) *Mentha aquatica-Alopecurus aequalis* zone, at margin of lake; (iii) mud and meadow zone, comprising some smaller communities including *Carex melanostachya*, *Urtica dioica*, *Calamagrostis epigejos* and *Poa goletanensis* (cf. 2.4.1.), and (iv) shrub and tree zone, which consists of *Rubus procerus* in the south and *Salix cf. caprea* in the north of the lake, respectively (Fig. 10, F). In Akhani (1999) the cover abundance of 7 phytosociological relevés in and around the lake is given. *Potamogeton natans*, *Alopecurus aequalis* and *Carex pseudocyperus* are new records which were discovered from around this lake and *Poa goletanensis* is a new grass which was found around this lake and on other subalpine meadows in the Park (cf. Akhani & Scholz 1999).

2.7.2 Hygrophilous vegetation in southern and northern parts of the Park (*Phragmites australis* and *Salix aegyptiaca* communities)

The riparian and stream side vegetation in semi-arid parts of the Park consist of communities dominated mainly by *Phragmites australis* and *Salix aegyptiaca*. *Phragmites australis* communities are well dominant in Qez-Qaleh (W Dasht), Degarmanli and Soolegerd streams. In most places the coverage of *Phragmites* is 100%. The height of *Phragmites* culms reaches up to 3.5 m (Fig. 10, G). Only a few species are associated with *Phragmites* like *Rubus sanctus*, *Lythrum salicaria*, *Mentha longifolia*, *Juncus inflexus*, *Epilobium hirsutum*, *Melilotus albus*, *M. dentatus*, *Berula angustifolia*, *Typha domingensis*, *Salix aegyptiaca*, *Bolboschoenus maritimus* and *Sonchus palustris*.

Towards higher elevations (over 1400m) and in deep valleys surrounded by *Juniperus excelsa* or *Acer monspessulanum* woodlands, the riparian vegetation consists mainly of the *Salix aegyptiaca* community. In the Degarmanli valley (1420 m) the following trees and shrubs have been recorded with willow: *Salix alba*, *Rubus sanctus*, *R. caesius*, *Rosa* sp., *Rhamnus pallasii*, *Lonicera floribunda*, *Prunus divaricata* and *Crataegus* sp. The herbal species include *Phragmites australis*, *Calamagrostis epigejos*, *Inula salicina*, *Equisetum ramosissimum*, *Galium humifusum*, *Securigera varia*, *Sonchus palustris*, *Althaea armeniaca*, *Eupatorium cannabinum*, *Juncus inflexus*, *Mentha longifolia*, *Samolus valerandi*, *Epilobium hirsutum*, *Teucrium chamaedrys* and *Lythrum salicaria*.

Along the Qortoy Valley, a very deep and long valley located in the northeast parts of the Park, and its branches, there is an important riparian vegetation type which has once been visited by the author. Here many hygrophilous trees and shrubs can be found, like *Salix* spp., *Platanus orientalis*, *Cornus australis* and *Vitis sylvestris*.

2.8 Fern communities (*Pteridium aquilinum*)

As discussed in the chapter "Successional scrub communities" (2.3.2), *Pteridium aquilinum* is one of the most invasive ferns in disturbed montane forests and scrubs over 1000 m. In the Qortoy valley, Koilar (Fig. 10, H) and Qameshli, there are many places covered by *Pteridium* with 100% coverage. *Thalictrum minus*, *Calamagrostis epigejos*, *Lathyrus pratensis*, *Vicia variabilis* and *Viola alba* are the most important associated species. Other species with lesser occurrence are: *Carex divulsa*, *Brachypodium sylvaticum*, *Calystegia sylvatica*, *Dactylis glomerata*, *Eryngium caucasicum*, *Artemisia vulgaris* and *Cirsium osseticum*.

3 FLORA AND MAPPING

3.1 Material and methods

I. Literature survey: All published volumes of Flora Iranica (Rechinger 1963-1997) and many recent regional and world-wide monographs and revisions have been scanned for records from our area. A first list of ca. 600 reported species has been provided with data on the relevant specimens.

II. Field studies: During five excursions (ca. 26 days) between 1987 and 1994, 1,572 specimens were collected in various parts of the Parks (partly together with Drs M. Ghorbanli, H. Meigouni and A. Shahsavari). From April to October 1995, I visited in the Park. Many excursions (ca. 120 days) have been made in most parts of the Park. The inaccessible and previously non-visited parts have been investigated during long excursions with 2 to 10 days camping in the area. These excursions were accompanied by Park rangers, using horses for transportation of plants and excursion equipments (Fig. 37, A). Mr B. Jafari (the Park deputy) and Mr B. S. Ghafoori (Park ranger, Fig. 9, B) have accompanied me during most of the excursions. 570 phytosociological relevés were created after Braun-Blanquet (1964). A total of 2,039 specimens were collected in 1995. The routes, collections and relevés sites were localized by using compass, altimeter and a topographic map (scale 1: 50,000). The position of studied places in the Park is shown in Fig. 11. From 13 to 22 November 1996, a 10 days excursion was made in order to collect the autumn plants yielding 150 specimens. Therefore a total of 3,761 specimens were collected by the author from 1987 to 1996 (ca. 3500 specimens of vascular plants and the remaining bryophytes and lichens). A complete list of localities, specimens numbers and the herbaria in which the specimens are held, is provided in the appendix.

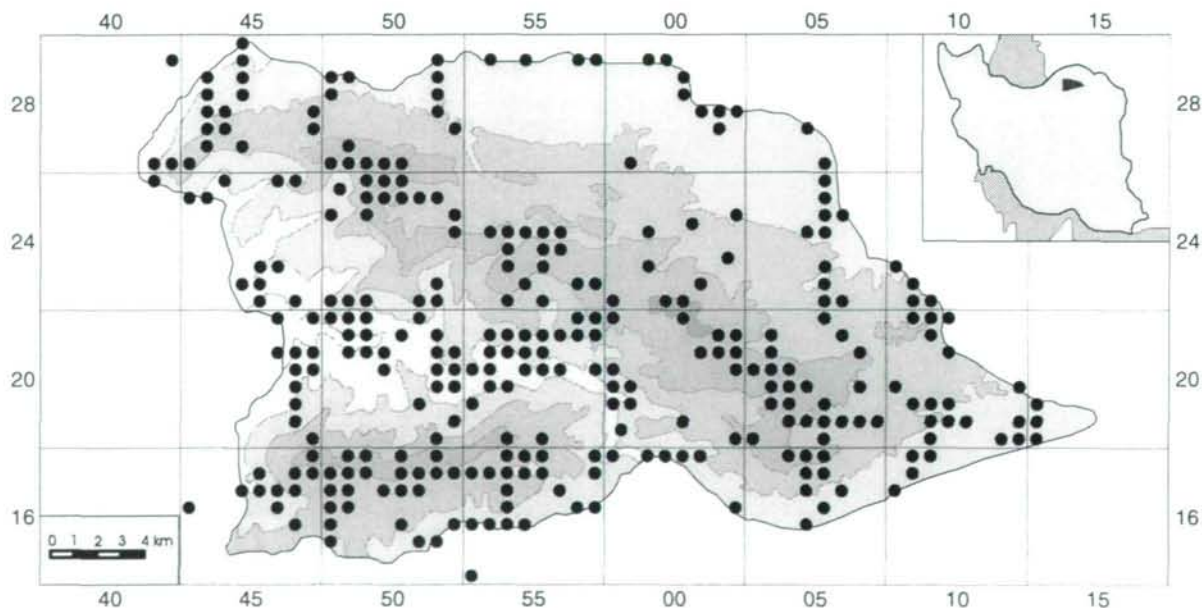


Fig. 11: Map of searched places in Golestan National Park during the field studies.

III. Herbarium and identification: All my plants collected between 1994 and 1996 were brought to Munich for identification. During my herbarium visits to BM, E, K, MMTT (Natural History Museum of Iran), PR, SBUH (Shahid Beheshti University Herbarium) and W the collections of other botanist were studied (acronyms of non-defined herbaria are according to Holmgren & al., 1990). Large parts of the collections by Rechinger (W),

Zehzad (SBUH) and Firuznia (MMTT) were loaned for further studies in Munich. In the appendix a complete list of all studied and reported localities from the Park is given. A total of ca. 5,200 specimens were studied during this research (see "Appendix" for a complete list of localities and collectors). The identification of the plants followed Flora Iranica (Rechinger 1963-1997) or standard floras of the neighbouring countries, recent revisions and monographs. Many difficult and critical groups were compared with the types or identical specimens held in Munich and other above mentioned herbaria. Some critical groups have been identified or revised by the experts: Dr K. I. Christensen (*Crataegus*); Prof. H. Freitag (*Ephedra*); Prof. J. Grau (*Myosotis*); Prof. O. Khassanov (partly *Allium*); Prof. E. Landolt (*Lemna*); Mr M. Moussavi (partly *Galium*); Prof. D. Podlech (most *Astragalus*), Dr A. Polatschek (partly *Erysimum*); Prof. G. Wagenitz (partly *Centaurea*), Prof. H. Scholz (*Poa*, partly *Bromus* and *Stipa*); Dr F. Schuhwerk (*Hieracium*), Prof. F. Sales (*Bromus* sect. *Genea*) and Mr B. Zehzad (partly *Euphorbia*).

IV. Computerized mapping: The Computer programme FLOREIN (1996) was used for the preparation of distribution maps. This programme which was originally created for Germany was adapted for our area by Mr C. Düring from the group team of Prof. P. Schönfelder (Regensburg). The whole of the area has been divided into 32 (8 x 4) quadrants. Each quadrant is further divided into 64 smaller quadrants with ca. 750 x 750 m dimensions (Fig. 12). The coordinates for each locality or relevé were transferred into a MTB number (Meßtischblatt) and quadrant numbers. The MTB number is a 4 digits number which is composed of vertical and horizontal numbers shown in all maps (cf. Figs 11, 12). This is followed by a 3 digit quadrant number which exactly specifies one of the 64 quadrants shown in Fig. 12. The following data from almost all localities and relevés were put into the computer: locality, habitat, altitude, coordinate, species and their cover abundances. The localities of other collectors are often not accurate enough to be used for large scale mapping. Only ca. 200 cases of such records are included.

Based on the input data, the programme is able to provide: (i) separate distribution maps for each species showing their cover abundances (see chapter 7 "Distribution maps" for legend); (ii) a list of information (locality, habitat, altitude, etc) for each species; (iii) the list of species for a defined quadrant and (iv) phytosociological tables ordered by the number of records (frequency). The distribution maps for ca. 880 species are provided in chapter 7 "Distribution maps". The maps for species which are known only from one or two localities are not provided (see below).

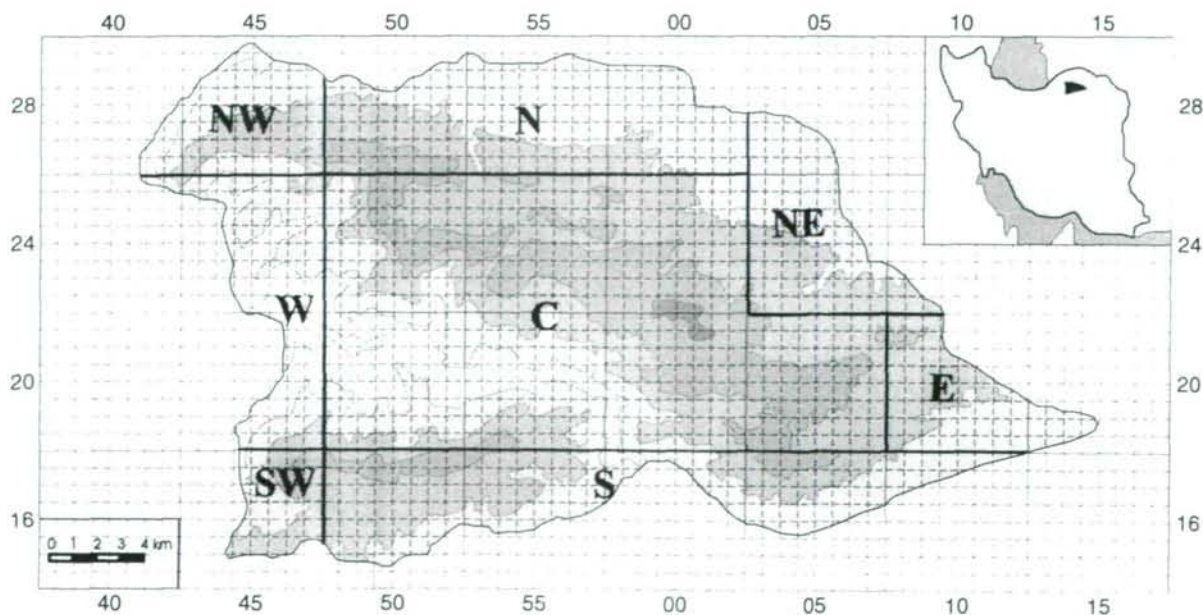


Fig. 12: Geographical and quadrant divisions of Golestan National Park (see text).

V. Nomenclature and checklist: A complete annotated checklist is provided. For each species the author names are abbreviated according to Brummitt & Powell (1992), citation of accepted names and its basionyms is abbreviated according to BPH: Lawrence & al. (1968) and BPH/S: Bridson & al. (1991). Only a selection of important synonyms is given. The infraspecific taxa (subspecies and varieties) are given, when they possess geographical and morphological importance. A broad species concept is adopted for the highly polymorphic species. The nomenclature is mostly based on Flora Iranica (Rechinger 1963-1997) or as far as possible on more recent available data in other taxonomic works. A table is provided for each species including the list of material examined (Mat., see also "Appendix"); habitat (Hab.), number of distribution map (Dist.), altitudes (Alt.), chorotype (Ch.), growth form (GF), and threat category within the park [Th. (GNP)] and in Iran [Th. (IR)]. For the species whose their map is not provided, the locality is briefly mentioned under "Hab." and the geographical position of the species within the park is given based on Fig. 12. The abbreviations and criteria used for the data for each species are defined in the next chapter or discussed in the chapters "Species diversity and altitude", "Growth form spectra", "Rarity and threat categories" and "Phytogeography and endemism". The figures in parentheses after the threat category within the Park shows the number of records which are based on ca. 20,000 records, gained from ca. 5200 herbarium specimens, 570 phytosociological relevés and partly from literatur.

3.2 New species, new combination and new records for Iran

During this research a total of 6 species, 1 subspecies and one combination are presented as new to science, and ca. 30 species as new records for Iran. Furthermore, there are one new genus and ca. 4 new species and subspecies which need further studies before validation. The new taxa and new records are either already published or are still in press. These species are listed below with references to the original papers, where details are given on their taxonomy, ecology and distribution as follows: (a) Akhani (1996), (b) Akhani (1999), (c) Akhani & Scholz (1999) and (d) Tzvelev (1997). Species which were not reported for Iran in Flora Iranica (Rechinger 1963-1997), but those existence in Iran is mentioned in other publications are marked by an asterisk (*). In the present work only generalized information and distribution maps are given for these species. There are further three new records for Iran which their identification are uncertain: *Astragalus ufraensis*, *Carex depauperata* and *Salix caprea*.

I. New species and new subspecies

Centaurea golesstanica Akhani & Wagenitz (b)
Eriocyclus ghafooriana Akhani (b)
Festuca akhaniae Tzvelev (d)
Laser rechingeri Akhani (a)
Plantago podlechii Akhani (b)
Poa golesstanensis H. Scholz & Akhani (c)
Seseli tortuosum L. subsp. *kiabii* Akhani (b)

II. New combinations

Cynoglossum kandavanensis (Bornm. & Gauba) Akhani (present work, page 80)

III. New records for Iran

Allium vavilovii Popov & Vved. (b)
Alopecurus aequalis Sobol. (c)
Alyssum alyssoides (L.) L. (b) *
Atraphaxis seravschanica Pavlov (a)
Bothriochloa bladonii (Retz.) S. T. Blake (c) *
Carex pseudocyperus L. (b)
Ceratophyllum submersum L. (b)

Cleistogenes serotina (L.) Keng (c)
Cousinia leucantha Bornm. & Sint. (a)
Erysimum kerbabaevii Kurbanov & Gudkova (a)
Euphorbia humilis C. A. Mey. ex Ledeb. (b)
Gagea glacialis K. Koch (b)
Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult. (c)
Hordelymus europaeus (L.) Harz (c)
Jurinea antonowii C. Winkl. (a)
Lactuca georgica Grossh. (b)
Linosyris vulgaris Cass. ex Less. (b)
Mattiastrum turcomanicum (Bornm. & Sint.) Brand. (a)
Melilotus dentatus (Waldst. & Kit.) Pers. (a)
Myosotis alpestris F. W. Schmidt (b)
Myosotis arvensis (L.) Hill (b)
Myosotis minutiflora Boiss. & Reuter (b)
Ononis spinosa L. subsp. *antiquorum* (L.) Arcangeli (a)
Poa compressa L. (c) *
Poa densa Troitsky (c) *
Potamogeton natans L. (b)
Rumex caucasicus Rech. f. (b)
Tragopogon capitatus S. Nikitin (a)
Vicia cassubica L. (b)

3.3 Annotated list of the vascular plants

3.3.1 Abbreviations

3.3.1.1. **Collectors:** For a complete list of collectors and localities see appendix. Collectors with few cited speci-mens (usually less than five) are not abbreviated

Acronym	Name(s)	Acronym	Name(s)
A	Akhani	RE	Riedl & Ershad
AS	Akhani & Shahsavari	So	Soják
D	Daneshpajouh	T	Termeh
E	Edmondson	TM	Termeh & Matin
ER	Ershad & Riedl	U	Uotila
F	Firuznia	Wa	Walton
Fu	Furse	W&C	Wendelbo & Cobham
GA	Ghorbanli & Akhani	WF	Wendelbo & Foroughi
I	Iranshahr	W&al	Wendelbo, Foroughi, Sanii & Shirdelpour
IZ	Iranshahr & Zargani	ZA	Zangui & Alvani
K	Kukkonen	Z	Zehzad
R	Rechinger	ZK	Zehzad & Kiabi
Rz	Renz	Z&al	Zehzad, Azizian, Taheri & Kiabi

3.3.1.II. Growth forms (simplified according to Dierschke 1994):

1. Phanerophytes

1.1 Trees (T)

- 1.1.1 Ever-green needle-leaved (PTE)
- 1.1.2 Summer-green broad-leaved (PTS)

1.2 Shrubs (S)

- 1.2.1 Ever-green
 - 1.2.1.1 Needle-leaved (PSN)
 - 1.2.1.2 Broad-leaved (PSB)
 - 1.2.1.3 Stem-green with reduced leaves (PSG) (like *Ephedra*)
- 1.2.2 Summer-green broad-leaved (PSS)

1.3 Lianas (PLI)

1.4 Epiphytes (PEP)

2. Chamaephytes (C)

2.1 Fruticose

- 2.1.1 Broad-leaved-green (CFR)
- 2.1.3 Stem-green with reduced leaves (CFS) (like *Ephedra*)

2.2 Suffruticose

- 2.2.1 Erect suffruticose (CSE)
- 2.2.2 Creeping or prostrate suffruticose (CSP)
- 2.2.3 Scandent suffruticose (CSS)
- 2.2.4 Cushion-form and caespitose suffruticose (CSC)

2.3 Herbal chamaephytes

- 2.3.1 Erect herbal chamaephytes (CHE)
- 2.3.2 Cushion-form herbal chamaephytes (CHU)
- 2.3.3 Succulent herbal chamaephytes (CHS).

3. Hemicryptophytes (H)

3.1 Graminoid hemicryptophytes (HGR)

3.2 Cushion-form (tufted or tussock) graminoid hemicryptophytes (HGC)

3.3 Rosette hemicryptophytes (HRO)

3.4 Semi-rosette hemicryptophytes (HSR)

3.5 Acauline hemicryptophytes (HAC) (like many members of *Astragalus* sect. *Caprini*)

3.6 Scapose (*sensu* Dierschke 1994), but leafy erect hemicryptophytes (HSC)

3.7 Creeping or prostrate hemicryptophytes (HCR)

3.8 Scandent hemicryptophytes (HST)

4. Geophytes (G)

4.1 Root tuber geophytes (GTU)

4.2 Rhizomatous geophytes (GRH)

4.3 Bulb and tuber geophytes (GBT)

4.4 Root parasite geophytes (GRP)

4.5 Scandent geophytes (GSC)

5. Therophytes (T)

5.1 Graminoid therophytes (TGR)

- 5.2 Caespitose and basally branched therophytes (TCA)
- 5.3 Rosette therophytes (TRO)
- 5.4 Semi-rosette therophytes (TSR)
- 5.5 Scapose (*sensu* Dierschke 1994), but leafy erect therophytes (TSC)
- 5.6 Creeping or prostrate therophytes (TCR)
- 5.7. Scandent therophytes (TST)

6. Hydrophytes (aquatic plants) A

- 6.1 Pleustophytes (APL)
- 6.2 Rhizophytes (ARH)

^{DW} Dwarf (used for comparatively short plants)

^{SU} Succulent (stem or leaf succulent)

TH Thorny, without considering the kind and nature of thorns

3.3.1.III. Threat categories (*cf.* Davis & al. 1994). For details and criteria see chapter 4.4 “Rarity and threat categories”

Threat category	Abbreviation
Extinct	EXT
Endangered	END
Vulnerable	VUL
Rare	RAR
Indeterminate	IND
Status unknown	SUN
Safe or Non-threatened	NOT

3.3.1.IV. Chorotypes (phytogeographical areas): Most abbreviations are given in Table 9 (chapter 5), except: tr. for tropical and NEO for Neophytes. The chorotypes of bi- or multiregional species are separated by a dash “-”. For example “IT-M” means that the species has a biregional Irano-Turanian and Mediterranean distribution. The chorotypes of transitional species between two chorotypes are shown by a slant “/”. For example “IT^{KK}/ES^{HY}” means that the species has a transitional distribution between the Khorasan-Kopetdagh province of the Irano-Turanian area and the Hyrcanian province of the Euro-Siberian area. The transgressive range of species is shown in brackets [...].

3.3.1.V. Table of informations:

Mat.: → Examined material(s). n.v. (non vidi), if not otherwise specified, indicates the specimens reported in Flora Iranica	
Hab.: → Habitat(s)	
Dist.: Map → Distribution map or geographical position	Alt.: → Altitude range (m)
Ch.: → Chorotype	GF.: → Growth form
Th. (GNP): (??) → Threat category in Golestan National Park. Figures in parentheses indicate the total number of records from relevés and herbarium specimens	Th. (IR): → Threat category in Iran
LN.: → Local name (given only for a few species)	

3.3.2 PTERIDOPHYTES

Adiantaceae (incl. *Sinopteridaceae*)

Adiantum capillus-veneris L., Sp. Pl.: 1096 (1753).

Mat: A-9906; GA-4989	
Hab.: In closed forest and dark gorge along streams	
Dist.: Map 1	Alt.: 790-1700
Ch.: SCO	GF.: GRH
Th. (GNP): VUL (4)	Th. (IR): SUN

Cheilanthes persica (Bory) Mett. ex Kuhn, Bot. Zeitung 26: 233 (1868). Syn.: *Notholaena persica* Bory in Bélanger, Voy. Indes. Orient., Bot. 2: 23 (1834). Fig. 15, A.

Mat: A-11717, 10533	
Hab.: Rock crevices	
Dist.: Map 2	Alt.: 670-1320
Ch.: IT [M]	GF.: GRH
Th. (GNP): RAR (9)	Th. (IR): SUN

Aspleniaceae

Asplenium adiantum-nigrum L., Sp. Pl.: 1081 (1753). s. l.

Mat: A-9238, 9239, 9290, 9985, 9911, 11639, 11518; R-33104; W&C14276	
Hab.: In crevices of rocks or on debris in open and closed lowland and montane forest and scrub	
Dist.: Map 3	Alt.: 700-2000
Ch.: PL	GF.: GRH
Th. (GNP): NOT (24)	Th. (IR): NOT

Asplenium ruta-muraria L., Sp. Pl.: 1081 (1753). Fig. 15, B.

Mat: A-10650, 11470	
Hab.: In crevices of steep rocky outcrops and vertical cliffs	
Dist.: Map 4	Alt.: 670-1880
Ch.: COS	GF.: GRH
Th. (GNP): RAR (13)	Th. (IR): NOT

Asplenium trichomanes L., Sp. Pl.: 1080 (1753).

Mat: A-4990, 6047, 9292, 9910, 9991, 10649; R-52585*; RE-15797; W&al-10952	
Hab.: Lowland and montane forests, rocky outcrops	

and steep slopes, waterside	
Dist.: Map 5	Alt.: 550-2000
Ch.: PL ^(N & S Temperate)	GF.: GRH
Th. (GNP): NOT (23)	Th. (IR): NOT

* Det.: C. R. Sleep and T. Reichstein

RE-15797 and W&al-10952 are doubtfully identified as *A. trichomanes* L. subsp. *quadrivalens* D. E. Mey. by T. Reichstein.

Ceterach officinarum DC., in Lam. & DC., Fl. Fr. 2: 566 (1805).

Mat: A-6048, 9565, 9909; RE-15798, W&al-10953, R-52656	
Hab.: Crevices of steep and vertical limestone cliffs, open scrub, rarely waterside	
Dist.: Map 6	Alt.: 670-2030
Ch.: ES-M-IT	GF.: GRH
Th. (GNP): NOT (27)	Th. (IR): NOT

Phyllitis scolopendrium (L.) Newman, Hist. Brit. Ferns, ed. 2, 10 (1844). Syn.: *Asplenium scolopendrium* L., Sp. Pl.: 1079 (1753).

Mat: A-4958, 9335, 9916; W&C14298; W&al-11030*	
Hab.: Wet places, and on soil rich in debris in lowland and montane closed forest	
Dist.: Map 7	Alt.: 500-1820
Ch.: PL ^(N Temperate)	GF.: GRH
Th. (GNP): RAR (15)	Th. (IR): NOT

* Det.: T. Reichstein

Dryopteridaceae (incl. *Aspidiaceae*)

Dryopteris affine (Lowe) Fraser-Jenkins, Fern Gaz. 12: 56 (1979). s. l. Syn.: *Nephrodium affine* Lowe, Trans. Cambridge Philos. Soc. 6: 525 (1838).

Mat: A-12210	
Hab.: <i>Carpinus betulus</i> - <i>Tilia</i> and <i>Ulmus glabra</i> closed forest in Beili-Kuh	
Dist.: NW	Alt.: 1400
Ch.: ES	GF.: GRH
Th. (GNP): END (1)	Th. (IR): SUN

The cited material probably belongs to subsp. *persica* Fraser-Jenkins. According to Fraser-Jenkins (1980), subsp. *coriacea* Fraser-Jenkins and subsp. *persica* Fraser-Jenkins occur in N Iran.

Dryopteris caucasica (A. Braun) Fraser-Jenkins & Corley, Fern Gaz. 10: 22 (1971). Syn.: *Aspidium caucasicum* A. Braun, Flora (Regensburg) 24: 707 (1841). Fig. 7, F.

Mat: A-11263, 11235, 11596, 11522, 12033, 11514, 10594; W&C14303*	
Hab.: Frequent in closed montane forests	
Dist.: Map 8	Alt.: 1060-2130
Ch.: ES ^{EH}	GF.: GRH
Th. (GNP): NOT (45)	Th. (IR): NOT

* Det.: C. R. Fraser-Jenkins

Dryopteris pallida (Bory) C. Chr. ex Maire & Petit., Étude Pl. Vasc. Réc. Grèce 2: 238 (1908). Syn.: *Nephrodium pallidum* Bory, Exp. Sci. Morée, Bot.: 287 (1832).

Mat: A-11861, 11955; W&C14295*,14393	
Hab.: Closed and moist lowland forests with rocky outcrops	
Dist.: Map 9	Alt.: 960-1330
Ch.: M ^C &E-ES ^{HY}	GF.: GRH
Th. (GNP): RAR (8)	Th. (IR): SUN

*Det. by C. R. Fraser-Jenkins under subsp. *raddeana* Fraser-Jenkins.

Polystichum aculeatum (L.) Roth, Tent. Fl. Germ. 3 (1): 79 (1799). Syn.: *Polypodium aculeatum* L., Sp. Pl.: 1090 (1753).

Mat: A-9240, 9324, 9917, 9990, 11234; RE-15796*; W&C14293**; W&al-11031*.	
Hab.: Closed montane forest, wet places at bottom of valleys in closed forest	
Dist.: Map 10	Alt.: (600-) 900-1900
Ch.: PL ^(Temperate Eurasia)	GF.: GRH
Th. (GNP): NOT (27)	Th. (IR): NOT

* Det.: A. Sleep & Reichstein

** Det.: Fraser-Jenkins

Equisetaceae

Equisetum ramosissimum Desf., Fl. Atl. 2: 398 (1799).

Mat: A-4882, 9499, 9500, 9540, 9863; R-52557*; W&C14232	
Hab.: Streamside in steppe zone and <i>Crataegus-Prunus</i> scrub in mesic zone	
Dist.: Map 11	Alt.: 450-1750
Ch.: PL	GF.: GRH
Th. (GNP): RAR (13)	Th. (IR): NOT

* Det.: C. R. Fraser-Jenkins

Equisetum telmateia Ehrh., Hannover. Mag. 18: 287 (1783). Fig. 15, D.

Mat: A-5006, 9761, R-52566*, TM-35085*	
Hab.: Riparian forest and streamside in closed forest and dark gorges	
Dist.: Map 12	Alt.: 500-1300
Ch.: PL ^(N Temperate)	GF.: GRH
Th. (GNP): VUL (4)	Th. (IR): SUN

* Det.: C. R. Fraser-Jenkins

Hypolepidaceae

Pteridium aquilinum (L.) Kuhn in Kersten, Reisen Ost-Afr. 3 (3): 11 (1897). Syn.: *Pteris aquilina* L., Sp. Pl.: 1075 (1753). Fig. 10, H.

Mat: A-9693, 10375, 11487, 11810, 11204, 11538, 11546, 11603, 11202, 11238	
Hab.: Very common in montane and submontane forest clearings and pioneer forest communities, particularly on steep slopes with developed soils in previously dry-farming agricultural lands, often with <i>Calamagrostis epigejos</i> , <i>Thalictrum minus</i> and scattered <i>Crataegus</i> shrubs, disturbed places around roads in montane forest	
Dist.: Map 13	Alt.: 900-1850
Ch.: COS	GF.: GRH
Th. (GNP): NOT (27)	Th. (IR): NOT
LN.: Jommaz (جمان)	

Ophioglossaceae

Botrychium lunaria (L.) Sw., Journ. Bot. (Schrad.) 1800 (2): 110 (1802). Syn.: *Osmunda lunaria* L., Sp. Pl.: 1064 (1753). Fig. 15, C.

Mat: A-11271	
Hab.: Montane forest in Bech-Jakhdan (mixed of <i>Quercus castaneifolia</i> , <i>Acer platanoides</i> , <i>Carpinus betulus</i> and <i>Sorbus torminalis</i> trees)	
Dist.: Map 14	Alt.: 1920
Ch. PL ^(N Temperate & Australasia)	GF.: GRH
Th. (GNP): END (1)	Th. (IR): END

Polypodiaceae

Polypodium interjectum Shivas, J. Linn. Soc., Bot. 58: 28 (1961).

Mat: A-9914, 9986, 11857, 11953, 12000, 9986	
Hab.: Closed lowland forest and gorge, on rocks	
Dist.: Map 15	Alt.: 800-1250
Ch.: ES-M	GF.: GRH
Th. (GNP): VUL (8)	Th. (IR): NOT

Polypodium vulgare L., Sp. Pl.: 1085 (1753).

Mat: A-12192, 12024	
Hab.: On rocks in montane forest and exposed edges above rocky escarpments	
Dist.: Map 16	Alt.: 1400-2010
Ch.: PL ^(N Temperate & S. Africa)	GF.: GRH
Th. (GNP): VUL (4)	Th. (IR): NOT

The distinction between *Polypodium interjectum* and *P. vulgare* is not always easy. Above cited identifications need confirmation.

Woodsiaceae (Athriaceae)

Athyrium filix-femina (L.) Roth, Tent. Fl. Germ. 3: 65 (1799). Syn.: *Polypodium filix-femina* L., Sp. Pl.: 1090 (1753).

Mat: A-11598, 11597, 11997, 11992, 11236, 11237, 12209	
Hab.: Closed montane forest	
Dist.: Map 17	Alt.: 1450-1900
Ch.: PL ^(N Temperate, SE Asia; E & S. America)	GF.: GRH
Th. (GNP): RAR (9)	Th. (IR): NOT

The above cited plants differ greatly from each other in degree of pinnule dissection. In one extreme, A-11236, 11237 characterized by the shallowly divided and flat pinnules and close pinnae (similar to *Dryopteris caucasica* !); these were collected in Juni. In another extreme, A-12209 has ± undulate and finely dissected pinnules (similar to *Cheilanthes* !) and remote pinnae. This latter has been collected in October. The other specimens which have been collected in intervals between Juni and October are morphologically intermediates of the two described extremes.

Cystopteris fragilis (L.) Bernh., Neues J. Bot. 1 (2): 27 (1805). Syn.: *Polypodium fragile* L., Sp. Pl.: 1091 (1753).

Mat: A-9630, 11260, 11638, 12016, AS-6099	
Hab.: Gorges and crevices of rocks in closed montane forest	
Dist.: Map 18	Alt.: 900-2000
Ch.: SCO	GF.: GRH
Th. (GNP): VUL (5)	Th. (IR): NOT

Matteucia struthiopteris (L.) Tod., Gior. Sci. Nat. Econ. Palermo 1: 235 (1866). Syn.: *Osmunda struthiopteris* L., Sp. Pl.: 1066 (1753). Fig. 15, E.

Mat: A-11993	
Hab.: Damp soils under <i>Salix cf. caprea</i> around Sulukli Lake	
Dist.: Map 19	Alt.: 1380
Ch.: PL ^(Temperate Eurasia, E & N America)	GF.: GRH
Th. (GNP): END (1)	Th. (IR): END

3.3.3 GYMNOSPERMS**Cupressaceae**

Cupressus sempervirens L., Sp. Pl.: 1002 (1753). Only as cultivated plant in Tangelol Guesthouse. The wild occurrence of the species in W of the Park (pass to Kondeskuk), as mentioned by Frey (1980: 36) needs confirmation. According to Browicz (1982: 9) the easternmost natural localities of *C. sempervirens* is in Pol-Zoghla.

Juniperus communis L., Sp. Pl.: 1040 (1753). s. l. Fig. 9, B.

Mat: A-4470, 10534, 12058, 10672, 9948, 11515, AS-6091, W&al-11077*	
Hab.: A component of scrub mountain summits with <i>J. sabina</i> and <i>J. excelsa</i> ; steep rocky slopes, often with <i>Carpinus orientalis</i>	
Dist.: Map 20	Alt.: 800-2080
Ch.: PL ^(N Temperate)	GF.: PSN (prostrate)
Th. (GNP): NOT (18)	Th. (IR): VUL

The above cited plants belong either to subsp. *nana* Syme or subsp. *hemisphaerica* (J. & C. Presl) Nyman. W&al-11077 was identified by Browicz as subsp. *hemisphaerica*.

Juniperus excelsa M. Bieb., Beschr. Länd. Terek & Kur, bot. Anhang: 204 (1800). Fig. 9, A.

Mat: A- 4491, 6170, 9502, 9511; AS-6087; F-1000; GA-4878; R-53220*; U-16051*

Hab.: In cold and xeric steep mountains in steppe zone of the Park

Dist.: Map 21 Alt.: 1200-2200

Ch.: IT GF.: PTE/PSN

Th. (GNP): NOT (46) Th. (IR): IND

LN: Ev'ars (اورس)

I am unable to distinguish more than one taxon among the studied material from the Park. Probably, only subsp. *polycarpus* (K. Koch) Takht. occurs in our area (cf. Farjon 1992). Two of the above cited specimens (marked by an asterisk) were determined by Farjon (in 1992) under *J. excelsa*, without designation of the respective subspecies.

Juniperus sabina L., Sp. Pl.: 1039 (1753).

Mat: A-12063, 12021; AS-6092, 6115

Hab.: Subalpine limestone mountain peaks and clefts of vertical cliffs

Dist.: Map 22 Alt.: 1900-2400

Ch.: ES-M-IT (alpine) GF.: PSN (prostrate)

Th. (GNP): VUL (6) Th. (IR): END

The cones of the above cited plants are clearly larger (to 8 mm) than many European plants compared in M.

Thuja orientalis L., Sp. Pl.: 1002 (1753).

Cultivated in Mirza-Baylu station.

Ephedraceae

Ephedra distachy L., Sp. Pl. 1040 (1753). Syn.: *E. vulgaris* L. Rich.

Mat: A-12337 (Det.: H. Freitag)

Hab.: *Artemisia* steppe near Soolegerd

Dist.: NE Alt.: 1200

Ch.: IT-M-ES GF.: CFS

Th. (GNP): END (1) Th. (IR): NOT

Ephedra intermedia Schrenk & C. A. Mey., Vers. Monogr. Gatt. *Ephedra*: 88 (1846). Syn.: *E. persica* (Stapf) V. A. Nikitin, *E. glauca* Regel.

Mat: A-9835, 10425 (Revised by H. Freitag)

Hab.: *Artemisia* steppe and transition zone between *Artemisia* steppe and *Juniperus excelsa* woodland

Dist.: Map 23 Alt.: 1000-1360

Ch.: IT^{C, E} GF.: CFS

Th. (GNP): VUL (6) Th. (IR): NOT

Ephedra major Host, Fl. Aust. 2: 671 (1831).

subsp. *procera* (Fisch. & C. A. Mey.) Bomm., Bot. Jahrb. Syst. 140 (1928). Syn.: *E. procera* Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 10: 45 (1845).

Mat: A-4477*, 4877, 6163, 9416*, 9583*, 10462*, AS-5968, 6094; Moghadam-1296

Hab.: *Juniperus* woodland, *Paliurus* and *Acer monspessulanum* scrubs, mountain steppes

Dist.: Map 24 Alt.: 800-2400

Ch.: IT (M^E, ES^{EH}) GF.: PSG

Th. (GNP): NOT (41) Th. (IR): NOT

* Revised by H. Freitag (Kassel)

Pinaceae

Pinus halepensis Mill., Gard. Dict. ed. 8, n° 8 (1768).

Cultivated in Tangebog and Tangerang stations.

Taxaceae

Taxus baccata L., Sp. Pl.: 1040 (1753).

Mat: Jafari in A-12240

Hab.: Margin of Aq-Su spring

Dist.: C Alt.: ? 1200

Ch.: ES-M GF.: PTE

Th. (GNP): END (1) Th. (IR): END

Apparently, very rare in our area of high conservation value. This record is the easternmost known range of this endangered species in Iran.

3.3.4 ANGIOSPERMS (I. DICOTYLEDONES)

Aceraceae

Acer campestre L., Sp. Pl. 1055 (1753).

Mat.: A-6125, 10596, 11251, 11901, 10633, 11344	
Hab.: Closed montane forest	
Dist.: Map 25	Alt.: (900-)1150-2000
Ch.: ES [M]	GF.: PTS
Th. (GNP): NOT (38)	Th. (IR): NOT
LN.: Nar-Karko (نرکوکو)	

Acer cappadocicum Gled., Schrift. Ges. Naturf. Freunde Berlin 6: 116 tab. 2 (1785). Syn.: *A. laetum* C. A. Mey.; *A. cultratum* Wall.

Mat.: A 4993, 9246, 11906; R-52540, U-16178, W&C14171	
Hab.: Closed montane forest	
Dist.: Map 26	Alt.: (500-)1000-2000
Ch.: ES ^{EH}	GF.: PTS
Th. (GNP): NOT (118)	Th. (IR): NOT
LN.: Shirdar (شیردار)	

Acer hyrcanicum Fisch. & C. A. Mey., Ind. Sem. Horti Petrop. 4: 31 (1837). Syn.: *A. opalus* Hohen. non Aiton; *A. opalifolium* auct.

Mat.: A-11903	
Hab.: Subalpine forest in Alu-Baq summit	
Dist.: Map 27	Alt.: 2120-2150
Ch.: M ^E -ES ^{EH}	GF.: PTS
Th. (GNP): END (1)	Th. (IR): VUL

Acer monspessulanum L., Sp. Pl.: 1056 (1753). subsp. **turcomanicum** (Pojark.) E. Murray Kalmia 1: 8 (28.4.1969). Syn.: *A. turcomanicum* Pojark., Trudy Bot. Inst. Akad. Nauk. SSSR, Ser, 1, 1: 143 (1933); *A. monspessulanum* subsp. *turcomanicum* Rech. f. nom. illig. (published 30.4.1969). Fig. 8, F.

Mat.: A-4321, 4539, 11784; R-33167, 52598, 52808, 53216, 53162; U-16045; K-7746; WF-12685; Z-82/308, 85/308	
Hab.: Common in mesic valleys in scrub zones of the Park (usually provides its own thickets); steep slopes just after hyrcanian forest and scrubs	
Dist.: Map 28	Alt.: 650-2400

Ch.: IT ^{KK} as subspecies and IT-M ^{as species}	GF.: PTS/PSB
Th. (GNP): NOT (89)	Th. (IR): NOT
LN.: Karko (کَرکُو)	

Acer platanoides L., Sp. Pl.: 1055 (1753).

Mat.: A-11221, 12031	
Hab.: Montane forest	
Dist.: Map 29	Alt.: 1350-2000
Ch.: ES	GF.: PTS
Th. (GNP): NOT (18)	Th. (IR): VUL

Acer velutinum Boiss. Diagn. Pl. Orient. Nov. I, 6: 28 (1846).

Mat.: A-9247, 9301, 9325, 9766, 11220; F-1062, Korhonen-1035, R-33171, 52532, .	
Hab.: Moist places at margin of rivers, streams and springs in forested zone	
Dist.: Map 30	Alt.: 450-2000
Ch.: ES ^{HY}	GF.: PTS
Th. (GNP): NOT (169)	Th. (IR): NOT
LN.: Afra (افرا)	

Almost all above cited plants belong to var. *glabrescens* (Boiss. & Buhse) Rehder. Most of the dots in treated map referred to plantules which do not survive in unsuitable dry soils.

Amaranthaceae

Amaranthus albus L., Syst. Nat. ed. 10: 1268 (1759).

Mat.: A-12108	
Hab.: Roadside weed along the road to Tangegol	
Dist.: W	Alt.: 500
Ch.: PL (NEO) ^(native in south of north America)	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Amaranthus blitoides S. Watson, Proc. Amer. Acad. Arts 12: 273 (1877).

Mat.: A-12205, Z-82/1186	
Hab.: Roadside weed in Tunnel and road to Tangegol	
Dist.: C	Alt.: ca. 1000
Ch.: PL (NEO) ^(native in south of N America)	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Amaranthus cruentus L., Syst. Nat. ed. 10: 1269 (1759). s. l. (*sensu* Greuter & Burdet, Med-Checklist, 1: 46, 1984). Syn.: *A. chlorostachys* Willd.; *A. paniculatus* L.

Mat.: A-12203, 12116, 12301	
Hab.: Weed in garden of Tangegol & Tangerang	
Dist.: W, C	Alt.: 450-670
Ch.: PL (NEO)	GF.: TSC
Th. (GNP): END (3)	Th. (IR): NOT

Amaranthus caudatus L., Sp. Pl.: 990 (1753).

Mat.: A-12301	
Hab.: Cultivated in Tangegol garden	
Dist.: C	Alt.: 670
Ch.: PL (NEO)	GF.: TSC

Amaranthus retroflexus L., Sp. Pl.: 991 (1753).

Mat.: A-12115; U-19028	
Hab.: Weed in garden of Tangegol and Tangerang	
Dist.: C	Alt.: 450-670
Ch.: PL ^(N America) (NEO)	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

Amaranthus viridis L., Sp. Pl. ed. 2: 1405 (1763).

Mat.: A-11848	
Hab.: Lowland forest on disturbed soil along Madrasu river near Golestan Parking	
Dist.: C	Alt.: 500
Ch.: PL (NEO)	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

The species was recently reported as a new record for Iran (Akhani & Joharchi 1995).

Anacardiaceae

Pistacia atlantica Desf., Fl. Atlant. 2: 364 (1799).

Mat.: A-10470	
Hab.: Juniper woodland	
Dist.: Map 31	Alt.: 1300-1350
Ch.: IT ^{omni}	GF.: PTS
Th. (GNP): END (1)	Th. (IR): NOT

The cited specimen is young and therefore its subspecific status is not clear. According to its distribution, it may belong to subspp. *mutica* (Fisch. & C. A. Mey.) Rech. f.

Apiaceae (Umbelliferae)

Anthriscus cerefolium (L.) Hoffm., Gen. Pl. Umbell. ed. 1: 41 (1814). Syn.: *Scandix cerefolium* L., Sp. Pl.: 257 (1753).

Mat.: A-10830, 10416; AS-6013; K-5682, W&A-10947	
Hab.: Shady and rather disturbed habitats in scrub and steppe communities	
Dist.: Map 32	Alt.: 1000-1200
Ch.: ES-M	GF.: TSC
Th. (GNP): VUL (6)	Th. (IR): NOT

Anthriscus nemorosus (M. Bieb.) Spreng., Pl. Umb. Prodr. 27 (1813). Syn.: *Chaerophyllum nemorosum* M. Bieb. Fl. Taur.-Caucas. 1: 232 (1808).

Mat.: A-10667, 11123, 11256, 11764	
Hab.: Grassy open scrubs (often with <i>Quercus macranthera</i> and <i>Carpinus orientalis</i>)	
Dist.: Map 33	Alt.: 1100-2230
Ch.: PL (mainly ES)	GF.: TSC
Th. (GNP): VUL (8)	Th. (IR): NOT

Anthriscus sylvestris (L.) Hoffm., Gen. Pl. Umbell. ed. 1: 40 (1814). Syn.: *Chaerophyllum sylvestris* L., Sp. Pl.: 258 (1753).

Mat.: A-6017 (determination uncertain)	
Hab.: <i>Paliurus spina-christi</i> - <i>Acer monspessulanum</i> scrub near Sharleg	
Dist.: S	Alt.: 1000
Ch.: PL (mainly ES)	GF.: TSC
Th. (GNP): END (1)	Th. (IR): END

Apium graveolens L., Sp. Pl.: 264 (1753).

Mat.: A- 12139	
Hab.: Margin of a brackish spring N Mirza-Baylu plain associated with <i>Juncus maritimus</i> , <i>J. inflexus</i> , <i>Samolus valerandi</i> , <i>Pulicaria dycentrica</i> and <i>Phragmites australis</i>	
Dist.: E	Alt.: 1280
Ch.: SCO	GF.: GTU (biennial)
Th. (GNP): END (1)	Th. (IR): VUL

Astrodaucus orientalis (L.) Drude in Engl. & Prantl, Natürl. Pflanzenfam. III, 8: 271 (1898). Syn.: *Caucalis orientalis* L., Sp. Pl.: 241 (1753); *C. pulcherrima* Willd.; *Daucus pulcherrimus* (Willd.) W. D. Koch ex DC.; *Torilis orientalis* (L.) Calest.

Mat.: A-11691; W&C-14204	
Hab.: Montane open scrub in Almeh & Ilanli	

Dist.: S, C	Alt.: 1620-1700
Ch.: IT ^{W&C}	GF.: GTU (biennial)
Th. (GNP): END (2)	Th. (IR): IND

The report of *A. persicus* by Zehzad (in Hasan-zadeh-Kiabi & al. 1994: 101) is a misidentification of W&C-14204 (TARI) (Zehzad, pers. comm.).

Berula angustifolia (L.) Mert. & W. D. Koch. in Röhl., Deutschl. Fl. 2, ed. 3: 25, 433 (1826). Syn.: *Sium angustifolium* L., Sp. Pl. ed. 2: 1672 (1763); *Berula erecta* (Huds.) Coville; *Siella erecta* (Huds.) Pimenov; *Berula orientalis* Schischk.

Mat.: A-9907, 9852.11560	
Hab.: Waterside in forest and steppe	
Dist.: Map 34	Alt.: 500-1100
Ch.: PL	GF.: HST
Th. (GNP): END (3)	Th. (IR): IND

Bifora testiculata (L.) Spreng. in Roem. & Schult., Syst. Veg. 6: 38 et 448 (1820). Syn.: *Coriandium testiculatum* L., Sp. Pl.: 256 (1753); *Bifora dicocca* Hoffm.

Mat.: R-52511	
Hab.: Ruderal places in Tangerang	
Dist.: W	Alt.: c. 450
Ch.: IT-M	GF.: TCA
Th. (GNP): END (1)	Th. (IR): NOT

Bunium kuhitangi Nevski, Trudy Bot. Inst. Akad. Nauk. SSSR, Ser. 1, 4: 274 (1937). Syn.: *B. longipes* Freyn var. *depressum* Korovin et var. *ellipsoideum* Freyn; *B. cylindricum* (Boiss. & Hohen.) Drude var. *minor* Freyn.

Mat.: A-10874, 10911, AS-5965, R-52803, 53007 (young, lacks fruit)	
Hab.: <i>Artemisia</i> steppe in Mirza-Baylu and <i>Paliurus</i> scrub in Sharleq	
Dist.: S, E	Alt.: 1000-1200
Ch.: IT ^E	GF.: GBT
Th. (GNP): VUL (5)	Th. (IR): VUL

As mentioned by Rechinger (Fl. Iranica 162: 246, 1987), the specific separation of *B. kuhitangi* from *B. persicum* is doubtful.

Bunium wolffii Kljuykov, Byull. Moskovsk. Obshch. Isp. Prir., Otd. Biol. 90: 84 (1985).

Mat.: A-11352, F-1124, R-53138	
Hab.: Juniper woodland and montane steppe in	

Almeh & Divar-Kaji	
Dist.: C	Alt.: 1500-2100
Ch.: IT ^C	GF.: GBT
Th. (GNP): END (3)	Th. (IR): RAR

Bupleurum exaltatum M. Bieb., Tabl. Prov. Cote Occid. Mer. Casp. 113 (1798) et Besch. Länd. Terek Casp. 156 (1800). Syn.: *B. linearifolium* DC.; *B. falcatum* L. subsp. *exaltatum* (M. Bieb.) Wolff var. *linearifolia* (DC.) Wolff; *B. kotschy-anum* Boiss.; *B. linearifolium* DC. var. *kotschy-anum* (Boiss.) Boiss.

Mat.: A-9460, 10848, 10917; W&C-14240; ZK-82/312	
Hab.: Sandy alluvial soils in dry stream bed and limestone rocks in <i>Juniperus excelsa</i> , <i>Acer monspessulanum</i> , <i>Haloxylon</i> scrubs	
Dist.: Map35	Alt.: 1200-2000
Ch.: IT ^{omni}	GF.: CSE
Th. (GNP): RAR (10)	Th. (IR): NOT

The record of *Bupleurum cerneum* by Zehzad (in Hasan-zadeh-Kiabi & al. 1994: 103) is misidentification of W&C-14204.

Bupleurum marschallianum C. A. Mey., Verz. Pfl. Cauc. 114 (1831). Syn.: *B. gracile* DC. Fig. 13, A.

Mat.: A-9681, 9717, 11815, 12195	
Hab.: Forest clearings in succession scrub and <i>Pteridium aquilinum</i> communities	
Dist.: Map 36	Alt.: 450-1100
Ch.: ES ^{EH}	GF.: TSC/TST
Th. (GNP): VUL (6)	Th. (IR): RAR

Bupleurum rotundifolium L., Sp. Pl.: 236 (1753).

Mat.: A-9501, 11095; R-52671; W&C14200	
Hab.: Open scrub	
Dist.: Map 37	Alt.: 760-1820
Ch.: IT-M	GF.: TSC
Th. (GNP): VUL (5)	Th. (IR): NOT

Caucalis platycarpus L., Sp. Pl.: 241 (1753). Syn.: *C. daucoides* L.

Mat.: A-10615; R-52445, 52448, 53146	
Hab.: On limestone rock in open scrub, <i>Stipa</i> steppe	
Dist.: Map 38	Alt.: 500-1830
Ch.: IT-M	GF.: TSC
Th. (GNP): IND (20)	Th. (IR): NOT

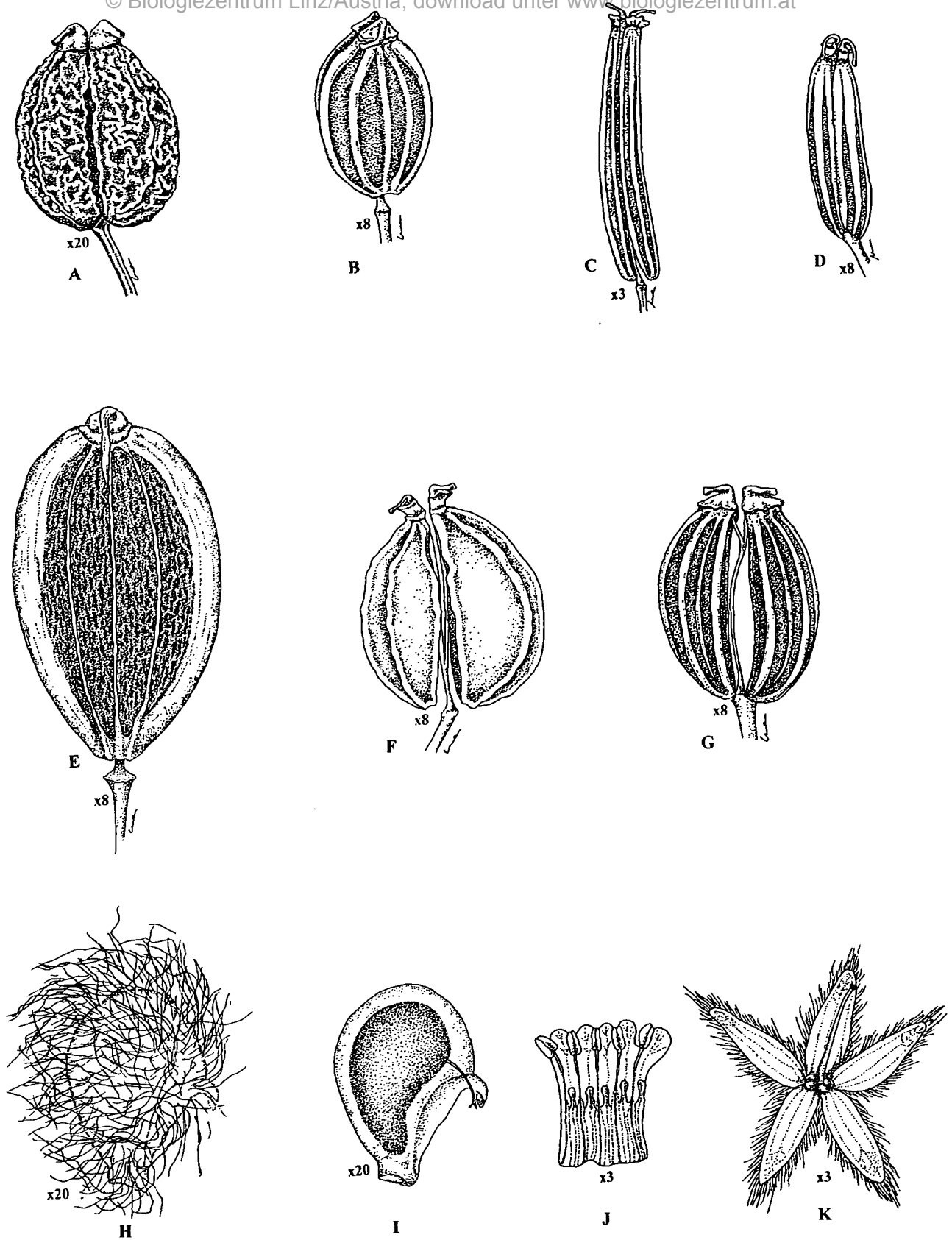


Fig. 13: *Apiaceae* fruits (A-G): A, *Bupleurum marschallianum* (Akhani 12303) B, *Cervaria cervariifolia* (Akhani 9459); C, *Chaerophyllum khorassanicum* (Akhani 12067); D, *Chaerophyllum bulbosum* (Akhani 11124); E, *Dorema hyrcanum* (Akhani 9560); F, *Eleutherospermum cicutarium* (Akhani 11517); G, *Froriepia subpinnata* (Akhani 12257). *Bombycilaena erecta* (Akhani 11148): H, involucre bracts enclosing radiate flowers and achenes; I, achene position and style placement. *Cynoglossum kandavanensis* (Typus, Gauba 1640), J, flower, K, calyx. Drawn by C. Wolf.

Cervaria cervariifolia (C. A. Mey.) Pimenov, Fl. Iranica 162: 452 (1987). Syn.: *Peucedanum cervariifolium* C. A. Mey., Verz. Pfl. Cauc. 126 (1831); *P. sintenisii* H. Wolff, *P. physospermoides* Bornm. & Gauba. Fig. 13, B.

Mat.: A-4487, 9459, 10772, 11157, 11756; W&C-14243 (n.v.), 14290	
Hab.: <i>Quercus macranthera</i> forest, <i>Acer monspessulanum</i> and juniper woodlands	
Dist.: Map 39	Alt.: 800-2230
Ch.: ES ^{HY}	GF.: HSR
Th. (GNP): NOT (17)	Th. (IR): IND

Chaerophyllum bulbosum L., Sp. Pl.: 258 (1753). Syn.: *Ch. caucasicum* (Hoffm.) Schischk. Fig. 13, D.

Mat.: A-4403, 10647, 11124, 11288, 11339, 11683	
Hab.: Closed montane forest	
Dist.: Map 40	Alt.: 1400-1900
Ch.: ES	GF.: GBT
Th. (GNP): RAR (9)	Th. (IR): END

Chaerophyllum khorassanicum Czerniak. ex Schischk., Fl. URSS 16: 590 (1950). Figs 13, C; 15, H.

Mat.: A-11287, 11334, 11739, 11766, 12067	
Hab.: <i>Quercus macranthera</i> forest; on lime soils between <i>Rhamnus pallasii</i> scrubs between cold-deciduous montane forest and <i>Juniperus excelsa</i> woodland	
Dist.: Map 41	Alt.: 1800-2230
Ch.: IT ^{KK}	GF.: GBT
Th. (GNP): VUL (7)	Th. (IR): VUL

Conium maculatum L., Spec. Plan. 243 (1753). Syn.: *C. leiocarpum* (Boiss.) Stapf & Wettst.

Mat.: A-4336, 11122, 11711, 11894; R-37630, 52522*	
Hab.: Moist and ruderal places, grassy scrub	
Dist.: Map 42	Alt.: 500-1650
Ch.: PL	GF.: HSC (biennial)
Th. (GNP): VUL (6)	Th. (IR): NOT

* R-52522 (between Tangerang and Tangegol) cannot be localized in the map.

Daucus carota L., Sp. Pl.: 242 (1753). s. l. Fig. 15, I.

Mat.: A-4971*, 5910*, 9643**, E-705* GA-4919**, IZ-40464*, WF-12846**

Hab.: Closed lowland forest, rocky outcrops, streamside, pioneer scrub	
Dist.: Map 43	Alt.: 500-1000
Ch.: PL	GF.: HSC
Th. (GNP): RAR (11)	Th. (IR): SUN

* subsp. *carota*

** subsp. *maximus* (Desf.) Ball

Daucus guttatus Sm. in Sibth. & Sm., Prodr. Fl. Graec. 1: 184 (1806).

Mat.: A-12208	
Hab.: Lowland forest and forest margin with scrub of <i>Crataegus-Prunus</i> and <i>Pteridium aquilinum</i> in western parts of Beili-Kuh	
Dist.: NW	Alt.: 1050-1100
Ch.: M [ES ^{HY}]	GF.: TSC
Th. (GNP): END (2)	Th. (IR): RAR

Dorema hyrcanum Koso.-Pol., Bot. Mater. Gerb. Glavn. Bot. Sada SSSR 2, 16-17: 67 (1921). Syn.: *D. glabrum* sensu Aitch. non Fisch. & C. A. Mey. Fig. 13, E.

Mat.: A-9560, 9866, 10910, 11006; T-40461; WF-12713; R-53218	
Hab.: Bottom of valleys and along brooklets on moist or alluvial soils	
Dist.: Map 44	Alt.: 1080-1800
Ch.: IT ^{KK/C?}	GF.: HSR
Th. (GNP): VUL (7)	Th. (IR): VUL

Eleutherospermum cicutarium (M. Bieb.) Boiss., Fl. Orient. 2: 924 (1872). Syn.: *Smyrnum cicutarium* M. Bieb.; Fl. Taur.-Caucas. 1: 239 (1808); *Eleutherospermum grandifolium* K. Koch. Fig. 13, F.

Mat.: A-11265-a, 11517	
Hab.: Closed montane forest	
Dist.: Map 45	Alt.: 1440-2000
Ch.: ES ^{EH}	GF.: GRH
Th. (GNP): VUL (10)	Th. (IR): END

E. cicutarium was known by Rechinger (Flora Iranica, 162: 177-178, 1987) only from a few localities in W of the Caspian forests. The occurrence of this species in the easternmost area of the South Caspian forests suggests that it may be found throughout the forested zone.

Eriocyclus ghafooriana Akhani (in press in Edinburgh J. Bot. 56 (1), 1999). Fig. 15, J.

Mat.: A-12002, 12322	
Hab.: Vertical limestone cliffs above Zav	
Dist.: Map 46	Alt.: 600
Ch.: ES ^{HY} (Endemic)	GF.: CSC
Th. (GNP): END (2)	Th. (IR): END

Eryngium bungei Boiss., Fl. Orient. 2: 824 (1872).

Mat.: A-9462; R-52911	
Hab.: Juniper woodland	
Dist.: Map 47	Alt.: 1200-1600
Ch.: IT ^C	GF.: HSR TH
Th. (GNP): VUL (5)	Th. (IR): NOT

Eryngium caucasicum Trautv., Trudy Glavn. Bot. Sada 1: 23 (1871). Syn.: *E. caeruleum* M. Bieb.; *E. biebersteinianum* Nevski.

Mat.: A-4376; E-704; GA-4915; R-52429; IZ-15345	
Hab.: Pioneer scrub and forest clearings dominated by <i>Pteridium aquilinum</i> ; open scrub on rocky outcrops; disturbed and grazed shrublands	
Dist.: Map 48	Alt.: 450-1600
Ch.: IT ^{omni (except W)}	GF.: HSR TH
Th. (GNP): NOT (36)	Th. (IR): NOT

Falcaria vulgaris Benth., Syst. Verz. Erfurt: 176 (1800). Syn.: *Sium falcaria* L., *F. persica* Stapf & Wettst.; *F. vulgaris* Bernh. var. *persica* (Stapf & Wettst.) Bornm.

Mat.: E-789; GA-4874; W&C-14253	
Hab.: Open scrubs (<i>Paliurus spina-christi</i> and <i>Crataegus-Prunus</i>), and <i>Pteridium aquilinum</i> community; disturbed and wet places	
Dist.: Map 49	Alt.: 1000-1700
Ch.: ES-IT-M	GF.: HSR
Th. (GNP): VUL (6)	Th. (IR): NOT

Ferula badrakema Koso.-Pol., Bot. Mat. Herb. Gl. Bot. Sada 2: 62 (1921). Syn.: *F. aghanistanica* Hiro. Fig. 15, F, G.

Mat.: A-10855	
Hab.: <i>Juniperus excelsa</i> woodland in Chond-e Abbas Mountain	
Dist.: S	Alt.: 1700
Ch.: IT ^{KK?}	GF.: GTU
Th. (GNP): END (1)	Th. (IR): END

Ferula oopoda (Boiss. & Buhse) Boiss., Fl. Orient. 2: 984 (1872). Syn.: *Peucedanum oopodum* Boiss. & Buhse, Nouv. Mém. Soc. Imp. Naturalistes Moscou, 12: 100 (1860).

Mat.: A-10557, 11709	
Hab.: Disturbed places in remnants of a stable	
Dist.: Northern border	Alt.: ca. 1000
Ch.: IT ^C	GF.: HSR
Th. (GNP): END (1)	Th. (IR): END

The identity of above cited plants is uncertain. A-10557 has been gathered early in spring (30.4.1995) with only basal leaves and A-11709 in late summer (9.7.1995) (only with remainings of leaf sheaths, without flowers and fruit), respectively. The leaf sheaths (ca. 2-3 X 8 cm) are relatively shorter than those of *F. oopoda*. Furthermore, the previously known localities of *F. oopoda* are in C, W and S Iran. New collections are required for a reliable identification.

Ferula ovina (Boiss.) Boiss., Fl. Orient. 2: 986 (1872). Syn.: *Peucedanum ovinum* Boiss., Diagn. Pl. Orient. Nov. sér. 1,6: 61 (1846); *F. kopet-daghensis* Korovin.

Mat.: A-10811, 10328; T-40459; R-53137; WF-12660; Z&al-86/2644 (p. p.)	
Hab.: Various mountain steppes, scrubs (maple and <i>Paliurus</i>), juniper woodland; <i>Artemisia</i> steppe	
Dist.: Map 50	Alt.: 1000-2380
Ch.: IT ^{C&E}	GF.: HSR
Th. (GNP): NOT (39)	Th. (IR): SUN

Ferula szowitsiana DC., Prodr. 4: 173 (1830). Syn.: *F. microloba* Boiss.; *F. hirtella* Boiss.; *F. collina* Freyn; *F. khorassanica* Rech. f. & Aellen.

Mat.: A-9525, 11071, 10847, 10871, 12288; R-53135, 52945; Sabeti-10447; WF-12715	
Hab.: <i>Artemisia</i> steppe, mountain steppe (mixed of grasses and thorn-cushions)	
Dist.: Map 51	Alt.: 1200-1750
Ch.: IT ^{W&C}	GF.: HSR
Th. (GNP): RAR (14)	Th. (IR): SUN

Herbarium W contains a material from the Park treated by Chamberlain under *F. flabelliloba* Rech. f. & Aellen: L'embranchement de la route Almeh (Dasht), 1200 m, 6.6.1975, Terme 41546-E. *F. karakalensis* Korovin is another species of this complex which was reported from our area by

Chamberlain & Rechinger (Fl. Iranica, 162: 405-406, 1987): based on Wendelbo & Foroughi 12715 (S Alneh). Although the specimen has not been seen, but based on my field studies and study of ample herbarium material (and discussion with Dr Chamberlain in Edinburgh), not more than one species can be distinguished in our area.

Froriepia subpinnata (Ledeb.) Ball, Hist. Pl. 7: 220 (1880). in adnot. Syn.: *Bupleurum subpinnatum* Ledeb. in Eichw., Pl. Nov. 13, tab. 11 (1831). Fig. 13, G.

Mat.: A-12394, 12257	
Hab.: Scrubs and forest clearings; garden of Park Center in Tangerang	
Dist.: Map 52	Alt.: 450-850
Ch.: ES ^{HY}	GF.: HSR (biennial)
Th. (GNP): VUL (4)	Th. (IR): RAR

Johrenia golestanica Rech. f., Fl. Iranica 162: 376 (1987). Fig. 14.

Mat.: A-12387, 12258, 12302, 12182, 11868, 11892, 12048, 11537*, 11807*, 9680*, 9813*, 11100*, 9585*; TM-35109;	
Hab.: Forest clearings (both lowland and montane), rocky outcrops, <i>Crataegus</i> , <i>Acer monspessulanum</i> and <i>Paliurus</i> scrubs	
Dist.: Map 53	Alt.: 450-2000
Ch.: ES ^{HY}	GF.: HSR
Th. (GNP): NOT (28)	Th. (IR): IND

* Specimens marked with an asterisk are young plants only with basal leaves, or young stems without fruit and flowers and therefore their identity is uncertain. Some of these may refer to *Froriepia subpinnata*. *Johrenia golestanica* produces two kinds of basal leaves. The first ones withered at the time of flowering or during early fruiting time. The second are produced in the fruiting time after autumn rainfalls. They are 1-pinnate, shiny green 5-20 cm long (incl. petiole), with 4-7 pairs of pinnae. The pinnae are ovate, 1-2 cm long and deeply incised. (cf. Fig. 14).

In W there is only Terme & Matine 35110 marked as type of the above species. But in the original description (Fl. Iranica 162: 376, 1987) number 35109-E is designated as type material.

Heracleum gorganicum Rech. f., Anz. Österr. Akad. Wiss. Math.-Naturwiss. Kl. 89: 200 (1952).

Mat.: A-4356, 4400, 10591	
Hab.: Closed montane forest	
Dist.: Map 54	Alt.: 1220-2130
Ch.: ES ^{HY}	GF.: HSC
Th. (GNP): NOT (26)	Th. (IR): SUN

Korovinia tenuisecta (Regel & Schmalh.) Nevski & Vved., Trudy Bot. Inst. Akad. Nauk. SSSR, Ser. 1, 4: 273 (1937). Syn.: *Peucedanum tenuisectum* Regel & Schmalh., Izv. Obsh. Ljub. Estv. Antr. Etnogr. 34,2: 37 (1882); *Galagania tenuisecta* (Regel & Schmalh.) M. Vassilcz. & Pimenov.

Mat.: A-11246, 10918; R-52961, T-40460, 41541, 41544	
Hab.: <i>Artemisia</i> steppe, on gravelly soils bottom of Alneh valley with scattered <i>Haloxylon</i> and <i>Juniperus excelsa</i> shrubs	
Dist.: Map 55	Alt.: 1100-1400
Ch.: IT ^{E & KK}	GF.: GTU/HSR
Th. (GNP): VUL (7)	Th. (IR): RAR

Korshinskya kopetdaghensis (Korovin) Pimenov & Kljuykov, Bot. Zhurn. URSS 66: 481 (1981). Syn.: *Physospermum kopetdaghensis* Korovin, Novosti Sist. Vyssh. Rast. 5: 84 (1924); *Scaligeria kopetdaghensis* (Korovin) Schischk. See Pimenov & Kljuykov (1995).

Mat.: A-11165; R-53006; T-41549	
Hab.: Juniper woodland	
Dist.: Map 56	Alt.: 1200-1400
Ch.: IT ^{KK}	GF.: GTU
Th. (GNP): VUL (4)	Th. (IR): END

Laser rechingeri Akhani, Ann. Naturhist. Mus. Wien, 98 B Suppl. 99 (1996).

Mat.: A-11443, 11510, 12023, 12045	
Hab.: Vertical rock cliffs	
Dist.: Map 57	Alt.: 850-2010
Ch.: ES ^{HY} (endemic)	GF.: HSR
Th. (GNP): VUL (7)	Th. (IR): VUL

The generic position of this enigmatic plant which was uncertain in the original description will be discussed in a coming paper.

Laser trilobum (L.) Borkh., Botaniker (Halle) 13-15: 246 (1795). Syn.: *Laserpitium trilobum* L., Sp. Pl.: 248 (1753); *Siler trilobum* (L.) Crantz.

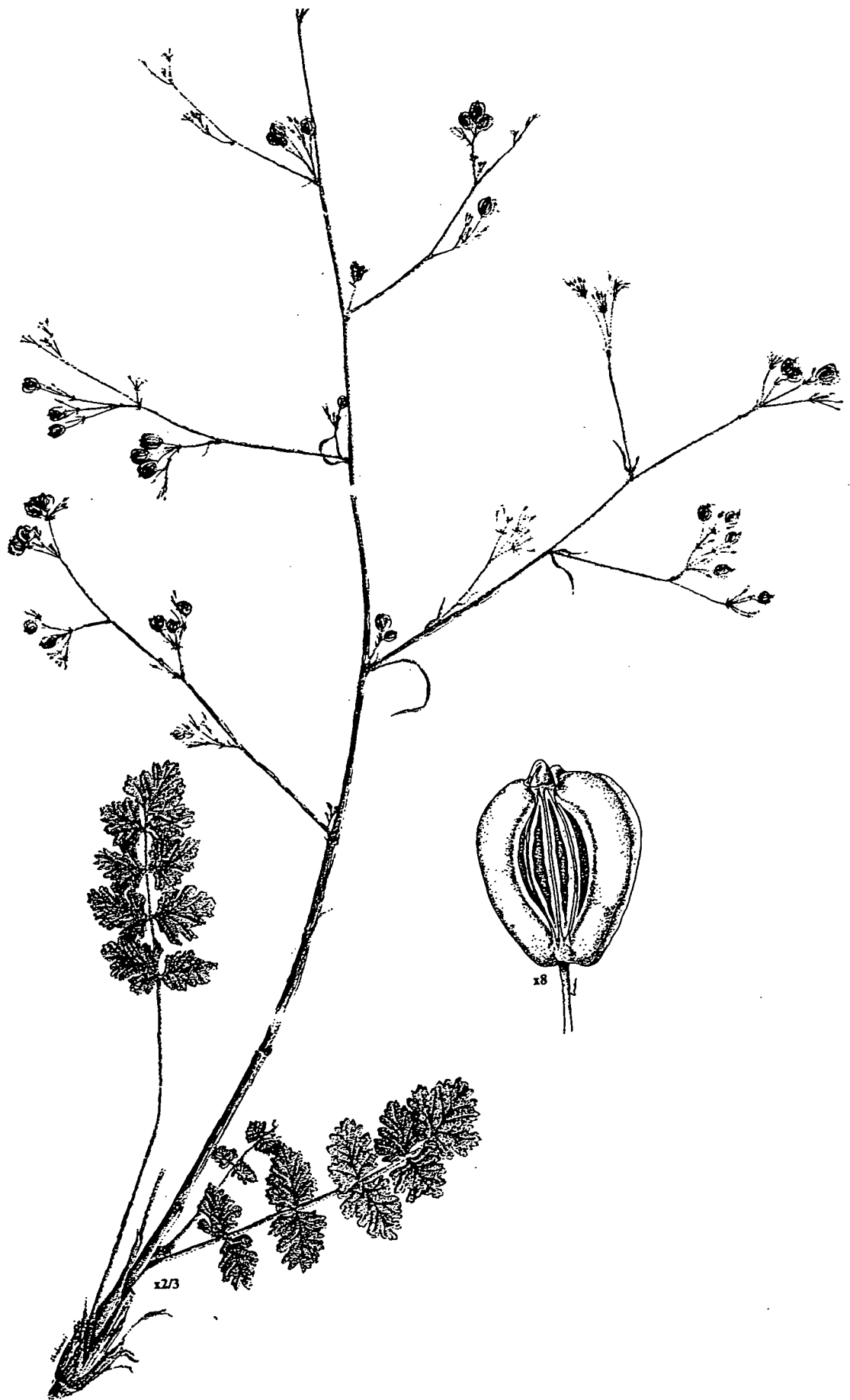


Fig. 14: *Johrenia golestanica* Rech. f. (Akhani 12302). Habitus drawn by Sh. Shokravi, fruit drawn by C. Wolf.

Mat.: A-4388, 4988, 9892; R-52670; TM-34937	
Hab.: Open scrubs, rocky outcrops; lowland and montane forest margins, often with <i>Carpinus orientalis</i>	
Dist.: Map 58	Alt.: 700-1900
Ch.: M [ES]	GF.: HSC
Th. (GNP): NOT (33)	Th. (IR): SUN

Lecokia cretica (Lam.) DC. Coll. Mém. (Ombellif.) 5: 67 (1829). Syn.: *Cachrys cretica* Lam., Encycl. Meth. Bot. 1: 259 (1783); *Scandix latifolia* Sm.

Mat.: A-11289, 11112; AS-6021, 6078; RE-16176; TM-34934; W&al-10959	
Hab.: Closed montane forest and <i>Carpinus orientalis</i> scrub	
Dist.: Map 59	Alt.: 650-1960
Ch.: M ^E -ES ^{HY}	GF.: GRH/HSR
Th. (GNP): RAR (13)	Th. (IR): RAR

Leutea gracillima Pimenov, Fl. Iranica 162: 448 (1987).

Mat.: A-12060, 10540; W&C-14243	
Hab.: Crevices of limestone cliffs in juniper woodland in S Almehr and Gerieh-Sar	
Dist.: C, S	Alt.: 1750-2000
Ch.: IT ^{KK}	GF.: HSR
Th. (GNP): END (2)	Th. (IR): END

Further field studies are needed to be certain on the specific separation of *L. gracillima* from *L. petiolaris* (DC.) Pimenov. A-10540 is a young specimen only with basal leaves. The terminal leaf segments are 5-7 cm long (in *L. gracillima* to 2.5 cm long). This may belong to *L. petiolaris*.

Opopanax hispidus (Friv.) Griseb., Spicil. Fl. Rumel. 1: 378 (1843). Syn.: *Ferula hispida* Friv., Flora 18: 333 (1835); *O. orientalis* Boiss.; ? *O. persicus* Boiss.

Mat.: A-10975, 9518, 9400, 10801; R-53136; WF-12636	
Hab.: Mountain steppe (subalpine meadows, grassy steppes with thorn-cushions); open scrubs of <i>Acer monspessulanum</i> and <i>Crataegus</i> spp.	
Dist.: Map 60	Alt.: 1450-2170
Ch.: M-IT ^W	GF.: HSR/HSC
Th. (GNP): RAR (13)	Th. (IR): RAR

R-53136, WF-12636 were determined by Rechinger as *O. persica* (cf. Rechinger in Fl. Iranica 162: 439, 1987). The leaves beneath of A-9400 are distinctly hispid, those of WF-12636 sparsely hispid, of R-53136 & A-10801 subglabrous and A-10975 glabrous, respectively. All were collected from the same population in Almehr. Clearly leaf indumentum cannot be considered as a constant specific character to distinguish *O. persica* from *O. hispidus* anymore. This has already been mentioned by Chamberlain in Flora of Turkey, 4: 473, 1972.

Orlaya daucoides (L.) Greuter, Boissiera 13: 92 (1967). Syn.: *Caucalis daucoides* L., Sp. Pl.: 241 (1753).

Mat.: A-11434	
Hab.: Rocky outcrops (<i>Carpinus orientalis</i> and <i>Quercus castaneifolia</i> scrub) in NW Tangegol	
Dist.: C	Alt.: 760-800
Ch.: M [ES ^{HY}]	GF.: TSC
Th. (GNP): END (1)	Th. (IR): END

Apparently no material has been seen by Rechinger (Fl. Iranica 162: 120, 1987) from Iran. The material cited above is over-ripe, without flowers. But the presence of two rows of crisped hairs in primary ridges of fruits and scarious bracts at the margin match well with *O. daucoides*, as compared with many identical plants in herbarium M.

Physocaulis nodosus (L.) W. D. Koch, Syn. Fl. Germ. ed. 2: 348 (1843). Syn.: *Scandix nodosa* L., Sp. Pl.: 257 (1753); *Myrrhoides nodosus* (L.) Cannon.

Mat.: A-11129; R-52642; TM-34936	
Hab.: Open scrub in Tangegol and Koilar	
Dist.: NW, C	Alt.: 600-1500
Ch.: ES-M-IT	GF.: TSC
Th. (GNP): END (3)	Th. (IR): RAR

Pimpinella affinis Ledeb., Fl. Ross. 2: 257 (1844). Syn.: *P. reuteriana* Boiss.; *P. multiradiata* (Boiss.) Korovin.

Mat.: A-12381 (sterile), A- s. n. (cultivated material in Munich Botanical Garden)	
Hab.: Steep N-facing slopes in <i>Carpinus orientalis</i> - <i>Quercus castaneifolia</i> scrub mixed with C ₄ grasses near Golestan Parking	
Dist.: C	Alt.: 700
Ch.: IT-ES ^{EH}	GF.: HSR/GTU
Th. (GNP): END (1)	Th. (IR): NOT

Pimpinella anthriscoides Boiss., Fl. Orient. 2: 874 (1872). Syn.: *P. cervariifolia* Freyn & Sint., *Sium lanceolatum* M. Bieb. var. *elongatum* Parsa . var. **anthriscoides**

Mat.: A-11265-b, 11595; F-1007	
Hab.: Closed montane forest, <i>Carpinus orientalis</i> comm.	
Dist.: Map 61	Alt.: 1800-1960
Ch.: ES ^{HY} -M ^E	GF.: HSR/GTU
Th. (GNP): VUL (8)	Th. (IR): VUL

Pimpinella tragium Vill., Prosp. Hist. Pl. Dauphiné 24 (1779). s. l.

Mat.: A-11048; WF-12670, 53133	
Hab.: Crevices of limestone cliffs in juniper woodland, grassy mountain steppes with thorn-cushions, <i>Acer monspessulanum</i> and <i>Crataegus</i> open scrubs	
Dist.: Map 62	Alt.: 1500-1880
Ch.: IT-ES-M	GF.: CHE
Th. (GNP): RAR (12)	Th. (IR): NOT

This very variable species is considered here in a broad sense. WF-12670, 53133 were identified by Engstrand as subsp. *lithophila* (Schischk.) Tutin (cf. Fl. Iranica 162: 325, 1987).

Prangos latiloba Korovin, Bot. Mater. Gerb. Glavn. Bot. Sada RSFRS 5: 74 (1924). Syn.: *Cachrys latiloba* (Korovin) Herrnst. & Heyn .

Mat.: A-10443, 10766, 11175; R-53215	
Hab.: <i>Artemisia</i> steppe, juniper woodland	
Dist.: Map 63	Alt.: 1100-1450
Ch.: IT ^C	GF.: HSR
Th. (GNP): VUL (5)	Th. (IR): IND

Sanicula europaea L., Sp. Pl.: 235 (1753).

Mat.: A-4389, 9890; F-1008	
Hab.: Montane closed forest	
Dist.: Map 64	Alt.: 1000-2000
Ch.: ES [M]	GF.: HRO
Th. (GNP): NOT (64)	Th. (IR): SUN

Scandix pecten-veneris L., Sp. Pl.: 256 (1753). Syn.: *S. persica* Mart.

Mat.: A-10447; FU-5117; R-52765; TM-34935	
Hab.: <i>Artemisia</i> steppe, rocky outcrops, ruderal places in Tangeqol, Sharleq and Dasht	
Dist.: C, S	Alt.: 600-1200

Ch.: IT-ES-M	GF.: TCA
Th. (GNP): SUN (4)	Th. (IR): NOT

Scandix stellata Banks & Sol. in Russell, Nat. Hist. Aleppo ed. 2, 2: 249 (1794).

Mat.: A-6228, 10475; R-53004; 53134; Z&a-8672595	
Hab.: Various kinds of scrub communities (<i>Acer monspessulanum</i> , <i>Paliurus spina-christi</i> , <i>Haloxylon ammodendron</i> , and <i>Juniperus excelsa</i>)	
Dist.: Map 65	Alt.: 970-1820
Ch.: IT-M	GF.: TCA
Th. (GNP): NOT (16)	Th. (IR): NOT

Seseli tortuosum L., subsp. **kiabii** Akhani (in press in Edinburgh J. Bot. 56 (1), 1999).

Mat.: A-11563, 12107, 12230, 12238, 12274, 12370, 12385	
Hab.: Rocky outcrops in open <i>Carpinus orientalis</i> - <i>Quercus castaneifolia</i> or <i>Paliurus spina-christi</i> scrubs	
Dist.: Map 66	Alt.: 650-2000
Ch.: ES ^{HY} (Endemic, as species M-ES)	GF.: HSR
Th. (GNP): RAR (14)	Th. (IR): SUN

As species a new record for Iran and as subspecies new for science, described in details in Akhani (1999).

Tordylium maximum L., Sp. Pl.: 240 (1753).

Mat.: A-11423; R-52669	
Hab.: Weed in garden of protection station, <i>Quercus castaneifolia</i> forest, scrub of <i>Acer monspessulanum</i> and <i>Lonicera floribunda</i>	
Dist.: Map 67	Alt.: 670-1120
Ch.: ES-M	GF.: TSC (HSC)
Th. (GNP): VUL (4)	Th. (IR): END

Torilis arvensis (Huds.) Link, Enum. Hort. Berol. Alt. 1: 265 (1821). Syn.: *Caucalis arvensis* Huds., Fl. Angl. 99 (1762); *C. fallax* Boiss.

Mat.: R-52468, 52607; T-41542	
Hab.: Open scrub from Tangerang to Tangeqol	
Dist.: W, C	Alt.: 500-1120
Ch.: PL	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): SUN

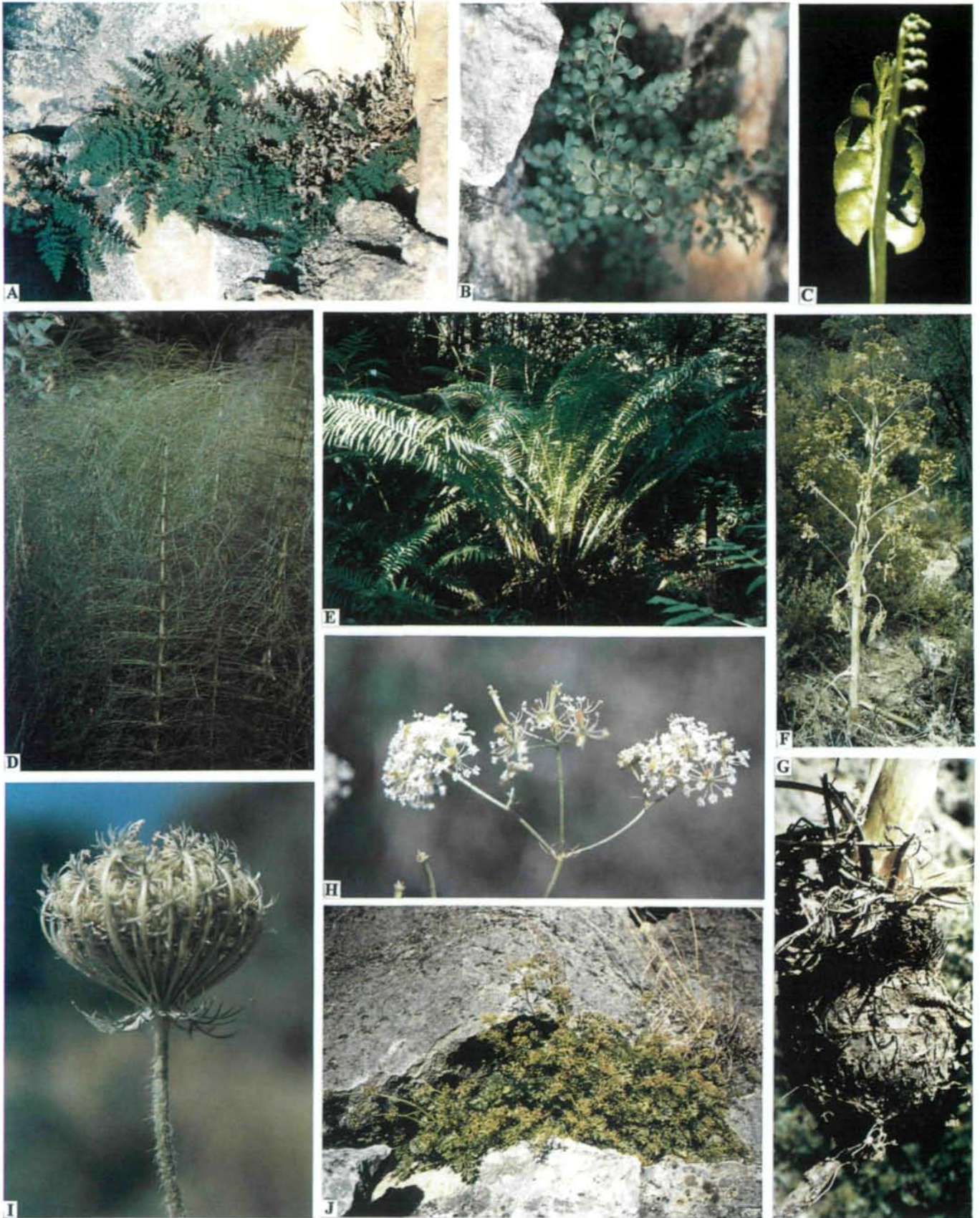


Fig. 15: A, *Cheilanthes persica*; B, *Asplenium ruta-muraria*; C, *Botrychium lunaria*; D, *Equisetum telmateia*; E, *Matteucia struthiopteris*; F-G, *Ferula badrakema*, habitus (F) and underground root tuber (G); H, *Chaerophyllum khorassanicum*; I, *Daucus carota* subsp. *maximus*; J, *Eriocyclus ghafooriana*.

Torilis heterophylla Guss., Fl. Sic. Prodr. 1: 326 (1827). *T. arvensis* subsp. *heterophylla* (Guss.) Thellung.

Mat.: A-11463, 11570 (p.p.); R-52572	
Hab.: Lowland forest between Tangerang and Tangelol	
Dist.: W, C	Alt.: 750-1040
Ch.: IT-M	GF.: TSC
Th. (GNP): END (3)	Th. (IR): SUN

The taxonomic separation of *T. heterophylla* from *T. japonica* needs further studies.

Torilis japonica (Houtt.) DC., Prodr. 4: 219 (1830). Syn.: *Caucalis japonica* Houtt., Nat. Hist. 8: 42 (1777).

Mat.: A-9886, 9363, 9285, 9803, 11830, 11860, 11684, 11893, 11570 p.p.; GA-5000, 5009; W&C14315	
Hab.: Lowland and montane forest with open scrub on steep slopes, forest margin, forest clearings dominated by <i>Pteridium aquilinum</i> , ruderal places	
Dist.: Map 68	Alt.: 460-1800
Ch.: PL	GF.: TSC
Th. (GNP): NOT (37)	Th. (IR): NOT

Trinia leiogona (C. A. Mey.) B. Fedtsch., Rast. Turkest. 608 (1915). Syn.: *Rumia leiogona* C. A. Mey., Verz. Pfl. Cauc. 125 (1831).

Mat.: A-10605, 10705, 10723, 11618, 11885	
Hab.: Mountain scrubs (often <i>Carpinus orientalis-Quercus castaneifolia</i> and <i>Juniperus excelsa</i>)	
Dist.: Map 69	Alt.: 1350-2050
Ch.: ES ^{EH}	GF.: HSC
Th. (GNP): NOT (16)	Th. (IR): RAR

Turgenia latifolia (L.) Hoffm., Gen. Pl. Umbell. 59 (1814). Syn.: *Tordylium latifolium* L., Sp. Pl.: 240 (1753); *Caucalis latifolia* L.

Mat.: A-4320; R-52784; WF-12687	
Hab.: As weed in disturbed habitats, <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> scrubs in Almeh, and from Sharleq to Mirza-Baylu	
Dist.: S & C	Alt.: 900-1750
Ch.: IT-M	GF.: TSC
Th. (GNP): RAR (3)	Th. (IR): NOT

Zosima absinthifolia (Vent.) Link, Enum. Hort. Berol. 1: 274 (1821). Syn.: *Heracleum absinthifolium* Vent., Choix Pl. 7 (1803); *Zozima orientalis*

Hoffm.; *Z. transcaspica*; *Z. iranica* Manden.; *Pichleria cruciata* Stapf & Wettst.; *P. pallidiflora* Stapf & Wettst.

Mat.: A-6183; AS-5964; R-52883, 53008; TM-43932; WF-12681	
Hab.: Montane steppe (mixed of grasses and thorn-cushions, <i>Stipa</i> -steppe), <i>Artemisia</i> steppe, <i>Juniperus excelsa</i> woodland	
Dist.: Map 70	Alt.: 1200-1850
Ch.: IT ^{omni}	GF.: HSR
Th. (GNP): NOT (19)	Th. (IR): NOT

Apiaceae I

A-10330

The cited plant is an incomplete specimen, only with basal leaves. It may belong to *Dorema*; but its basal leaves are completely dissimilar with those of *Dorema hyrcanum*.

Apocynaceae

Trachomitum venetum (L.) Woodson, Ann. Missouri Bot. Gard. 17: 158 (1930). Syn.: *Apocynum venetum* L., Sp. Pl.: 213 (1753).

Mat.: A-12146	
Hab.: Around a brackish spring in N Mirza-Baylu plain associated with <i>Phragmites australis</i>	
Dist.: E	Alt.: 1280
Ch.: PL	GF.: HSC
Th. (GNP): END (1)	Th. (IR): VUL

Vinca herbacea Waldst. & Kit., Pl. Rar. Hung. 1: 8 (1802).

Mat.: A-9590, 11643	
Hab.: Rocky outcrops in <i>Carpinus orientalis</i> , <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> scrubs	
Dist.: Map 71	Alt.: 1100-1920
Ch.: ES-M	GF.: HCR
Th. (GNP): VUL (8)	Th. (IR): VUL

The above cited specimens match with typical subspecies. Rechinger (Fl. Iranica 103: 10, 1974) reported subsp. *mixta* Velen., Fl. Bulg. 380 (1891), from a locality which is probably located within the Park: 62 km E Loveh versus Dasht, in silvis frondosis, 1200 m, Rech. 33137 (n.v.).

Aquifoliaceae

Ilex spinigera (Loes.) Loes., Mitt. Deutsch. Dendrol. Geo. 1919: 41 (1919). Syn.: *I. aquifolium* L. var. *caspica* Loes. f. *spinigera* Loes., Nov. Actorum Acad. Cae. Leop.-Carol. German. Nat. Cur. 78: 1 (1901). *I. hyrcana* Pojark.; *I. aquifolium* L. subsp. *caspica* (Loes.) Rech. f. Figs 7, D; 16, A.

Mat.: A-11588, 11512, 12213, 11225	
Hab.: Montane closed forest	
Dist.: Map 72	Alt.: 1380-1750
Ch.: ES ^{HY}	GF.: PSB TH
Th. (GNP): VUL (8)	Th. (IR): VUL

A typical Hyrcanian element (see Browicz, 1984, 1989), these findings extends the known range of this evergreen species further east (cf. Rechinger in Flora Iranica 25: 1, 1966).

Asclepiadaceae

Cynanchum acutum L., Sp. Pl.: 212 (1753).

Mat.: A-10833, 12148	
Hab.: Saline soils and scrub valley northwestern parts of Mirza-Baylu plain	
Dist.: S	Alt.: 1250-1300
Ch.: IT-M	GF.: HST
Th. (GNP): END (2)	Th. (IR): NOT

Both specimens lack flowers. The leaves of A-12148 are broadly cordate-triangular and correspond with typical subspecies. It has been collected in October on saline soils, S of the Park. A-10833 was collected in May, also in S of the Park, in a shrubby valley. This specimen characterized by oblong-lanceolate leaves and matches with subsp. *sibiricum* (Willd.) Rech. f.

Periploca gracea L., Sp. Pl.: 211 (1753). Fig. 16, B-C.

Mat.: A-4924, 10949; R-52453; Z&al-86/2932	
Hab.: Scrub margin of lowland forest	
Dist.: Map 73	Alt.: 450-800
Ch.: M ^E -ES ^{EH}	GF.: PLI
Th. (GNP): VUL (8)	Th. (IR): SUN

Vincetoxicum pumilum Decne. in DC., Prodr. 8: 525 (1844). Syn.: *Cynanchum pumilum* (Decne.)

Bornm.; *Antitoxicum pumilum* (Decne.) Pobed.; *Alexitoxicum pumilum* (Decne.) Pobed.

Mat.: A-9471, 9955, 11441, 11460; AS-5991; GA-4976; R-52735	
Hab.: Crevices of steep limestone rocks	
Dist.: Map 74	Alt.: 700-2000
Ch.: IT ^{KK} [ES ^{HY}]	GF.: HSC
Th. (GNP): NOT (28)	Th. (IR): SUN

Vincetoxicum scandens Sommier & Levier, Trudy Glavn. Bot. Sada 12: 158 (1892). Syn.: *Cynanchum scandens* (Sommier & Levier) Kusn., *Antitoxicum scandens* (Sommier & Levier) Pobed., *Alexitoxicum scandens* (Sommier & Levier) Pobed.

Mat.: A-4436, 9340, 9672, AS-6070; Z-85/264; Korhonen-1092; Z-85/189	
Hab.: Lowland and montane closed forests	
Dist.: Map 75	Alt.: 500-1820
Ch.: ES ^{EH}	GF.: HST/HCR
Th. (GNP): NOT (60)	Th. (IR): NOT

Vincetoxicum spec. intermediate between *V. pumilum* and *V. scandens*
A-11474, 11475; U-16105.

Vincetoxicum pumilum and *V. scandens* are two common species in the Park which are morphologically and ecologically well separated. The former is a rocky species found in the rocky outcrops in the forested zone associated with *Carpinus orientalis*, and on rocky slopes dominated by *Juniperus excelsa* in eastern and southern parts of the Park. *V. scandens* is a characteristic forest element restricted to shady forests in western and central parts of the Park. In rocky steep slopes in the centre of the Park, where *V. scandens* and *V. pumilum* grow side by side, but in different orographic habitats, there are individuals which cannot be assigned any of the two species. The distinguishing characters of the two species and intermediate individuals are summarized below (Table 3). Further studies are required to show whether the intermediates have hybrid origin, or belong to another species. It is also probable that both species are two variants of one species adapted to different habitats. Cultivation under the same ecological conditions may solve this problem.

Table 3: Comparison of morphological characters in *Vincetoxicum pumilum*, *V. scandens* and *V. spec.* (intermediate) of the populations occurring in Golestan National Park .

Character	<i>V. pumilum</i>	<i>V. scandens</i>	<i>V. spec.</i> (intermediate)
Height	15-40 cm tall	50-200 cm tall	40-60 cm tall
Stem indumentum	± densely puberulent all around	puberulent in one or two opposite rows, glabrous in intervals	intermediate i. e. sparsely puberulent with ± glabrous intervals
Leaf texture	thick, ± fleshy	papery	intermediate
Leaf length (median leaves)	2-4.5 x 1.5-3 cm	9-14 x 5.5-8.5 cm	5-8 x 3.5-5
Leaf apex	abruptly narrowed towards the apex	gradually narrowed towards the apex	intermediate
Petiole	1-2 mm	6-22 mm	2-4 mm long
Fruit	3-5.5 x 0.7-1 cm	6.5-8.5 x 0.7-1 cm	3-3.5 x c. 0.7-0.8 cm
Habitat	open rocky outcrops	shady forest	transition between shady and open woodland

Asteraceae (*Compositae*)

Acantholepis orientalis Less, *Linnaea* 6: 88 (1831).

Mat.: A-10893	
Hab.: <i>Artemisia</i> steppe in N of Armadlu	
Dist.: S	Alt.: 1200
Ch.: IT ^{omni}	GF.: TSC TH
Th. (GNP): END (1)	Th. (IR): NOT

Achillea biebersteinii Afan., *Bot. Mater. Gerb. Glavn. Bot. Sada SSSR* 19: 361 (1959). Syn.: *A. micrantha* Willd., *Sp. Pl.*: 3: 2209 (1803); *A. pachycephala* Rech. f. var. *diminuata* Rech. f.

Mat.: A-9423, 11104; R-52622, 53102, 52781 (n.v.)	
Hab.: Scrubs of <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> ; <i>Artemisia</i> steppe, grassy mountain steppe with thorn-cushions	
Dist.: Map 76	Alt.: 600-1850
Ch.: IT	GF.: HSC
Th. (GNP): NOT (15)	Th. (IR): NOT

Achillea nobilis L. *Sp. Pl.*: 899 (1753).

subsp. ***neilreichii*** (A. Kern.) Formánek, *Verh. Naturf. Vereins Brünn* 31: 118 (1892). Syn.: *A. neilreichii* A. Kern., *Österr. Bot. Z.* 21: 141 (1871).

Mat.: A-11127	
Hab.: Often in <i>Paliurus spina-christi</i> scrub, rare in grassy montane steppes with thorn-cushions and <i>Acer monspessulanum</i> and <i>Crataegus</i> scrubs	
Dist.: Map 77	Alt.: 700-1700
Ch.: ES ^E -ES ^{EH} [IT]	GF.: HSC
Th. (GNP): RAR (12)	Th. (IR): SUN

Achillea tenuifolia Lam., *Encycl. Meth. Bot.* 1: 26 (1783). Syn.: *A. albicaulis* C. A. Mey.

Mat.: A-9496, 10864	
Hab.: Disturbed or sandy soils in <i>Artemisia</i> steppe	
Dist.: Map 78	Alt.: 1200-1250
Ch.: IT ^{W&C}	GF.: HSC
Th. (GNP): END (2)	Th. (IR): NOT

A rare species found only two times in the driest zone of the northern and northeastern border of the Park. This is a tall and robust herb, richly branched from the base. The main branches or stems are brittle and deeply furrowed.

Achillea wilhelmsii K. Koch, *Linnaea* 24: 328 (1851). Syn.: *A. santolina* auct. mult. non L.; *A. eriophora* auct. fl. Ross. non DC.; *A. teretifolia* Ledeb.; *A. kermanica* Gand.

Mat.: R-52832, 52973	
Hab.: <i>Artemisia</i> steppe in N Robat-e Qare Bil	
Dist.: E	Alt.: 1200-1300
Ch.: IT	GF.: HSC
Th. (GNP): IND (2)	Th. (IR): NOT

Acroptilon repens (L.) DC., *Prodr.* 6: 663 (1837). Syn.: *Centaurea repens* L., *Sp. Pl.*: ed. 2: 1293 (1763); *Centaurea picris* Pall. ex Willd.; *Acroptilon picris* (Pall. ex Willd.) C. A. Mey.

Mat.: R-52852, 52772; ZK-82/326	
Hab.: On disturbed soils around the road and building in Almeh station and Mirza-Baylu plain	
Dist.: C, S, ES	Alt.: 1200-1750
Ch.: IT	GF.: HSC
Th. (GNP): VUL (5)	Th. (IR): NOT

Rechinger (*Fl. Iranica* 139b: 309, 1980) classifies the population in our area under subsp. *australe* (Iljin) Rech. f.

Amberboa amberboi (L.) Tzvelev, *Fl. URSS* 28: 331 (1963). Syn.: *Centaurea moschata* L. var. *amberboi* L., *Sp. Pl.*: 909 (1753); *C. amberboi* (L.) Lam.; *Amerboa suaveolens* (Willd.) Iljin.

Mat.: A-10569, F-1083	
Hab.: <i>Artemisia</i> steppe and margin of road in Soolegerd	
Dist.: NE	Alt.: 1100-1200
Ch.: IT ^{Cauc.-Turk.}	GF.: TSC TH
Th. (GNP): END (3)	Th. (IR): IND

Amberboa turanica Iljin, *Izv. Bot. Sada Akad. Nauk SSSR* 30: 110 (1932).

Mat.: A-10861; R-52879	
Hab.: <i>Artemisia</i> steppe in Mirza-Baylu plain	
Dist.: E	Alt.: 1200
Ch.: IT	GF.: TSC ^{±TH}
Th. (GNP): END (2)	Th. (IR): SUN

Anthemis altissima L., *Sp. Pl.*: 893 (1753) emend. Spreng., *Syst. Veg.* 3: 594 (1826).

Mat.: IZ-34090*; R-52491; Sabeti-4364*; TM-34753*; ZK-86/2925	
Hab.: Forest margins and disturbed habitats in Tangerang, Tangegol and Almeh	

Dist.: W, C	Alt.: 400-1700
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): IND (5)	Th. (IR): SUN

* Marked plant have been reported by Iranshahr (*Fl. Iranica* 158: 23-24, 1986) under var. *altissima*. Only R-52491 has been seen by the author.

Anthemis austriaca Jacq., *Fl. Austr.* 5: 22 (1778). Syn.: *A. hyrcana* Sosn. ex Grossh.

Mat.: AS-5978; R-52771-a & 52771; TM-34754-E	
Hab.: <i>Paliurus spina-christi</i> scrub, transition zone between <i>Artemisia</i> steppe and shrubland	
Dist.: Map 79	Alt.: 1000-1200
Ch.: ES ^{Pontic}	GF.: TSC
Th. (GNP): VUL (6)	Th. (IR): SUN

R-52771-a and another specimen collected from Almeh, 1680 m, Sabeti 4367 (n. v.) were given by Iranshahr (*Fl. Iranica* 158: 26, 1986) under *A. coelopoda* Boiss. var. *coelopoda*. I cannot see any differences between the former and other determined specimens of *A. austriaca* from Golestan (like TM-34754). All of them match well with European representatives of this species. I have not seen the type of *A. coelopoda* which was described from W of Turkey, but an identical specimen hold in Munich (Sabadja, Sintenis 4385, cited in the *Flora of Turkey* 5: 217, 1975) shows a remarkable thickened peduncle. None of our plants from Golestan have such a thick peduncle.

Iranshahr (*Fl. Iranica* 158: 21, 1986) cited another specimen from Golestan: 3 km ab oppido Dasht, Soják 8364 (PR) under *A. mazandaranica* Iranshahr. The type of *A. mazandaranica* (Kalardasht, northern foothills of Takhte Sulieman, 3000 ft, alt., 26.6.1962, P. Furse 2840 (W) and Soják's specimen have been studied by the author (the latter only in a short visit to Prague). Soják's specimen is certainly misidentified by Rechinger. It was not identified by the Iranshar, the author of the *Anthemis* account for *Flora Iranica*.

Anthemis tinctoria L., *Sp. Pl.*: 2: 896 (1753).

Mat.: A-10711; So-8362 (n.v.)	
Hab.: Juniper woodland south of Alu-Baq	
Dist.: S	Alt.: 1400
Ch.: ES [M, IT]	GF.: HSC
Th. (GNP): END (2)	Th. (IR): VUL

Anthemis triumfettii (L.) All., Fl. Pedem. 1: 187 (1785). Syn.: *A. tinctoria* L. var. *triumfettii* L., Sp. Pl.: 896 (1753). s. l. [incl. subsp. *triumfettii* and subsp. *khorsanica* (Rech. f.) Iranshahr].

Mat.: A-10684, 4365, 9687; R-52414	
Hab.: Usually under the shade of different shrubs in lowland and montane open scrubs	
Dist.: Map 80	Alt.: 640-2050
Ch.: ES [IT]	GF.: HSC
Th. (GNP): NOT (60)	Th. (IR): NOT

Arctium minus (Hill) Bernh. Syst. Verz. Erfurt. 134 (1800). Syn.: *Lappa minor* Hill, Veg. Syst. 4: 28, t. 25 f. 3 (1762).

Mat.: A-4503 (young collection with uncertain status), 11268, 11371	
Hab.: Montane forest and open scrub	
Dist.: Map 81	Alt.: 1500-2230
Ch.: ES [M]	GF.: HSC TH
Th. (GNP): VUL (6)	Th. (IR): SUN

Artemisia

Artemisia is an extremely difficult genus. As pointed out by Podlech (Fl. Iranica 158: 160-161, 1986 & pers. comm.), at the time being, it is not possible to name many Iranian plant of this genus. This genus requires intensive field and biosystematic studies. Golestan National Park, with its very diverse climatic and microclimatic conditions, is one of the areas, where many *Artemisia* species occur. Six species, namely, *A. absinthium*, *A. annua*, *A. ciniformis*, *A. deserti*, *A. scoparia* and *A. vulgaris* are easily distinguishable. There are a further 5-6 species belonging to difficult complexes. As far as possible their possible status "cf." is given.

Artemisia absinthium L., Sp. Pl.: 848 (1753).

Mat.: A-9881, 12095, 11657, 10676; Mozaffarian-59654	
Hab.: Grazed habitats in forest zones, transition zone between forest and shrubland, <i>Crataegus</i> and <i>Paliurus spina-christi</i> scrubs	
Dist.: Map 82	Alt.: 750-1850
Ch.: ES	GF.: CHE
Th. (GNP): RAR (13)	Th. (IR): NOT
LN: Golmouran (گلموران)	

Artemisia annua L., Sp. Pl.: 847 (1753).

Mat.: A-12110, 12271	
Hab.: Weed in garden, rocky outcrops	
Dist.: Map 83	Alt.: 450-800
Ch.: M-ES ^{EH} [IT]	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Artemisia ciniformis Krasch. & Popov ex Poljakov, Bot. Mater. Gerb. Glavn. Bot. Sada SSSR 16: 403 (1954).

Mat.: A-10908, 12154	
Hab.: <i>Haloxylon</i> shrubland and on igneous scree	
Dist.: Almeh valley	Alt.: 1300-1350
Ch.: IT ^{KK}	GF.: CSE
Th. (GNP): END (2)	Th. (IR): END/VUL

The species was known in Flora Iranica 158: 218, 1986, only from one locality in Iran: Khorasan: Sovaldi, Abeti 1358 (n. v.).

Artemisia deserti Krasch., Sched. Herb. Fl. URSS 10: 106 (1936).

Mat.: A-10842	
Hab.: Foothills of Chonde-Abbas Mountain, NW of Mirza-Baylu	
Dist.: S	Alt.: 1200
Ch.: IT ^{KK-Aralo-Caspian}	GF.: CHE
Th. (GNP): END (1)	Th. (IR): END

Apart from the longer leaves, the cited material shows no other differences with the type of *A. deserti* studied in M: In promontoriis Kyuren Dagh prope Kazandshik. Androsov 3199-a. This is probably due to early collection of the specimen in June.

Artemisia cf. fragrans Willd. (halophyte)

Mat.: A-10828, 10877, 10901, 10934, 12142, 12174, 12175	
Hab.: By saline and brackish brooks and springs or on saline soils	
Dist.: Map 84	Alt.: 1200-1300
Ch.: -	GF.: CSE
Th. (GNP): RAR	Th. (IR): SUN

Artemisia cf. gypsacea Krasch., Popov & Lincz. ex Poljakov, Bot. Mater. Gerb. Glavn. Bot. Sada SSSR 16: 409 (1954).

Closely related to *A. cf. fragrans*.

Mat.: A-12122, 12177, 12227, 12286, 12312, 12365, 12369	
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Hab.: On gypsum or moderately saline soils, disturbed places, road and stream margins	
Dist.: Map 85	Alt.: 1200-1300
Ch.: -	GF.: CSE
Th. (GNP): RAR	Th. (IR): SUN

Artemisia cf. kopetdaghensis Krasch., Popov & Lincz. ex Poljakov, Bot. Mater. Gerb. Glavn. Bot. Sada SSSR 16: 406 (1954). Syn.: *A. badghysi* Krasch. & Lincz. ex Poljakov.

Mat.: A-10757, 10829, 10865, 12119, 12141, 12173, 12289, 12293, 12313, 12363, 12364, 12366, Anderson & Peterson-315 (n.v. cf. Fl. Iranica 158: 201, 1986); GA-4838	
Hab.: The dominant species in flat plains and gentle slopes in steppe zone of the Park	
Dist.: Map 86	Alt.: 1100-1700
Ch.: IT ^{KK}	GF.: CSE
Th. (GNP): NOT	Th. (IR): NOT

Apparently, the most widespread species in our area.

Artemisia scoparia Waldst. & Kit., Pl. Rar. Hung. 1: 66 (1801).

Mat.: A-9949, 11454, 12270, 12323; GA-4905; Mozaffarian-59651	
Hab.: Rocky outcrops, forest margins, ruderal places	
Dist.: Map 87	Alt.: 750-1700
Ch.: PL	GF.: CHE
Th. (GNP): RAR	Th. (IR): NOT

Artemisia cf. sieberi Besser

Mat.: A-10459, 10716, 12171, 12172, 12217	
Hab.: Dry <i>Artemisia</i> steppe	
Dist.: Map 88	Alt.: 1200
Ch.: ? IT-M-SS	GF.: CSE
Th. (GNP): SUN	Th. (IR): NOT

Further studies need to determine whether the above cited plants really belong to the most dominant Central Iranian *A. sieberi* sensu Podlech, Fl. Iranica 158: 203, 1986. The climatic conditions in southern parts of the Park and the occurrence of several other typical xerophytes in these parts of the Park would confirm such a status.

Artemisia vulgaris L., Sp. Pl.: 848 (1753).

Mat.: A-9698, 9743, 9796, 12109; GA-4923	
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Hab.: Forest margin and forest clearings, ruderal places in station gardens; pioneer scrub, <i>Pteridium aquilinum</i> stands	
Dist.: Map 89	Alt.: 450-1300
Ch.: PL ^{North Temperate}	GF.: CHE
Th. (GNP): NOT (14)	Th. (IR): SUN

Artemisia spec. A

Mat.: A- 12319	
Hab.: On loess soil margin of cultivated land and road between Savar and Zav*	
Dist.: NW	Alt.: 500
Ch.: -	GF.: CSE

* This locality is outside the Park borders.

Artemisia spec. B

Mat.: A- 12118	
Hab.: Moderately saline soils	
Dist.: S	Alt.: 1200
Ch.: -	GF.: CSE

Aster tripolium L., Sp. Pl.: 2: 872 (1753). Syn.: *Tripolium vulgare* Nees, Gen. Sp. Sater 153 (1753).

Mat.: A-10887	
Hab.: Around a saline spring together with <i>Phragmites australis</i> in N of Mirza-Baylu plain	
Dist.: SE	Alt.: 1280
Ch.: ES [IT, E Asia]	GF.: HSC ^{SU}
Th. (GNP): END (1)	Th. (IR): END

Aster tripolium is a halophytic species and apparently very rare in Iran. Grierson (Fl. Iranica, 154: 2, 1982) mentioned only three old collections, all in SE coasts of Caspian Sea near Gorgan. I have collected this species in northern shores of Uromieh Lake in Azerbaijan (NW Iran).

Asteriscus spinosus (L.) Sch.-Bip., in Webb & Berth. Phyt. Canar. 3 (2): 231 (1846). Syn.: *Buphthalmum spinosum* L., Sp. Pl.: 2: 903 (1753); *Pallenis spinosa* (L.) Cass.

Mat.: F-1147; ZK-82/157; R-52416; Termeh & Moussavi-34789	
Hab.: Forest margins and ruderal places between Tangerang to Tanggol	
Dist.: W & C	Alt.: 450-800
Ch.: PL ^(Temperate Eurasia)	GF.: TSC TH
Th. (GNP): VUL (4)	Th. (IR): SUN

According to Aurich & Podlech (1989), the Iranian plants belong to subsp. *spinus* with a more or less Mediterranean distribution.

Bombycilaena erecta (L.) Smoljan., Bot. Mater. Gerb. Glavn. Bot. Sada SSSR 17: 450 (1955). Syn.: *Micropus erectus* L., Sp. Pl.: Addenda post indicem (1753). Fig. 13, H-I.

Mat.: A-11449, 11148	
Hab.: Steep limestone slopes, <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes	
Dist.: Map 90	Alt.: 980-1250
Ch.: ES [M-IT]	GF.: TCA
Th. (GNP): END (3)	Th. (IR): VUL

The only cited specimen of this species from Iran (Gorgan: Ziarat, Bunge) by Wagenitz in Fl. Iranica 145: 145, 1980) has not been marked by a quotation mark "!". It means that the author of Flora Iranica apparently did not see the specimen. *Bombycilaena erecta* is a small annual plant covered throughout with greyish-white hairs which make it difficult to distinguish its palea and achene structure from other related genera like *Cymbolanea* and *Filago*. *C. griffithii* is a widespread species in Iran and differs from *Bombycilaena* by its ovate palea and apically or erect placement of style. In *B. erecta*, the style is obliquely connate to the ovary and the whole shape of fruit-like structure (involucral bracts enclosing radiate flowers and achenes) is bean-like (see Fig. 13, H-I).

Callicephalus nitens (M. Bieb. ex Willd.) C. A. Mey., Verz. Pfl. Cauc.: 66 (1831). Syn.: *Centaurea nitens* M. Bieb. ex Willd., Sp. Pl.: 3, 3: 2505 (1803); *Serratula nitens* (M. Bieb. ex Willd.) Spreng.

Mat.: A-9966; R-52774; Z-82/178, 82/295	
Hab.: Rocky outcrops, <i>Carpinus orientalis</i> , <i>Acer monspessulanum</i> and <i>Crataegus</i> scrubs, <i>Quercus macranthera</i> forest, loess soils margin of the road	
Dist.: Map 91	Alt.: 700-2000
Ch.: ES ^{EH} [IT ^{Cauc.-Turk.}]	GF.: TSC
Th. (GNP): NOT (21)	Th. (IR): SUN

Calycocorsus tuberosus (Fisch. & C. A. Mey.) Rauschert, Feddes Repert. 73: 225 (1966). Syn.: *Willemetia tuberosa* Fisch. & C. A. Mey. ex DC., Prodr. 7: 150 (1838).

Mat.: A-10394; U-16170; W&a-11011

Hab.: Moist places in forests of Tangegol and Tangerang	
Dist.: W & C	Alt.: 500-600
Ch.: ES ^{HY}	GF.: GTU
Th. (GNP): END (3)	Th. (IR): IND

Carduus pycnocephalus L., Sp. Pl.: ed. 2: 1151 (1763).

Mat.: U-16085 (n.v.)*; A-11464-b; TM-34785**; R-52783***; U-16085***	
Hab.: In open rocky outcrops of <i>Carpinus orientalis</i> , <i>Paliurus spina-christi</i> and <i>Crataegus</i> scrubs; Madrasu valley, Sharleq and Yelaq flats	
Dist.: C & S	Alt.: 1000-1600
Ch.: M-IT [ES-SS]	GF.: TSC TH
Th. (GNP): RAR (12)	Th. (IR): NOT

* subsp. *pycnocephalus*

** subsp. *albidus* (M. Bieb.) Kazmi

***subsp. *arabicus* (Jacq. ex Murray) Nyman

Carduus seminudus M. Bieb., Fl. Taur.-Caucas. 2: 271 (1808).

Mat.: TM-34784	
Hab.: As a weed in Tangegol	
Dist.: C	Alt.: 600-650
Ch.: ES ^{HY} -IT ^{Cauc.-Turk.}	GF.: TSC/HSC TH (biennial)
Th. (GNP): END (1)	Th. (IR): SUN

Carduus transcaspicus Gand., Bull. Soc. Bot. France 65: 37 (1918). Syn.: *C. nigrescens* Vill. subsp. *hamulosus* (Ehrh.) Arènes var. *persicus* Arènes.

Mat.: A-10727**, 11476*, 11401*, 11681*; Z-83/1369*; R-52577**	
Hab.: Rocky outcrops, <i>Crataegus</i> scrub, disturbed and over-grazed habitats in forest and shrubland margins	
Dist.: Map 92	Alt.: 500-1600
Ch.: ES ^{HY} -IT ^{Alborz}	GF.: TSC TH
Th. (GNP): RAR (13)	Th. (IR): SUN

* subsp. *transcaspicus*

** subsp. *macrocephalus* (Arènes) Kazmi

Carlina vulgaris L., Sp. Pl.: 828 (1753).

Mat.: A-12049, 11663	
Hab.: Steep slopes in montane open <i>Carpinus orientalis</i> scrub	
Dist.: Map 93	Alt.: 1500-1880
Ch.: ES	GF.: HSC TH

Th. (GNP): END (3)	Th. (IR): VUL
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Carpesium abrotanoides L. Sp. Pl.: 860 (1753).

Mat.: A-11837, 12189	
Hab.: Stream and spring side in closed lowland forest	
Dist.: Map 94	Alt.: 500-1050
Ch.: PL ^(ES, Southeast Asia)	GF.: HSC
Th. (GNP): VUL (5)	Th. (IR): RAR

Carpesium cernum L. Sp. Pl.: 859 (1753).

Mat.: A-9254, 9695, 9729, 9795	
Hab.: Closed lowland forest, streamside	
Dist.: Map 95	Alt.: 750-1250
Ch.: ES-Southeast Asia	GF.: HSC
Th. (GNP): VUL (8)	Th. (IR): RAR

Carthamus lanatus L., Sp. Pl.: 830 (1753).

subsp. *turkestanicus* (Popov) Hanelt, Feddes Rept. 67: 148 (1963). Syn.: *C. turkestanicus* Popov, Trudy Uzb. Goz. Univ. Ser. Biol. 27: 36 (1941).

Mat.: A-9842	
Hab.: Disturbed habitats near Dasht, steep rocky slopes near Golestan Parking	
Dist.: W, S	Alt.: 600-1100
Ch.: IT [ES ^{HY}]	GF.: TSC TH
Th. (GNP): END (2)	Th. (IR): NOT

Centaurea balsamita Lam., Encycl. Méth. Bot. 1: 667 (1785). Syn.: *Stizolophus balsamita* (Lam.) Cass. ex Takht.

All belong to subsp. *balsamita*

Mat.: A-9437; R-53204; W&C14207; Z-82/177	
Hab.: Disturbed soils in Almeh, Soolegerd and Sharleg	
Dist.: C, E, S	Alt.: 1000-1700
Ch.: IT ^{W&KK}	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Centaurea cheiranthifolia Willd., Phytogr. 1: 12, tab. 7 (1794).

var. *purpurascens* (DC.) Wagenitz, Notes Roy. Bot. Gard. Edinburgh 33: 230 (1974).

Mat.: A-10804; F-1090 (det.: G. Wagenitz)	
Hab.: Steppe of grasses and thorn-cushions in Almeh and Soolegerd	
Dist.: C & NE	Alt.: 1200-1750
Ch.: IT ^W	GF.: HSC
Th. (GNP): END (3)	Th. (IR): END

C. cheiranthifolia (incl. var. *cheiranthifolia* and var. *purpurascens*) was known by Wagenitz (Fl. Iranica 139b: 413, 1980) only from a few localities in Azerbaijan (NW Iran).

Centaurea depressa M. Bieb., Fl. Taur.-Caucas. 2: 346 (1808).

Mat.: R-52787; WF-12680	
Hab.: Ruderal and disturbed habitats in <i>Artemisia</i> steppe, mountain steppe and margin of <i>Paliurus spina-christi</i> scrub	
Dist.: Map 96	Alt.: 1000-1800
Ch.: IT	GF.: TSC
Th. (GNP): RAR (10)	Th. (IR): NOT

Centaurea golestanica Akhani & Wagenitz (in press in Edinburgh J. Bot. 56, 1, 1999). Fig. 16, D.

Mat.: A-4544, 11128, 11707, 11704; Z-83/1377	
Hab.: Open woodland with dense patches of grasses	
Dist.: Map 97	Alt.: 1250-1400
Ch.: ES ^{HY} (Endemic)	GF.: HSC TH
Th. (GNP): VUL (6)	Th. (IR): END

Centaurea hyrcanica Bormm., Bull. Herb. Boissier, sér. 2, 7: 425 (1907). Syn.: *C. trichocephala* M. Bieb. var. *latifolia* Fisch. & C. A. Mey.; *C. hyrcana* Grossh. Fig. 16, F.

Mat.: A-4363, 9691; E-714; R-52780; WF-12800	
Hab.: Closed lowland and montane forest, open scrubs in rocky outcrops	
Dist.: Map 98	Alt.: 450-2050
Ch.: ES ^{HY}	GF.: HCR
Th. (GNP): NOT (58)	Th. (IR): NOT

Centaurea iberica Trevirs. ex Spreng., Syst. Veg. 3: 406 (1826).

Mat.: Z-82209	
Hab.: As weed around Sharleg station	
Dist.: S	Alt.: 1000
Ch.: IT [ES ^{EH} -ES]	GF.: HSC TH
Th. (GNP): END (1)	Th. (IR): NOT

Centaurea iljinii Czerniak., Feddes Rept. 27: 285 (1930).

Mat.: A-11005	
Hab.: Exposed summit on limestone rocks (Qareh-Gineh Mountain, 4 km NW Almeh)	
Dist.: C	Alt.: 1950
Ch.: IT ^{KK}	GF.: CHE
Th. (GNP): END (1)	Th. (IR): END

Centaurea kotschyi (Boiss. & Heldr.) Hayek
Centaureae exsicc. crit. Fasc. III. no. 140 (1921).
 Syn.: *Cheirolepis kotschyi* Boiss. & Heldr., *Diagn. Pl. Orient. Nov. sér. 1, 10: 107* (1849).
 var. *persica* (Boiss.) Wagenitz, *Bot. Jahrb. Syst. 82: 169* (1963). Syn.: *Cheirolepis persica* Boiss., *Diagn. Pl. Orient. Nov. sér. 1, 10: 108* (1849). **Fig. 16, E.**

Mat.: A-4314*, 4534*, 11158, 11409	
Hab.: Grassy mountain steppe with thorn-cushions; juniper woodland	
Dist.: Map 99	Alt.: 1500-1880
Ch.: IT ^W & Alborz	GF.: CHE TH
Th. (GNP): VUL (7)	Th. (IR): IND

* Revised by G. Wagenitz

Centaurea leuzeoides (Jaub. & Spach) Walp., *Ann. Bot. Syst. 1: 447* (1849). Syn.: *Hyalea leuzeoides* Jaub. & Spach, *Ill. Pl. Orient. 3: 21, tab. 216* (1847).

Mat.: A-6161; AS-5959; R-52936, 53203; RZ-53970; WF-12738	
Hab.: Juniper woodland, rocky outcrops with open scrub	
Dist.: Map 100	Alt.: 850-1700
Ch.: IT ^{Alborz}	GF.: CHE
Th. (GNP): RAR (11)	Th. (IR): NOT

Centaurea pulchella Ledeb., *Icon. Pl. Fl. Ross. 1: 22* (1829). Syn.: *Hyalea pulchella* (Ledeb.) K. Koch, *Linnaea 24: 418* (1851). *Eremopappus pulchellus* (Ledeb.) Takht.

Mat.: A-10863; R-52978	
Hab.: <i>Artemisia</i> steppes in Mirza-Baylu plain	
Dist.: SE	Alt.: 1200-1300
Ch.: IT	GF.: TCA
Th. (GNP): END (2)	Th. (IR): NOT

Centaurea rhizantha C. A. Mey., *Verz. Pfl. Cauc.: 64* (1831). Syn.: *C. glaucescens* Fisch. & C. A. Mey.

Mat.: A-12093 (Revised by G. Wagenitz)	
Hab.: Alpine meadow N of Soltan Hoopi (Divar-Kaji Mountain)	
Dist.: C	Alt.: 2060
Ch.: IT ^C	GF.: HRO (stemless)
Th. (GNP): END (1)	Th. (IR): IND

Centaurea sintenisiana Gand., *Bull. Soc. Bot. France 65: 37* (1918). Syn.: *C. persica* Boiss. var.

pseudodeiacantha Rech. f.; *C. esfandiarii* Rech. f. & Aellen. **Fig. 16, G.**

Mat.: A-4553, 9465, 9952, 11177; R-37627, 52593	
Hab.: Steep rocky outcrops, <i>Stipa</i> steppe	
Dist.: Map 101	Alt.: 500-800
Ch.: IT ^{KK}	GF.: HSC TH
Th. (GNP): RAR (13)	Th. (IR): RAR

Centaurea solstitialis L. *Spec. Plant 917* (1753).
 subsp. *solestitialis*

Mat.: Wa-162; Anderson & Peterson-309	
Hab.: Oak forest, stony ground in mountain valley, probably along the Madrasu river and southern border of the Park	
Dist.: ? C & S	Alt.: 1000-1100
Ch.: ES [IT-M]	GF.: TSC TH
Th. (GNP): END/EXT (2)	Th. (IR): NOT

This common weedy species in C and NW parts of Iran was collected only two times ca. 30 years ago (1967 and 1969) in our area. I have not been able to find the species again.

Centaurea virgata Lam., *Encycl. Meth. Bot. 1: 670* (1785).

According to Wagenitz (*Fl. Iranica 139b: 336, 1980*), only subsp. *squarrosa* (Willd.) Gugler occurs in Iran.

Mat.: Z-82/245; Wa-204 (n.v.)	
Hab.: Frequent in most of the montane vegetation types, particularly in open scrubs and juniper woodlands, disturbed places	
Dist.: Map 102	Alt.: 970-2000
Ch.: IT	GF.: CSE ^{±TH}
Th. (GNP): NOT (50)	Th. (IR): NOT

Centaurea zovandica (Sosn.) Sosn., *Fl. URSS 28: 435* (1963). Syn.: *Psephellus zovandica* Sosn., *Zam. Sist. Geogr. Rast. Tbil. 14: 17* (1948). **Fig. 16, H.**

Mat.: A-11276	
Hab.: limestone rockys outcrops and vertical cliffs	
Dist.: Map 103	Alt.: 1580-2000
Ch.: ES ^{HY} -IT ^{Alborz}	GF.: HSC
Th. (GNP): END (3)	Th. (IR): IND

Cephalorrhynchus kossinskyi (Krasch.) Kirp., *Fl. URSS 29: 347* (1964). Syn.: *Cicerbita kossinskyi* Krasch., *Izv. Glavn. Bot. Sada SSSR 26, 2: 115*

(1927); *Lactuca khorasanica* Rech. f. & Aellen .
Fig. 16, J.

Mat.: A-10915, 11173	
Hab.: Gravelly soils, bottom of a dry valley with <i>Haloxylon</i> shrubs, ledges of limestone rocks in <i>Juniperus excelsa</i> woodland	
Dist.: Map 104	Alt.: 1400
Ch.: IT ^{KK}	GF.: GTU
Th. (GNP): END (2)	Th. (IR): END

Chardinia orientalis (L.) Kuntze, Trudy Glavn. Bot. Sada 10: 201 (1887). Syn.: *Xeranthemum annuum* L. var. *orientale* L., Sp. Pl.: 858 (1753). *Chardinia xeranthemoides* Desf.; *Xeranthemum orientale* Mill.

Mat.: A-10253	
Hab.: <i>Artemisia-Stipa</i> steppe	
Dist.: Map 105	Alt.: 1200-1250
Ch.: IT ^{W&C}	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Chondrilla juncea L. Sp. Pl.: 2: 796 (1753). Syn.: *Ch. acantholepis* Boiss.

Mat.: A-9841, 11924	
Hab.: <i>Crataegus</i> shrubland, sandy dry stream bed	
Dist.: Map 106	Alt.: 970-1500
Ch.: ES-IT-M	GF.: HSC
Th. (GNP): END (3)	Th. (IR): NOT

Cichorium intybus L., Sp. Pl.: 813 (1753).

Mat.: U-19203 (n.v.); Wa-157 (n.v.); Z-82/212	
Hab.: Plentiful in ruderal places around the road and protection stations from Tangerang to Mirza-Baylu	
Dist.: W, C & S	Alt.: 450-1200 ?
Ch.: PL	GF.: HSC/HRO
Th. (GNP): NOT	Th. (IR): NOT

Cirsium arvense (L.) Scop., Fl. Carn. ed. 2, 2: 126 (1772). Syn.: *Serratula arvense* L., Sp. Pl. 820 (1753). s. l. (incl. var. *arvense* & *incanum* (S. G. Gmel.) Ledeb.

Mat.: A-11408; R-53205	
Hab.: Roadside weed and disturbed soils in Tangegol, Almeh and Jakhtikalan Pass	
Dist.: C, NE	Alt.: 850-1600
Ch.: PL	GF.: HCR TH
Th. (GNP): END (2)	Th. (IR): NOT

Cirsium bornmuelleri Sint. ex Bornm., Feddes Repert. 8: 261 (1910).

Mat.: A-9454, 9538, 9413; U-19140; W&C-14216	
Hab.: Mountain steppes (mixed of grasses and thorn-cushions, alpine meadows); maple, juniper, <i>Crataegus</i> woodlands	
Dist.: Map 107	Alt.: 1500-2120
Ch.: IT ^{KK}	GF.: HSC TH
Th. (GNP): NOT (19)	Th. (IR): IND

Cirsium osseticum (Adams) Petr., Vestn. Tbilissk. Bot. Sada Sér. 12/1: 3 (1912). Syn.: *Carduus osseticus* Adams in Web. & Mohr, Beitr. Naturk. 1: 65 (1805). s. l. (incl. subsp. *osseticum* & subsp. *tricholoma* (Fisch. & C. A. Mey.) Petr.).

Mat.: A-4966, 11921	
Hab.: Rocky outcrops, margin of montane forest, <i>Pteridium aquilinum</i> comm.	
Dist.: Map 108	Alt.: 700-1920
Ch.: ES ^{EH}	GF.: HSC TH
Th. (GNP): VUL (8)	Th. (IR): VUL

Cirsium turkestanicum (Regel) Petr. Österr. Bot. Zeitschr. 60: 4 (1910).

var. **pseudolappaceum** (Kharadze) Petr., Fl. Iranica 139a: 258 (1979). Syn.: *C. pseudolappaceum* Kharadze, Zam. Syst. Geogr. Rast. Tbil. 23: 115 (1963). Fig. 16, I.

Mat.: A-12041	
Hab.: Grassy mountain steppe with scattered <i>Crataegus</i> shrubs	
Dist.: Map 109	Alt.: 1700
Ch.: IT ^E	GF.: HSC TH
Th. (GNP): END (1)	Th. (IR): END

C. turkestanicum is apparently very rare in Iran. Petrak (in Fl. Iranica 139a: 259, 1979) cited only one specimen from Iran: Sepid inter Bojnurd et Tappeh-ye Morave, 1350 m, Rech. 32599 (n.v.). In the Park it was once found in westernmost parts of Qortoy valley.

Cirsium vulgare (Savi) Ten., Fl. Napolit. 5: 209 (1835-1836). Syn.: *Carduus vulgaris* Savi, Fl. Pis. 2: 241 (1798).

Mat.: A-11964, 9873; TM-35072; W&C14259	
Hab.: Wet places near streams in Qez-Qaleh Dasht, Tangegol, Almeh and around Sulukli Lake	
Dist.: NW, C, S	Alt.: 600-1700
Ch.: PL	GF.: HSC TH
Th. (GNP): VUL (5)	Th. (IR): NOT

Cnicus benedictus L., Sp. Pl.: 826 (1753). Syn.: *Centaurea benedicta* (L.) L., Sp. Pl.: ed. 2: 1296 (1763). s. l. [incl. var. *benedictus* and var. *kotschy* (Sch.-Bip.) Boiss.].

Mat.: AS-5984; R-52775	
Hab.: <i>Paliurus spina-christi</i> scrub southern parts of the Park near Sharleg	
Dist.: S	Alt.: 1000-1100
Ch.: IT-M	GF.: TRO TH
Th. (GNP): END (2)	Th. (IR): NOT

Codonocephalum peacockianum Aitch. & Hemsl., Trans. Linn. Soc. London, Bot., Ser. 2, 3: 75 (1886). Syn.: *Inula peacockianum* (Aitch. & Hemsl.) Korovin.

Mat.: A-4448	
Hab.: Shrubby vegetation between Tunnel and Sharleg	
Dist.: S	Alt.: 950
Ch.: IT	GF.: HSC
Th. (GNP): END (1)	Th. (IR): NOT

Conyza bonariensis (L.) Cronquist, Bull. Torrey Bot. Club 70: 632 (1943). Syn.: *Erigeron bonariensis* L., Sp. Pl.: 863 (1753). *E. salakensis* Rech. f. & Edelb., *E. linifolius* Willd.
See notes under *C. canadensis*

Conyza canadensis (L.) Cronquist, Bull. Torrey Bot. Club 70: 632 (1943). Syn.: *Erigeron canadensis* L. Sp. Pl.: 863 (1753). *E. myriocephalus* Rech. f. & Edelb.

Mat.: A-12112, 12297; R-52551 (under <i>C. bonariensis</i>)	
Hab.: As weed in gardens and disturbed soils between Tangerang to Tangegol	
Dist.: W & C	Alt.: 500-700
Ch.: SCO (NEO)	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

R-52551 was treated under *C. bonariensis*, (Flora Iranica 145: 63. 1980), but matches well with *C. canadensis*. However, the occurrence of the former in our area is likely.

Conyzanthus squamatus (Spreng.) Tamamsch., Fl. URSS 25: 186 (1959). Syn.: *Conyza squamatus* Spreng., Syst. Veg. 3: 515 (1826); *Aster squamatus* (Spreng.) Hieron.

Mat.: A-11825 (sterile), 12299

Hab.: In disturbed soils near Golestan Tourist Center and as weed in Tangegol guesthouse	
Dist.: W & C	Alt.: 500-670
Ch.: PL (NEO)	GF.: TSC
Th. (GNP): END (2)	Th. (IR): SUN

Cousinia

Most of the *Cousinia* from our area have already been reported by Rechinger in the supplement of the genus for the Flora Iranica (Fl. Iranica 139a: 108-153, 1979); except *C. leucantha* which was recently added to the Iranian Flora by the author (Akhani 1996: 102). Due to very dry climatic conditions in 1994-1995, many *Cousinia* species did not grow or complete their life cycle. Therefore, some of the species reported by Rechinger were not found again.

Cousinia arctotidifolia Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, sér. 7, 9, 2: 42 (1865). *C. praetermissa* Bornm.

Mat.: A-10936; R-52985; T-34057; WF-12815	
Hab.: <i>Artemisia steppe</i>	
Dist.: Map 110	Alt.: 1200-1250
Ch.: IT ^{KK}	GF.: CHE TH
Th. (GNP): VUL (6)	Th. (IR): VUL

Cousinia congesta Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, sér. 7, 9, 2: 12 (1865).

Mat.: GA-4846; W&C-14367*	
Hab.: Along the road on southern border of the Park	
Dist.: S	Alt.: 1200
Ch.: IT ^C	GF.: HSC TH
Th. (GNP): END (2)	Th. (IR): SUN

* This was collected outside the official border of the Park: 5 km from Robat-e Qareh Bil to Bojnurd, 1500 m, 31.7.1974.

Cousinia decipiens Boiss. & Buhse, Nouv. Mém. Soc. Imp. Naturalistes Moscou, 12 (18): 125 (1860). s. l. Syn.: *C. hyrcanica* Bornm.; *C. daryoushiana* Parsa; *C. esfandarii* Rech. f. & Aellen (pro. syn.).

Mat.: A-9425, 12055, 12056; T- 34058, 34042, 34052, 33965; R-52860; U-19151; W&C-14227; WF-12703	
Hab.: Mountain steppes with grasses and thorn-cushions, alpine meadows, scrubs of <i>Acer monspessulanum</i> , <i>Juniperus excelsa</i> and <i>Crataegus</i>	

Dist.: Map 111	Alt.: 1000-2200
Ch.: IT ^{Alborz}	GF.: HSC TH
Th. (GNP): NOT (84)	Th. (IR): NOT

Cousinia decipiens s. s. belongs to a very polymorphic group including several names i.e. *C. esfandiarii*, *C. commutata*, *C. calolepis*, *C. stahlia*, *C. hypopolia*. Two of them, namely *C. decipiens* and *C. esfandiarii*, were reported by Rechinger (Fl. Iranica 139a: 126, 127, 1979) from several collections within the Park. During my field studies and study of many herbarium specimens including the types, I was unable to distinguish more than one polymorphic species among the populations in our area. However, there are two forms based on the leaf colour: plants with greyish leaf colour are more frequent and grow in many mountain steppe communities. Plants with silver-green leaf colour are rare and are found together with the grey form in altitudes from 1800 to 2200 m. Here, I prefer to consider them as one species in a broad sense, before new data are available on the taxonomy and variation of the whole complex.

Cousinia edmondsonii Rech. f., Fl. Iranica 90: 321 (1972).

It has been known only from the type locality, in neighbouring Qorkhod Protected Area (Holotype: Khorasan; Kuh-e Kurkhud [Qorkhod], 45 km W of Bojnurd, Valley, in juniper zone, 2500 m, 56°30'E, 37°30'N, 2500 m, 22.7.1971, J. R. Edmondson 751, W). Its occurrence within or at the borders of the Park is likely.

Cousinia eryngioides Boiss., Diagn. Pl. Nov. Ser. 1, 10: 101 (1849). Syn.: *Arctium eryngioides* (Boiss.) Kuntze, Revis. Gen. 1: 307 (1891).

Mat.: A-10906; R-52907; WF-12716	
Hab.: Gravelly soils in Almehr valley	
Dist.: Map 112	Alt.: 1200-1400
Ch.: IT ^{KK & Alborz}	GF.: HSC TH
Th. (GNP): VUL (4)	Th. (IR): VUL

Cousinia freynii Bornm., Russk. Bot. Zhurn. 1: 4 (1911).

Mat.: WF-12835	
Hab.: <i>Artemisia</i> steppe between Robat-e Qareh Bil and Behkadeh	
Dist.: E border	Alt.: 1250-1300
Ch.: IT ^{KK}	GF.: HSC TH
Th. (GNP): END (1)	Th. (IR): END

Cousinia leucantha Bornm. & Sint. Russk. Bot. Zhurn. 1: 1 (1911). Syn.: *C. simplex* Kult.

Mat.: A-11357	
Hab.: Juniper woodland	
Dist.: Map 113	Alt.: 2000
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP) END (1):	Th. (IR): END

Recently known as a new record for Iran (Akhani 1996: 102).

Cousinia meshhedensis Bornm. & Rech. f., Feddes Reper. 48: 144 (1940). Syn.: *C. strictissima* Rech. f.

Mat.: A-9473, 11360; R-52962	
Hab.: Juniper woodland, <i>Artemisia</i> steppe, scree and sandy soils on steep slopes	
Dist.: Map 114	Alt.: 1400-2000
Ch.: IT ^{KK}	GF.: HSC TH
Th. (GNP): RAR (9)	Th. (IR): VUL

Cousinia neurocentra Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, sér. 7, 9, 2: 29 (1865).

Mat.: A-10907; R-52888, 52889; WF-12729	
Hab.: <i>Artemisia-Stipa</i> steppe, igneous stony ground	
Dist.: Map 115	Alt.: 1200-1400
Ch.: IT ^{KK}	GF.: CHE TH
Th. (GNP): VUL (6)	Th. (IR): VUL

Cousinia qarehbilensis Rech. f., Fl. Iranica 139a: 131 (1979).

Mat.: R-52908	
Hab.: <i>Artemisia</i> steppe near Robat-e Qareh-Bil	
Dist.: E	Alt.: 1200
Ch.: IT ^{KK}	GF.: HSC TH
Th. (GNP): END (1)	Th. (IR): END (1)

Rechinger (Fl. Iranica 139a: 131, 1979) placed *C. qarehbilensis* in the Sect. *Sciadocousinia* Tscherneva and compared it with *C. eryngioides* Boiss. and *C. fraternella* Bornm. The species seems to be only superficially similar to *C. eryngioides*. It differs from *C. eryngioides* mainly by the decurrent leaves, non umbell-like synflorescence and by the much shorter involucre. Patent parts of the involucre in *C. eryngioides* are 1.5-2 cm long but in *C. qarehbilensis* are 0.8-1.2 cm long. The species has not been refound after the type collection.

Cousinia rechingerae Bornm., Feddes Repert. 48: 133 (20.5.1940). Syn.: *C. achmed-adlii* Bornm. & Gauba, *C. kandewanensis* Parsa var. *golydaghi* Parsa .

Mat.: R-52779	
Hab.: <i>Paliurus spina-christi</i> scrub between Sharleq and Tunnel	
Dist.: S	Alt.: 900-1000
Ch.: IT ^{KK}	GF.: HSC TH
Th. (GNP): END (1)	Th. (IR): IND

Its habit and capitula are superficially very similar to *Carduus transcaspicus* and some *Cirsium* species.

Cousinia smirnowii Trautv., Trudy Glavn. Bot. Sada 8: 488 (1883). Syn.: *C. fulgens* Bornm. & Rech. f.; *C. globosa* (Kult.) Bornm. Fig. 16, K.

Mat.: A-10963; Rz-53185	
Hab.: Gravelly soils in exposed mountain steppes of grasses and thorn-cushions	
Dist.: Map 116	Alt.: 2000-2100
Ch.: IT ^{KK}	GF.: HSC TH
Th. (GNP): END (2)	Th. (IR): END

Cousinia tenella Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 1: 25 (1834). Syn.: *Lappa tenella* Fisch. & C. A. Mey. ex DC. *Arctium tenellum* (Fisch. & C. A. Mey.) Kuntze .

Mat.: A-6227, 10450, 10478; R-52972	
Hab.: Dry soils with <i>Haloxylon</i> shrubs, disturbed soils around the Soolegerd station	
Dist.: Map 117	Alt.: 1200-1400
Ch.: IT	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): RAR

Cousinia turcomanica C. Winkl., Trudy Glavn. Bot. Sada 11: 133 (1889). Syn.: *Serratula microcephala* Trautv., *Arctium turcomanicum* (C. Winkl.) Kuntze .

Mat.: A-4313; R-52890, 52992; W&C14263	
Hab.: <i>Artemisia-Stipa</i> steppe	
Dist.: Map 118	Alt.: 1150-1550
Ch.: IT ^{KK}	GF.: CHE TH
Th. (GNP): NOT (14)	Th. (IR): IND

Cousinia turkmenorum Bornm., Beih. Bot. Centralbl. 34, 2: 153 (1917) in nota. Syn.: *C. dissecta* Kar. & Kir. var. *microcephala* Trautv., *C. dissecta*

Kar. & Kir. var. *simplicior* Trautv., *C. stenoptera* Juz., *C. simplicior* Juz.

Mat.: A-10935; AS-5909; R-52859	
Hab.: Subsaline soils in <i>Anabasis aphylla-Artemisia</i> community in Mirza-Baylu plain	
Dist.: E	Alt.: 1200
Ch.: IT ^E	GF.: CHE TH
Th. (GNP): END (3)	Th. (IR): VUL

Crepis micrantha Czerep., Fl. URSS 29: 684 (1964).

Mat.: R-52431	
Hab.: On rocky S-facing outcrops in Tangerang	
Dist.: W	Alt.: 450
Ch.: IT-M ^E	GF.: TSC
Th. (GNP): END (1)	Th. (IR): SUN

Crepis pulchra L., Sp. Pl. 2: 806 (1753). Syn. *C. pulchra* subsp. *turkestanica* Babç.

Mat.: R-52549	
Hab.: Forest margin along the Madrasu River between Tangerang and Tangegol	
Dist.: C	Alt.: 450-600
Ch.: IT	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Crepis sancta (L.) Babç., Univ. Calif. Publ. Bot. 19: 403 (1941). Syn.: *Hieracium sanctum* L., Cent. Pl. 2: 30 (1756). s.l.

Mat.: A-10866, 10345; F-1081; R-52825*; U-16100*	
Hab.: Early spring therophyte in <i>Artemisia</i> steppe, shrublands and as weed in disturbed habitats	
Dist.: Map 119	Alt.: 900-1300
Ch.: IT-M	GF.: TRO
Th. (GNP): IND (6)	Th. (IR): NOT

* Determined by Rechinger under subsp. *nemausensis* (Gouan) Babç. (cf. Rechinger in Fl. Iranica 122: 334, 1977).

Crepis turcomanica Krasch., Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, 1: 181 (1933). Syn.: *C. grammolepis* Rech. f.

Mat.: A-11763	
Hab.: Limestone stony ground at summit of Qare-Gineh Mountain, 6 km N Almeh	
Dist.: C	Alt.: 2150
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): END (1)	Th. (IR): VUL



Fig. 16: A, *Ilex spinigera*; B-C, *Periploca graeca*; D, *Centaurea golesitanica*; E, *Centaurea kotschyi* var. *persica*; F, *Centaurea hyrcanica*; G, *Centaurea sintenisiana*; H, *Centaurea zuvandica*; I, *Cirsium turkestanicum* var. *pseudolappaceum*; J, *Cephalorrhynchus kossinskyi*; K, *Cousinia smirnowii*.

Crepis willemetioides Boiss., Fl. Orient. 3: 845 (1875). Syn.: *Hieracioides willemetioides* (Boiss.) Kuntze; *Crepis kandavanensis* Bornm. & Gauba

Mat.: A-11145; AS-6046; K-5689 (n.v.); U-16055 (n.v.)	
Hab.: Juniper woodland, lowland forest from Tangegol and northwards to Qortoy valley	
Dist.: C, N	Alt.: 600-1400
Ch.: ES ^{HY} /IT ^{KK}	GF.: GRH
Th. (GNP): VUL (5)	Th. (IR): VUL

Crupina vulgaris Cass., Dict. Science Nat. 12: 68 (1818).

Mat.: A-9571, 10512	
Hab.: Open scrubs of <i>Paliurus spina christi</i> , <i>Crataegus</i> and <i>Juniperus excelsa</i> ; <i>Stipa-Artemisia</i> steppe	
Dist.: 120	Alt.: 800-1800
Ch.: IT-M	GF.: TSC
Th. (GNP): NOT (21)	Th. (IR): SUN

C. crupinastrum and *C. vulgaris* are very similar and differ only in their achene base: The first species characterized by obovoid achenes which are sharply keeled at the base, with narrowly elliptic lateral hilum. The achenes of *C. vulgaris* are cylindrical, and at the base rounded-truncate with ± central ovoid-orbicular hilum. TM-34786 was misidentified by Rechinger (cf. Fl. Iranica, 139b: 449, 1980) as *C. crupinastrum*. I examined many plants in the field, but never found *C. crupinastrum* in the populations of *Crupina* occurring in the Park.

Dittrichia graveolens (L.) Greuter, Exsicc. Genav. Conserv. Bot. Distrib. Fasc. 4: 71 (1973). Syn.: *Erigeron graveolens* L. in Jusl. Cent. Plant.: 30 (1755). *Inula graveolens* (L.) Desf.; *I. brahuica* Boiss.

Mat.: TM-35076	
Hab.: As weed in garden of guesthouse in Tangegol	
Dist.: C	Alt.: 670
Ch.: IT-M	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Echinops koelzii Rech. f., Anz. Österr. Akad. Wiss. Math.-Naturwiss. Kl. 89: 259 (1951).

Mat.: A-9641, 9827; R-37624; Z-84/38; Wa-146 (n.v.)	
Hab.: Closed and open lowland and montane forest,	

steep slopes under the shade of shrubs	
Dist.: Map 121	Alt.: 500-2050
Ch.: ES ^{HY}	GF.: HSC TH
Th. (GNP): NOT (50)	Th. (IR): IND

E. koelzii and *E. ritrodes* inhabit different ecological niches. The former is a forest and the latter a grassland or steppe element, respectively. In several transition zones between forest and grassland or shrubby areas, these species grow side by side, however, each occupies its own particular habitat: *E. koelzii* grows under shrubs, *E. ritrodes* in sunny open intervals.

Echinops ritrodes Bunge, Bull. Acad. Imp. Sci. Saint-Petersbourg. 6: 407 (1863), "*rytrodes*". Syn.: *E. kernerii* Heimerl. Fig. 17, E.

Mat.: A-9403, 9575, 11864; GA-4890, 4970; R-52918; Wendelbo-14223; Z-84/16, 82/274	
Hab.: Mountain steppes, juniper woodland, <i>Acer monspessulanum</i> , <i>Paliurus</i> and <i>Crataegus</i> scrubs	
Dist.: Map 122	Alt.: 1000-2200
Ch.: IT ^C	GF.: HSC TH
Th. (GNP): NOT (76)	Th. (IR): NOT

Echinops ritro and *E. ritrodes* are very close or possibly conspecific. The latter is widely distributed from C & S Europe, Anatolia, Caucasus to Turkmenistan and the former is endemic of Iran and Turkmenistan. Rechinger (in Fl. Iranica 139a: 65, 1979) characterized *E. ritro* by the ± eglandular or papillose surface leaves, against *E. ritrodes* with strongly glandulose-villose or setose or papillose ones. In p. 72, he noted that the upper leaves of bearing capitula in *E. ritro* are deeply pinnatisect down to the midrib, but not so in *E. ritrodes*. Based on the study of a lot of material from the Park (including those cited in Flora Iranica) and field observations, I am not able to distinguish such differences. Z-84/16 and another collection from Khorasan (48 km S Bojnurd towards Esfarayen Rechinger 83579) and Turkmenistan (Aschabad, Suluklü, Sintenis 686) -both determined as *E. ritrodes* - have deeply pinnatisect leaves. The character of the indumentum is also very variable, so most of the studied specimens determined as *E. ritrodes* are subglabrous and eglandular on the upper surface. Therefore the taxonomic status of *E. ritrodes* is doubtful.

See also notes under *E. koelzii*.

Epilasia hemilasia (Bunge) C. B. Clarke, Compos. Ind. 279 (1876). Syn.: *Scorzonera hemilasia* Bunge, Beitr. z. Kenntn. Flor. Russlands, u. d. Steppen Central Asia 201 (1851). *Scorzonera nana* Boiss. & Buhse; *Epilasia nana* (Boiss. & Buhse) Grossh.

Mat.: R-52830	
Hab.: In <i>Artemisia</i> steppe E of the Park	
Dist.: E	Alt.: 1200
Ch.: IT	GF.: TRO
Th. (GNP): END (1)	Th. (IR): SUN

Erigeron acer L., Sp. Pl.: 863 (1753). s. l. Fig. 17, D.

Mat.: Abai 12244-E*; A-11779*; Abai 12242-E**, A-12014**	
Hab.: Alpine meadows	
Dist.: Map 123	Alt.: 2000-2200
Ch.: PL	GF.: HSC
Th. (GNP): VUL (6)	Th. (IR): SUN

* subsp. *pycnotrichus* (Vierh.) Grierson

**subsp. *arctophilus* (Rech. f.) Rech. f.

A-11779 and A-12014 are identified by M. Pakravan (Tehran).

Eupatorium cannabinum L., Sp. Pl.: 838 (1753).

Mat.: A-9258; GA-4953; TM-35071; U-19043; W&C-14304; Z-85/190	
Hab.: Moist soils and ruderal places in lowland forest and scrub, waterside in lowland and montane valleys, forest clearings dominated by <i>Pteridium aquilinum</i>	
Dist.: Map 124	Alt.: 450-1500(-1700)
Ch.: ES [M]	GF.: HSC
Th. (GNP): NOT (34)	Th. (IR): NOT

Garhadiolus angulosus Jaub. & Spach, Ill. Pl. Orient. 3: 122 (1850). Syn.: *Rhagadiolus angulosus* (Jaub. & Spach) Kupicha; *Rhagadiolus hedypnos* Fisch. & C. A. Mey.; *Garhadiolus hedypnos* (Fisch. C. A. Mey.) Jaub. & Spach.

Mat.: A-10323	
Hab.: <i>Paliurus spina-christi</i> scrub	
Dist.: Map 125	Alt.: 950-1150
Ch.: IT	GF.: TRO
Th. (GNP): END (2)	Th. (IR): SUN

Filago arvensis L. Sp. Pl.: addenda post indicem (1753)

Mat.: Z-82/210	
Hab.: <i>Paliurus spina-christi</i> scrub in Sharleq	
Dist.: S	Alt.: 900
Ch.: ES-IT-M	GF.: TCA
Th. (GNP): END (1)	Th. (IR): SUN

This widespread multiregional species was collected only once in our area. The species is characterized by stellately arranged fruiting involucre. See notes under *Bombycilaena erecta*.

Helichrysum oocephalum Boiss., Fl. Orient. 3: 236 (1875). Syn.: *H. kopetdaghense* Kirp.

Mat.: A-9402, 12092; R-53105; Z-82/161, WF-12623	
Hab.: Montane steppes (mixed of grasses and thorn-cushions)	
Dist.: Map 126	Alt.: 1700-2200
Ch.: IT ^c	GF.: HSC
Th. (GNP): RAR (12)	Th. (IR): RAR

WF-12623 and R-53105 were reported by Georgiadou & Rechinger (Fl. Iranica, 145: 61-62, 1980) under *H. graveolens* (M. Bieb.) Sweet. This species was originally described from the Crimea. A comparison of the specimens from our area with the type specimen of *H. graveolens* - Tauriae montes altiores, Marschall-Bieberstein, W - and identical specimens of *H. oocephalum* showed that those match better with *H. oocephalum*. Furthermore, this latter species was described from Khorassan: prope Nischapur et Meschhed, Bunge (n.v.), which phytogeographically better matches with our area.

Heteropappus altaicus (Willd.) Novopokr., Sched. ad Herb. Fl. Ross. 8: 193 (1922). Syn.: *Aster altaicus* Willd., Enum. Pl. Hort. Berol.: 881 (1809). Fig. 17, B-C.

Mat.: A-4405, 9497, 12374; GA-4896, 4927, R-52592; W&C14226; Z-83/1360	
Hab.: Rocky outcrops in various open scrub, forest clearing with <i>Pteridium aquilinum</i> stands	
Dist.: Map 127	Alt.: 450-1700
Ch.: IT-ES ^{HY}	GF.: HSC
Th. (GNP): NOT (50)	Th. (IR): NOT

According to Grierson (Fl. Iranica 154: 8, 1982) the majority of the Iranian plants belong to var.

canescens (Nees) Serg. (Syn.: *Aster pyrropappus* Boiss.).

Hieracium umbellatum L., Sp. Pl.: 804 (1753).

Mat.: A-12042* (Det.: F. Schuhwerk)	
Hab.: Vertical cliffs on accumulated soils between rock clefts	
Dist.: C	Alt.: 1830
Ch.: PL (North Temperate)	GF.: HSC
Th. (GNP): END (1)	Th. (IR): VUL

Hieracium cf. woronowicum Zahn, Vestn. Tbilissk. Bot. Sada 12: 3 (1908).

Mat.: A-11376, 11337 (Det.: F. Schuhwerk)	
Hab.: In <i>Crataegus-Acer monspessulanum</i> scrub in Jakhtikalan Pass and mountain steppe top of Divar-Kaji Mountain	
Dist.: C & NE	Alt.: 1580-2400
Ch.: ES ^{HY} /IT ^{Alborz}	GF.: HSC
Th. (GNP): END (2)	Th. (IR): SUN

Inula britannica L. Sp. Pl.: 882 (1753).

Mat.: A-9431	
Hab.: Mountain steppe in Almeh	
Dist.: S	Alt.: 1700-1750
Ch.: ES [IT-M]	GF.: HSC
Th. (GNP): ? END (1)	Th. (IR): SUN

Inula oculus-christi L., Sp. Pl.: 881 (1753). Syn.: *I. montana* M. Bieb.

Mat.: A-9432, 11367; R-52770, 53100; WF-12632; K-7707; Z-82/284, 83/1772	
Hab.: Grassy mountain steppes (often with <i>Stipa</i>), <i>Acer monspessulanum</i> scrub	
Dist.: Map 128	Alt.: (1000-)1400-2070
Ch.: ES-IT-M	GF.: GRH
Th. (GNP): NOT (30)	Th. (IR): NOT

Inula salicina L., Sp. Pl. 882 (1753).
subsp. *aspera* (Poir.) Hayek, Prodr. Fl. Penins. Balcan. 2: 602 (1931). Syn.: *I. aspera* Poir., Encycl. Suppl. 3: 154 (1813); *I. salicina* L. var. *aspera* (Poir.) Beck; *I. cordata* Boiss.

Mat.: A-4493, 9706, 9359; E-771; F-1143; W&C14311; R-52590, 52624	
Hab.: Grassy mountain steppes, rocky outcrops, scrubs of <i>Acer monspessulanum</i> , <i>Crataegus</i> and <i>Paliurus spina-christi</i> , forest clearings dominated by <i>Pteridium aquilinum</i>	
Dist.: Map 129	Alt.: 450-2000

Ch.: ES [IT-M]	GF.: GRH
Th. (GNP): NOT (60)	Th. (IR): NOT

Inula thapsoides (M. Bieb. ex Willd.) Spreng., Pl. Min. Cog. Pug. 58 (1813). Syn.: *Conyza thapsoides* M. Bieb. ex Willd., Sp. Pl.: 3, 3: 1949 (1800). Fig. 17, G.

Mat.: A-9683, 9815, 9786, 9800, 11865, 11391, 11557, 11188, (sterile); GA-4930, 4973	
Hab.: Open scrubs (<i>Paliurus</i> , <i>Crataegus</i> , <i>Acer</i>), mountain meadows, lowland forest	
Dist.: Map 130	Alt.: 560-2060
Ch.: ES ^{EH}	GF.: GRH
Th. (GNP): NOT (37)	Th. (IR): NOT

Inula vulgaris (Lam.) Trevis., Fl. Euganea 29 (1842). Syn.: *Conyza vulgaris* Lam., Fl. Fr. 2: 73 (1778); *C. squarrosa* L.; *I. conyza* DC.

Mat.: A-5008, 11835, 11956, 11524 (sterile), W&C-14326	
Hab.: Closed forest on moist soils, or rocky outcrops, streamside	
Dist.: Map 131	Alt.: 850-1450
Ch.: ES	GF.: HSC
Th. (GNP): VUL (6)	Th. (IR): VUL

A rare species in Iran which only one more locality outside the Park has been cited in Flora Iranica 145: 92, 1980, from NW Iran: Azerbaijan, Hasan Beyglu, Knapp.

Iranecio elbrusensis (Boiss.) B. Nord., Fl. Iranica 164: 55 (1989). Syn.: *Senecio elbrusensis* Boiss., Fl. Orient. 3: 410 (1875).

Mat.: A-12071	
Hab.: On accumulated soils at basal parts of a limestone cliff, transition zone between <i>Carpinus orientalis</i> and juniper woodlands in Gerieh-Sar	
Dist.: C	Alt.: 2000
Ch.: IT ^{Alborz}	GF.: HSC
Th. (GNP): END (1)	Th. (IR): IND

Iranecio othonnae (M. Bieb.) B. Nord., Fl. Iranica 164: 58 (1989). Syn.: *Senecio othonnae* M. Bieb., Fl. Taur.-Caucas. 2: 308 (1808); *Cacalia pinnata* Willd.; *Senecio rariflorus* K. Koch.

Mat.: A-4420, 9887, 11507; W&C-14297	
Hab.: Closed montane forest	
Dist.: Map 132	Alt.: (900-)1400-2230
Ch.: ES ^{EH}	GF.: HSC
Th. (GNP): NOT (33)	Th. (IR): RAR

Jurinea antonowii C. Winkl., Trudy Glavn. Bot. Sada 11, 1: 145 (1890).

Mat.: A-11240	
Hab.: On a dry gypsum hill in northern border of the Park	
Dist.: Map 133	Alt.: 1150
Ch.: IT ^{KK}	GF.: CSC
Th. (GNP): END (1)	Th. (IR): END

The species has been recently reported as a new record for Iran (Akhani 1996: 103).

Jurinea monocephala Aitch. & Hemsl., Trans. Linn. Soc. London, Bot. 3: 80 (1888). s. l. [incl. subsp. *monocephala* & subsp. *sintensisii* (Bornm.) Wagenitz]. Syn.: *J. suffruticosa* Regel var. *latifolia* C. Winkl.; *J. sintensisii* Bornm.; *J. delitescens* Iljin ex Czerniak. Fig. 17, F.

Mat.: A-10241, 10715; R-53099; Rz-53971; Wendelbo-12639; TM-s. n.	
Hab.: Rocky limestone in various scrubs and mountain steppe communities	
Dist.: Map 134	Alt.: 700-2200
Ch.: IT ^{KK}	GF.: ±CHU
Th. (GNP): NOT (42)	Th. (IR): SUN

According to Rechinger & Wagenitz (Fl. Iranica 139a: 188, 1979) only the type collection was known to belong to the typical subspecies; all other cited plants are placed under subsp. *sintensisii* (Bornm.) Wagenitz.

Jurinea radians Boiss., Fl. Orient. 3: 577 (1875). subsp. *radians*

Mat.: A-10836	
Hab.: <i>Artemisia</i> steppe and moderately saline soils	
Dist.: Map 135	Alt.: 1200
Ch.: IT ^C	GF.: GTU/HRO
Th. (GNP): END (3)	Th. (IR): RAR

Koelpinia linearis Pall., Reise durch versch. Prov. d. Russ. Reiches 3, append.: 755 (1776). Syn.: *Rhagodiolus koelpinia* Willd.; *Koelpinia latifolia* C. Winkl.

Mat.: A-4325, 6222, 6221, 10745; AS-5932; R-52829, 53128	
Hab.: <i>Artemisia</i> steppe, moderately saline soils in <i>Anabasis-Artemisia</i> community, <i>Haloxylon</i> shrubs along Alme valley	
Dist.: Map 136	Alt.: 1200-1550

Ch.: IT-SS	GF.: TGR/TCA
Th. (GNP): VUL (7)	Th. (IR): NOT

Lactuca georgica Grossh. in Grossh. & Schischk. Sched. ad herb. Pl. or. exsicc. fasc. I-VIII (1924).

Mat.: A-9624, 11926, 11840, 11745, 12054; Fu-9020; GA-4916	
Hab.: Rocky outcrops	
Dist.: Map 137	Alt.: 750-2000
Ch.: IT ^{Cauc.-Turk} /ES ^{HY}	GF.: HSC
Th. (GNP): VUL (8)	Th. (IR): ? END

Known as new record for Iran (see Akhani 1999 for further details).

Lactuca serriola L., Amoen. Acad. 4: 328 (1759). Syn.: *L. scariola* L.

Mat.: A-12111, 11872, 12169, 11706; R-37625; Z-82/214	
Hab.: By brook, ruderal habitats in protection stations and roadside	
Dist.: Map 138	Alt.: 450-1500
Ch.: ES-IT-M	GF.: HSC
Th. (GNP): VUL (6)	Th. (IR): NOT

Lactuca undulata Ledeb., Fl. Altaica 4: 156 (1833).

Mat.: A-10860; R-52989, 52930	
Hab.: <i>Artemisia</i> steppe in Mirza-Baylu plain	
Dist.: S & SE	Alt.: 1200-1300
Ch.: IT [M]	GF.: TRO
Th. (GNP): END (3)	Th. (IR): NOT

Lapsana communis L., Sp. Pl.: 811 (1753). s.l.

Mat.: A-9715, 9821, 4394, 9250, 11791; Korhonen-1086; WF- 12780	
Hab.: Closed lowland and montane forest	
Dist.: Map 139	Alt.: 540-2230
Ch.: ES	GF.: HSC
Th. (GNP): NOT (52)	Th. (IR): NOT

Lapsana was treated by Rechinger (Fl. Iranica 122: 221-223, 1977) with a narrow species concept considering *L. communis*, *L. intermedia* and *L. grandiflora* as separate species. The first two species are reported to occur in our area. Sell (1981) discussed the taxonomic problems of this group and reduced the rank of these species to the subspecies.

Leontodon asperimus (Willd.) Boiss. ex Ball, Ann. Mag. Nat. Hist., ser. 2, 6: 15 (1850). Syn.: *Scorzonera asperima* Willd., Sp. Pl. 3, 3: 1507 (1803).

Mat.: A-10704, 11619, 11106; R-52849	
Hab.: Limestone ground, scrubs of <i>Acer monspessulanum</i> , <i>Crataegus</i> , <i>Carpinus orientalis</i> , <i>Juniperus excelsa</i> woodland	
Dist.: Map 140	Alt.: 1200-2000
Ch.: IT ^{W&C}	GF.: HRO
Th. (GNP): RAR (9)	Th. (IR): NOT

Linosyris vulgaris Cass. ex Less., Syn. Gen. Comp. 195 (1832). Syn.: *Chrysocoma linosyris* L.; *Aster linosyris* (L.) Bernh.; *Crinitaria linosyris* (L.) Less. Fig. 17, E.

Mat.: A-11673, 11920, 12053, 12315, 12388	
Hab.: Open scrubs and thickets of <i>Acer monspessulanum</i> , <i>Crataegus</i> spp., <i>Carpinus orientalis</i>	
Dist.: Map 141	Alt.: 800-2000
Ch.: ES-M	GF.: GRH
Th. (GNP): NOT (29)	Th. (IR): SUN

Known as new record for Iran. For further details see Akhani (1999).

Myriactis wallichii DC., Prodr. 5: 309 (1836). Syn.: *Botryadenia gmelinii* Fisch. & C. A. Mey., *Myriactis gmelini* (Fisch. & C. A. Mey.) DC.

Mat.: A-11984, 11845	
Hab.: Damp soils and along streams or riverside in closed forests	
Dist.: Map 142	Alt.: 500-1400
Ch.: ES ^{HY} -HIM	GF.: TSC/HSC
Th. (GNP): VUL (8)	Th. (IR): END

In Flora Iranica (154: 58, 1982) *Myriactis wallichii* was known by Rechinger only from a few localities in N. Iran. The species is distributed in Talish, N. Iran and distantly occurs in Pakistan, E Afghanistan, Himalaya and Pamir-Alaj. Based on the material collected from the Park, the plant height reaches to 60 cm tall and the leaves to 14 cm long and 9 cm broad, respectively. Rechinger described the height of the plants to 40 cm and the leaves 3-6 x 2-4 cm.

Onopordon acanthium L. Sp. Pl.: 827 (1953).

Mat.: A-11410

Hab.: Weed in waste places, gardens and disturbed habitats in forest and scrub zone of the Park	
Dist.: Map 143	Alt.: 450-1560
Ch.: ES [IT-M]	GF.: HSC TH
Th. (GNP): END (3)	Th. (IR): NOT

Onopordon leptolepis DC. Prodr. 6: 619 (1838). Fig. 17, H.

Mat.: A-11420	
Hab.: Gravelly and scree soils at margin and bed of a few dry streams in Mirza-Baylu plain	
Dist.: E	Alt.: 1200-1300
Ch.: IT	GF.: HSC TH
Th. (GNP): END (2)	Th. (IR): SUN

Petasites hybridus (L.) P. Gaertn., B. Meyer & Scherb., Oekon. Fl. Wetterau 3: 184 (1801). Syn.: *Tussilago hybrida* L., Sp. Pl.: 866 (1753); *T. petasites* L.; *P. ochroleucus* Boiss. & Huet. Fig. 8, B.

Mat.: A-11506; W&C-14318	
Hab.: Mountain springs in closed forest	
Dist.: Map 144	Alt.: 1000-1800
Ch.: ES	GF.: GRH
Th. (GNP): VUL (5)	Th. (IR): VUL

Picnomon acarna (L.) Cass., Dict. 40: 188 (1826). Syn.: *Cnicus acarna* L., Sp. Pl.: ed. 2: 1158 (1763); *Carthamus canescens* Lam.

Mat.: Wa-205 (n.v.); Z-82/211	
Hab.: Rocky outcrops, alpine meadows, <i>Paliurus spina-christi</i> scrub	
Dist.: Map 145	Alt.: 850-2060
Ch.: IT-M	GF.: TSC TH (or biennial)
Th. (GNP): VUL (4)	Th. (IR): NOT

Picris strigosa M. Bieb., Fl. Taur.-Caucas. 2: 250 (1808).

subsp. **strigosa** Syn.: *P. glaucescens* DC.; *P. turcomanica* Gand.; *P. subinflata* (Bornm. & Gauba) Rech. f.

Mat.: A-11629, 11576, 10728	
Hab.: Limestone rocks, crevices of cliffs, mountain steppe, <i>Juniperus</i> woodland, <i>Stipa</i> steppe	
Dist.: Map 146	Alt.: 740-2000
Ch.: IT ^{W&C}	GF.: HSC
Th. (GNP): RAR (9)	Th. (IR): NOT

A-11576 differs from other material by the non-setulose upper parts of stem and capitula.

Psychrogeton aucheri (DC.) Grierson, Notes Roy. Bot. Gard. Edinburgh 27: 142 (1967). Syn.: *Conyza aucheri* DC., Prodr. 7: 281 (1838); *Erigeron khorassanicus* Boiss.

Mat.: A-11747, 11364	
Hab.: On lime soils at bottom of a dry valley surrounded by <i>Juniperus excelsa</i>	
Dist.: Map 147	Alt.: 1550-2000
Ch.: IT ^{C&E}	GF.: TSC/HSC
Th. (GNP): END (2)	Th. (IR): END

Superficially very similar to *Conyza* and *Erigeron*; *Psychrogeton aucheri* originally was described under the former and as synonym under the latter. Apart from differences in flowers and achenes which are not easily distinguishable without exact experience and perfectly collected material, *P. aucheri* is distinguished from *Conyza canadensis* by the occurrence of glandulose hairs on the stem and branches, much broader leaves up to 2 cm wide which are oblanceolate to spatulate in outline, and by a more densely pilose and broader involucre 1-1.4 cm wide. In *C. canadensis* leaves are often oblong-linear and subglabrous with long stiffy hairs at the margin. From *Erigeron acer*, *Psychrogeton aucheri* is distinguished by the long radiate flowers which are distinctly longer than the involucre, up to twice as long.

Pulicaria dysenterica (L.) Bernh., Syst. Verz. Erfurt 153 (1800). Syn.: *Inula dysenterica* L., Sp. Pl.: 882 (1753).

Mat.: A-12138, 11713	
Hab.: Margin of a stream in Soolegerd together with <i>Conium maculatum</i> and in a salt spring N of Mirza-Baylu plain with <i>Phragmites australis</i>	
Dist.: E & NE	Alt.: 1200-1280
Ch.: ES-IT-M	GF.: HSC
Th. (GNP): END (2)	Th. (IR): NOT

The genus is characterized by its peculiar pappus which is surrounded by a series of scales at the base, and the species is characterized by its finely 10-ribbed achene, therefore easily distinguished from other similar genera like *Conyza*, *Erigeron* etc. The fresh plant has a bad, mustard-like, smell.

Scariola orientalis (Boiss.) Soják., Nov. Bot. Horti Bot. Univ. Carol. Prag 1962: 46 (1962). Syn.: *Phaenopus orientalis* Boiss., Voy. Bot. Midi Esp. 2: 390 (1839); *Lactuca orientalis* Boiss.

Mat.: A-11697; Z-84/02, 85/157, 84/10	
Hab.: Waste-places around the road and protection stations, mountain steppes with grasses and thorn-cushions	
Dist.: Map 148	Alt.: 1200-1780
Ch.: IT	GF.: CSE
Th. (GNP): VUL (7)	Th. (IR): NOT

Scariola viminea (L.) F. W. Schmidt, Samml. Phys.-Oekon. Aufsätze I: (1795). Syn.: *Prenanthes viminea* L., Sp. Pl.: 797 (1753). *Lactuca viminea* (L.) J. & C. Presl.

Mat.: A-11773, 11889, 11841; W&C-14221	
Hab.: Rocky outcrops	
Dist.: Map 149	Alt.: 900-2300
Ch.: IT ^{W&Cauc.-Turk.-M}	GF.: HSC (biennial)
Th. (GNP): VUL (5)	Th. (IR): END

Scorzonera grossheimii Lipsch. & Vassilcz., Fl. URSS 29: 718 (1964).

Mat.: A-10324; R-53108; Rz-53183	
Hab.: <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> scrubs; mountain steppe of grasses and thorn-cushions	
Dist.: Map 150	Alt.: 1000-1820
Ch.: IT ^{Alborz}	GF.: HRO
Th. (GNP): VUL (5)	Th. (IR): NOT

Scorzonera laciniata L. Sp. Pl.: 791 (1753). Syn.: *Podospermum laciniatum* (L.) DC.

Mat.: A-10948, 10768	
Hab.: Subsaline and waste-places margin of road in S Mirza-Baylu plain and Dasht	
Dist.: S & E	Alt.: 1000-1200
Ch.: ES-M-IT	GF.: HSC (biennial)
Th. (GNP): END (2)	Th. (IR): NOT

Scorzonera leptophylla (DC.) Krasch. & Lipsch., Fragm. Monogr. Gen. Scorz. 1: 78 (1935). Syn.: *S. mollis* M. Bieb. var. *leptophylla* DC. Prodr. 7, 1: 122 (1838).

Mat.: A-10349, U-16077 (n.v.)	
Hab.: In scrub of <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> in Sharleq	
Dist.: S	Alt.: 1000-1150
Ch.: IT ^{Cauc.-Turk.}	GF.: GTU
Th. (GNP): END (3)	Th. (IR): SUN

As stated by Rechinger (Flora Iranica 122: 39, 1977), *S. raddeana*, *S. leptophylla*, *S. szovitsii*, *S. stenocephala*, *S. mucida* and *S. tunicata* belong to a difficult complex with ambiguities in their boundaries. Therefore, the correctness of the above cited plants is doubtful.

Scorzonera litwinowii Krasch. & Lipsch., Bull. Soc. Nat. Mosc. 43, 1: 153 (1934).

Mat.: A-10283, AS-5911; W&a-11072	
Hab.: <i>Artemisia</i> steppe	
Dist.: Map 151	Alt.: 1100-1250
Ch.: IT ^E	GF.: GTU
Th. (GNP): END (3)	Th. (IR): VUL

Scorzonera raddeana C. Winkl., Trudy Glavn. Bot. Sada 40, 1: 150 (1890). Syn.: *S. turcomanica* Krasch. & Lipsch., *S. afghana* Rech. f.

Mat.: A-10504, 10263, 10442, 10960; F-1175; K-5700 (n.v.); W&a-11073	
Hab.: <i>Artemisia-Festuca-Stipa</i> steppe, mountain steppe, waste places	
Dist.: Map 152	Alt.: 1100-1900
Ch.: IT ^C	GF.: GTU
Th. (GNP): RAR (9)	Th. (IR): NOT

Senecio erucifolius L., Sp. Pl., 869 et 1231 (1753).

subsp. **grandidentatus** (Ledeb.) B. Nord., Fl. Iranica 164: 76 (1989). Syn.: *S. grandidentatus* Ledeb., Fl. Ross. 2: 636 (1845); *S. arenarium* M. Bieb.; *S. velenovskyi* Borbas.

Mat.: A-12185, 11957, 12001; TM-35080	
Hab.: Lowland forest clearings	
Dist.: Map 153	Alt.: 450-1220
Ch.: ES ^{EH}	GF.: HSC
Th. (GNP): VUL (6)	Th. (IR): END

Senecio glaucus L., Sp. Pl.: 868 (1753). Syn.: *S. lacerus* Boiss.; *S. noëanus* Rupr.; *S. glaucus* L. subsp. **coronopifolius** (Desf.) Alexander.

Mat.: A-10725*; Fu-7383 (n.v.); R-52550	
Hab.: <i>Artemisia</i> steppe, juniper woodland; disturbed habitats in C and S parts of the Park	
Dist.: C & S	Alt.: 500-1450
Ch.: IT-M-SS	GF.: TSC
Th. (GNP): END (3)	Th. (IR): NOT

* A late collection without complete leaves; determination uncertain.

Senecio vernalis Waldst. & Kit., Pl. Rar. Hung. 1: 23 (1800). Syn.: *S. rapistroides* DC.

Mat.: A-10314, 10340; ER-15909; K-5666 (n.v.); TM-34779; W&a-10937	
Hab.: Spring therophyte as weed in disturbed habitats, gardens, road margin and open vegetation in forest and steppe zone	
Dist.: C & S	Alt.: 450-1500
Ch.: ES ^{Pontic-EH} -IT ^W	GF.: TSC
Th. (GNP): IND (8)	Th. (IR): NOT

Serratula latifolia Boiss., Diagn. Pl. Orient. Nov. sér. 1, 10: 96 (1849). Syn.: *Schumeria latifolia* (Boiss.) Iljin; *Centaurea plumosa* Aitch. & Hemsl.; *Serratula litwinowii* Iljin.

Mat.: A-4308; R-52990, 52782; WF-12746	
Hab.: <i>Artemisia</i> steppe, mountain steppe of grasses and thorn-cushions, <i>Stipa</i> steppe, juniper woodland, <i>Acer monspessulanum</i> and <i>Paliurus spina-christi</i> scrubs	
Dist.: Map 154	Alt.: 1000-2140
Ch.: IT ^C	GF.: HSC
Th. (GNP): NOT (70)	Th. (IR): NOT

Serratula quinquefolia M. Bieb. ex Willd., Sp. Pl. 3: 1639 (1803).

Mat.: A-11665	
Hab.: On moist soil by brook in closed montane forest	
Dist.: Map 155	Alt.: 1550
Ch.: ES ^{EH}	GF.: HSC
Th. (GNP): END (1)	Th. (IR): NOT

According to Flora Iranica (139b: 299, 1980) almost all known localities of this rare Euxine-Hyrcanian element are located in center and western parts of the South Caspian forests.

Sonchus asper (L.) Hill., Brit. Herb. 1: 47 (1756). Syn.: *S. oleraceus* L. var. *asper* L., Sp. Pl.: 794 (1753).

subsp. **glaucescens** (Jord.) Ball, J. Linn. Soc., Bot. 16: 548 (1878). Syn.: *S. glaucescens* Jord.

Mat.: R-52553; K-5769 (n.v.)	
Hab.: Weed in gardens and disturbed habitats from Tangerang to Tangegol	
Dist.: W & C	Alt.: 500-600 ?
Ch.: IT-M ^(as subspecies)	GF.: HSC (biennial)
Th. (GNP): END (2)	Th. (IR): NOT

Sonchus oleraceus L. Sp. Pl.: 794 (1753).

Mat.: A-12170	
Hab.: By brooklet in Mirza-Baylu station	
Dist.: E	Alt.: 1200
Ch.: PL	GF.: TSC (or biennial)
Th. (GNP): END (1)	Th. (IR): NOT

Sonchus palustris L., Sp. Pl.: 2: 793 (1753).

Mat.: A-11710; TM-35075	
Hab.: Waterside associated with <i>Phragmites australis</i>	
Dist.: Map 156	Alt.: 1200-1550
Ch.: ES [IT]	GF.: GRH
Th. (GNP): END (3)	Th. (IR): END

Steptorrhampus persicus (Boiss.) O. & B. Fedtsch., Consp. Fl. Turkest. 4: 319 (1911). Syn.: *Lactuca persicus* Boiss., Diagn. Pl. Orient. Nov. sér. 1, 7: 9 (1846); *Cicerbita persica* Beauverd.

Mat.: R-52964	
Hab.: Probably <i>Artemisia</i> steppe	
Dist.: E	Alt.: 1300
Ch.: IT	GF.: GTU
Th. (GNP): END (1)	Th. (IR): IND

It is not certain whether the above cited plant was really collected from a locality within the present boundaries of the Park.

Steptorrhampus tuberosus (Jacq.) Grossh., Fl. Kawk. 4: 258 (1934). Syn.: *Lactuca tuberosa* Jacq., Hort. Vindob. 1: 18 (1770); *L. petraea* Fisch. & C. A. Mey.; *Steptorrhampus linczewskyi* Kirp.

Mat.: R-53107	
Hab.: ? Mountain steppe in Almeh	
Dist.: C	Alt.: 1500?1800
Ch.: IT ^{W & Cauc.-Turk.}	GF.: GTU
Th. (GNP): END (1)	Th. (IR): IND

Apparently very rare in our area. Despite intensive collections and field observations in Almeh, it was not refound.

Tanacetum coccineum (Willd.) Grierson, Notes Roy. Bot. Gard. Edinburgh 33: 262 (1974). Syn.: *Chrysanthemum coccineum* Willd., Sp. Pl.: 3: 2144 (1803).

Mat.: A-10586, 12051, 12025	
Hab.: In crevices of limestone cliffs and rocky outcrops in open scrubs	

Dist.: Map 157	Alt.: 1300-2000
Ch.: ES ^{?EH}	GF.: HSC
Th. (GNP): VUL (4)	Th. (IR): RAR

Tanacetum parthenium (L.) Sch.-Bip., Tanacet. 55 (1844). Syn.: *Matricaria parthenium* L., Sp. Pl.: 890 (1753). *Chrysanthemum parthenium* (L.) Bernh.; *P. persicum* Boiss.; *Tanacetum partheniifolium* (Willd.) Sch.-Bip.

Mat.: A-9737, 9613, 9279; 12384; TM-34788; R-52552, 52661	
Hab.: Lowland and montane forest, moist soils, rocky outcrops	
Dist.: Map 158	Alt.: 480-2030
Ch.: PL	GF.: HSC
Th. (GNP): NOT (50)	Th. (IR): NOT

Tanacetum polycephalum Sch.-Bip., Tanacet. 47 (1844).

subsp. **duderanum** (Boiss.) Podlech, Fl. Iranica 158: 120 (1986). Syn.: *Pyrethrum duderanum* Boiss., Diagn. Pl. Orient. Sér. 1, 11: 26 (1849); *Chrysanthemum shahrudense* Rech. f., Aellen & Esfand.; *Tanacetum duderanum* (Boiss.) Tzvelev.

Mat.: A-10714; R-53101; Rz-53184	
Hab.: Vertical limestone cliffs, rocky outcrops and exposed summits in <i>Juniperus</i> and <i>Acer monspessulanum</i> scrubs	
Dist.: Map 159	Alt.: 800-2380
Ch.: IT ^{W & C}	GF.: HRO
Th. (GNP): RAR (12)	Th. (IR): NOT

Taraxacum

It is not possible for me to determine the plants of this extremely difficult genus. The account of the genus in Flora Iranica is provided with a narrow species concept (cf. Van Soest in Fl. Iranica 122: 223-284, 1977) which makes it very difficult to use for those of us unfamiliar with *Taraxacum* taxonomy. In Flora Iranica, five specimens from the Park have been cited under four species which are listed below. Other informations which are usually provided for each species are very incomplete for *Taraxacum*. The specimens collected by me are listed under *Taraxacum* spp.

Taraxacum juzepczukii Schisch., Fl. URSS 29: 731, 479 (1964).

Mat.: R-52991

Hab.: <i>Artemisia</i> steppe in Mirza-Baylu plain	
Dist.: E	Alt.: 1200
Ch.: IT ^E	GF.: HRO
Th. (GNP): SUN	Th. (IR): ? END

Taraxacum nikitinii Schischk., Fl. Turkmen. 7: 319, 383 (1960).

Mat.: K-5665 (n.v.)	
Hab.: 30 km E of Tangegol	
Dist.: E	Alt.: ? 1200
Ch.: ? IT ^{KK}	GF.: HRO
Th. (GNP): SUN	Th. (IR): ? END

Taraxacum serotinum (Waldst. & Kit.) Poir. in Lam., Encycl. Meth. Bot. Suppl. 4: 420 (1816). Hand.-Mazz., Mon. Tar.: 21 (1907). Syn.: *Leontodon serotinus* Waldst. & Kit., Descr. et Ic. Pl. Rar. Hung. 2: 119 (1805).

Mat.: U-19038 (n.v.); Wa-158 (n.v.)	
Hab.: In forested zone of the Park	
Dist.: ?	Alt.: ? 650
Ch.: ES [IT]	GF.: HRO
Th. (GNP): SUN (2)	Th. (IR): NOT

Taraxacum syriacum Boiss., Diagn. Pl. Orient. Nov. sér. 2, 3: 96 (1856). Syn.: *T. denudatum* Boiss. & Noë.

Mat.: E-768	
Hab.: ? Mountain steppe in Almesh	
Dist.: C	Alt.: ? 1800
Ch.: ? IT	GF.: HRO
Th. (GNP): SUN (1)	Th. (IR): NOT

Taraxacum spp.

A-5944, 11705, 11917, 12295, 12296.

Tragopogon

Tragopogon is a difficult genus and its account in Flora Iranica (Rechinger 122: 83-85, 1977) is provisional. It is always difficult to correlate the characters of fruiting and flowering specimens (Rechinger l.c.: 83-84). Also there are no clear-cut boundaries in the variation range of many species. In the Park, there are at least 9 species, some of them with uncertain status.

Tragopogon capitatus S. Nikitin, Bot. Mater. Gerb. Bot. Inst. Akad. Nauk SSSR 7: 257 (1937). Fig. 17, J.

Mat.: A-11248, 11116, 11191	
Hab.: Mixed grassland and scrub (transition between forest and steppe)	
Dist.: Map 160	Alt.: 1350-1500
Ch.: IT ^E	GF.: HSC (biennial)
Th. (GNP): VUL (4)	Th. (IR): END

Recently known as new record for Iran (Akhani 1996: 104).

Tragopogon coloratus C. A. Mey., Verz. Pfl. Cauc. 6 (1831).

Mat.: K-5699 (n.v.); U-16095 (n.v.)	
Hab.: Unknown (30 km E Tangerang)	
Dist.: S	Alt.: 1050
Ch.: IT ^W	GF.: HSC (biennial)
Th. (GNP): END (2)	Th. (IR): RAR

Tragopogon gongylorrhizus Rech. f., Fl. Iranica 122: 98 (1977).

Mat.: A-11031, 11674; U-16116 (n.v.); W&al-11048; Z-83/1375	
Hab.: Scrub vegetation on rocky outcrops	
Dist.: Map 161	Alt.: 600-1700
Ch.: ES ^{HY}	GF.: HSC
Th. (GNP): VUL (5)	Th. (IR): VUL

Tragopogon graminifolius DC. Prodr. 7: 114 (1838). Syn.: *T. iranicus* Rech. f.; *T. khorasanicus* Rech. f.

Mat.: A-11716; F-1162; Z- 84/19	
Hab.: Weed on moist and disturbed soils around the Soolegerd station	
Dist.: Map 162	Alt.: 1200
Ch.: IT ^C	GF.: HSC
Th. (GNP): END (1)	Th. (IR): NOT

See notes under the following species.

Tragopogon kotschyi Boiss., Diagn. Pl. Nov. Ser. 1, 11: 45 (1849). Syn.: *T. graminifolius* DC. var. *kotschyi* Boiss. Fig. 17, K.

Mat.: A-11774, 11322	
Hab.: Alpine meadows and limestone ground	
Dist.: Map 162	Alt.: 2180-2380
Ch.: IT ^{Alborz}	GF.: HSC
Th. (GNP): END (3)	Th. (IR): IND

T. kotschyi is very similar to *T. graminifolius*, but differs by the broader, 6-8 mm wide cauline leaves, which narrow abruptly in the middle and are whitish at the base, and by non-beaked achenes. Ecologically the species grows in high altitudes, while *T. graminifolius* is a weedy hygrophylous species in lower altitudes. I have seen no intermediate population between these different habitats in the Park (see Map 163), where both species occur.

As pointed out by Rechinger (Fl. Iranica 122: 108, 1977), *T. kotschyi* and *T. reticulatus* are very close and not easy to separate. The former was described from Alborz Mountain and the latter from Erzurum in Anatolia. Provisionally, I prefer to use the name of *T. kotschyi* for the plants that occur in our area. Firstly, it is the older name; secondly, the species was described from Alborz, which is phytogeographically similar to our area. However, the presence of distinct reticulate fibres at the base of plant, c. 21 mm achene length and the presence of a floccose-flacke at the base of the involucre would rather indicate to place the specimens to *T. reticulatus*, according to the Flora Iranica account.

Tragopogon longirostris Bisch. in Webb, in Webb & Berth., Phyt. Canar. 2: 469 (1850). Syn.: *T. krascheninnikovii* S. Nikitin. Fig. 17, I.

Mat.: A-10769, 10329, 10428, 10691; F-1192; R-53098, 52875, 52554, 52777; TM-34776	
Hab.: Open scrubs (<i>Acer monspessulanum</i> , <i>Paliurus spina-christi</i> , <i>Carpinus orientalis</i> , <i>Crataegus</i> , <i>Juniperus excelsa</i>), <i>Artemisia</i> steppe	
Dist.: Map 163	Alt.: 500-1750
Ch.: M-IT-SS	GF.: HSC
Th. (GNP): RAR (14)	Th. (IR): NOT

Tragopogon maturatus Boriss. Fl. Turkmen. 7: 297 (1960). Syn.: *T. praecox* S. Nikitin.

Mat.: TM-34780-E (determination uncertain)	
Hab.: Probably open forest or weed in garden of Tanagerah	
Dist.: W	Alt.: c. 500
Ch.: IT ^{KK} /ES ^{HY}	GF.: HSC (biennial)
Th. (GNP): END (1)	Th. (IR): END

T. maturatus was originally described from Gorgan: in jugo Adshilar [probably Ishlar] 29.5.1914, Michelson 521 LE (n.v.). The above specimen was not identified by Rechinger, but more or less

matches with the original description given by Nikitin. The specimen is in fruiting state, without the information on the colour of the flowers. It shares intermediate characters between *T. graminifolius*, *T. kotschyi* on one hand and *T. gongylorrhizus* and *T. longirostris* on the other hand. In habit, it is similar to *T. gongylorrhizus* with a slightly thickened peduncle and broad phyllaries, but differs by the much shorter involucre and achenes. It differs from *T. graminifolius* by the longer achenes and involucre, broader phyllaries, broader leaves, taller growth and thick peduncle and stems. It needs more studies for a reliable identification.

Tragopogon montanus S. Nikitin, Bot. Mater. Gerb. Glavn. Bot. Sada SSSR 7: 270 (1937).

Mat.: A-10422, 20466; TM-34777; R-52988; W&a-11056	
Hab.: <i>Artemisia</i> steppe and juniper woodland S parts of the Park from Dasht to Mirza-Baylu	
Dist.: S	Alt.: 1000-1400
Ch.: IT ^E	GF.: HSC
Th. (GNP): VUL (5)	Th. (IR): VUL

Tragopogon vvedenskyi Popov ex Pavlov, Byull. Moskovsk. Obshch. Isp. Prir. 42: 138 (11.12.1933). Syn.: *T. angustissimus* S. Nikitin; *T. agrostiphyllus* Rech. f. & Koeie.

Mat.: A-11693, 11422, 11746, 11283, 10982; R-52776, 53109; ZK-82/165	
Hab.: Open scrub, mountain steppe (mixed of grasses with thorn-cushions, <i>Stipa</i> steppe)	
Dist.: Map 164	Alt.: 800-1980
Ch.: IT ^{C&E} [ES ^{HY}]	GF.: HSC
Th. (GNP): RAR (14)	Th. (IR): RAR

Tripleurospermum disciforme (C. A. Mey.) Sch.-Bip., Tanacet. 34 (1844). Syn.: *Chrysanthemum disciforme* C. A. Mey., Verz. Pfl. Cauc. 75 (1831); *Matricaria disciforme* (C. A. Mey.) DC.; *Chamaemelum disciforme* (C. A. Mey.) Vis.

Mat.: A-11315; R-53206; TM-35078; WF-12629; Z-82/282	
Hab.: Subalpine meadow, mountain steppe of mixed grasses and thorn-cushions	
Dist.: Map 165	Alt.: ? 1000-1900
Ch.: IT	GF.: TSC (or biennial)
Th. (GNP): VUL (6)	Th. (IR): NOT

Tussilago farfara L., Sp. Pl.: 865 (1753).

Mat.: A-11952	
Hab.: On moist lime soil margin of a spring in Piche Soleyman Koshteh	
Dist.: Map 166	Alt.: 1250
Ch.: ES [IT-M]	GF.: GTU
Th. (GNP): END (1)	Th. (IR): NOT

Urospermum picroides (L.) Desf., Cat. Pl. Hort. Paris. ed. 1: 90 (1820). Syn.: *Tragopogon picroides* L., Sp. Pl.: ed. 1: 790 (1753).

Mat.: A-11422-b; R-52634	
Hab.: Open rocky outcrops above Tangegol	
Dist.: C	Alt.: 750-800
Ch.: IT-M [SS]	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

Varthemia persica DC. Prodr. 5: 473 (1836). Syn.: *Iphiona persica* (DC.) Benth. & Hook. f.; *Inula rupestris* Aitch. & Hemsl.

Mat.: A-9836, 11698, 12278	
Hab.: In crevices of conglomerate rocks, vertical limestone cliffs	
Dist.: Map 167	Alt.: 700-1300
Ch.: IT ^C	GF.: CHE
Th. (GNP): VUL (5)	Th. (IR): RAR

Xanthium strumarium L., Sp. Pl.: 987 (1753).

Mat.: A-12234	
Hab.: As weed in Tangerang garden	
Dist.: W	Alt.: 450
Ch.: COS	GF.: TSC
Th. (GNP): END (1)	Th. (IR): SUN

Xanthium spinosum L., Sp. Pl.: 987 (1753).

Mat.: Z-82/216	
Hab.: Weed in waste-places in Sharleq	
Dist.: S	Alt.: 1000
Ch.: COS	GF.: TSC TH
Th. (GNP): END (1)	Th. (IR): NOT

Berberidaceae

Berberis integerrima Bunge, Del. Sem. Hort. Dorpat. 6 (1843). Syn.: *B. densiflora* Boiss. & Buhse; *B. vulgaris* var. *integerrima* (Bunge) Trautv.; *B. turcomanica* Kar.; *B. baluchistanica* Ahrendt.

Mat.: A-4322, 10702, 10783, 11281, 11701;

Bamdadian 12135*; 53210*; Z-82/281, Z&al-86/2618	
Hab.: Juniper woodland, dry stream bed in valleys, mountain steppes	
Dist.: Map 168	Alt.: 1250-1700
Ch.: IT	GF.: PSS TH
Th. (GNP): ? NOT	Th. (IR): NOT

* Det.: K. Browicz

Berberis orthobotrys Bien. ex C. K. Schneid. p. p., Ill. Handb. Laubholz. 1: 310 (1905).

Mat.: A-9489, 12064; R-52801*	
Hab.: Open forest, valleys	
Dist.: Map 169	Alt.: 1000-1900
Ch.: ES ^{HY} /IT ^{KK}	GF.: PSS TH
Th. (GNP): ? SUN	Th. (IR): RAR

* Det.: K. Browicz

Berberis vulgaris L., Sp. Pl.: 1: 330 (1753).

Mat.: A-10782, 11473, 11633; AS-6041; K-7742 (n.v.)	
Hab.: Open lowland and montane scrub	
Dist.: Map 170	Alt.: 780-1900
Ch.: ES	GF.: PSS TH
Th. (GNP): ? SUN	Th. (IR): RAR

Berberis hybrids (determination provisional)

B. orthobotrys x *integerrima*:

A-12046 & 11625.

B. vulgaris x *integerrima*

A-4550; 9592, 9607, 9951.

Betulaceae

Alnus glutinosa (L.) Gaertn., Fruct. Sem. Pl. 2: 54 (1790). Syn.: *Betula alnus* L. var. *glutinosa* L., Sp. Pl.: 983 (1753).

Mat.: A-11881, 11981, 12349	
Hab.: Montane forest, banks of springs and streams	
Dist.: Map 171	Alt.: 600-1800
Ch.: ES-M	GF.: PTS
Th. (GNP): RAR (12)	Th. (IR): SUN

According to Browicz (Flora Iranica 96: 6, 1972), the Iranian plants belong to subsp. *barbata* (C. A. Mey.) Yalt., distributed in NE Turkey, N. Iran, Talish and Caucasus.



Fig. 17: A, *Echinops ritrodes*; B-C, *Heteropappus altaicus*; D, *Erigeron acer* subsp. *pycnotrichus*; E, *Linosyris vulgaris*; F, *Jurinea monocephala*; G, *Inula thapsoides*; H, *Onopordon leptolepis*; I, *Tragopogon longirostris*; J, *Tragopogon capitatus*; K, *T. kotschyi*.

Alnus subcordata C. A. Mey., Verz. Pfl. Cauc. 43 (1831). Syn.: *A. cordifolia* Ten. var. *subcordata* (C. A. Mey.) Regel.

Mat.: A-11831, 11995, 12250; GA-4909, 4931	
Hab.: Lowland forest on banks of rivers, streams and springs	
Dist.: Map 172	Alt.: 500-1300
Ch.: ES ^{HY}	GF.: PTS
Th. (GNP): RAR (9)	Th. (IR): SUN

Boraginaceae

Anchusa arvensis (L.) M. Bieb., Fl. Taur.-Caucas. 1: 123 (1808).

subsp. ***orientalis*** (L.) Nordh., Norsk Fl. 526 (1940). Syn.: *Lycopsis orientalis* L.; *L. Anchusa orientalis* (L.) Rchb.; *A. ovata* Lehm.

Mat.: A-10554, 10457; R-33153; WF-12849	
Hab.: <i>Artemisia-Stipa</i> steppe, open scrub	
Dist.: Map 173	Alt.: 700-1200
Ch.: M-IT	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): SUN

Anchusa azurea Mill., Gard. Dict., ed. 8: n° 9 (1768). Syn.: *A. italica* Retz.

Mat.: A-11412; E-785	
Hab.: Grassy mountain steppe, <i>Artemisia</i> steppe, open scrub	
Dist.: Map 174	Alt.: 560-1750
Ch.: IT-M [ES]	GF.: HSC
Th. (GNP): VUL (4)	Th. (IR): SUN

Arnebia decumbens (Vent.) Coss. & Kralik, Bull. Soc. Bot. France 4: 402 (1857). Syn.: *Lithospermum decumbens* Vent., Descr. Pl. Jard. Cels: tab. 37 (1801).

Mat.: A-10872, 10843; R-52827	
Hab.: <i>Artemisia</i> steppe, saline soils	
Dist.: Map 175	Alt.: 1200-1250
Ch.: IT-SS	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Arnebia grandiflora (Trautv.) Popov in Lapin., Opred. rast. Tashkent. oazisa: 342 (1938). Syn.: *A. cornuta* (Ledeb.) Fisch. & C. A. Mey. var. *grandiflora* Trautv., Bull. Soc. Imp. Naturalistes Moscou 4: 4212 (1866); *A. transcaspica* Popov.

Mat.: A-10320, 10285	
Hab.: <i>Artemisia-Stipa</i> steppe	

Dist.: Map 176	Alt.: 1100-1150
Ch.: IT [?] Aralo-Caspian	GF.: TSC
Th. (GNP): END (3)	Th. (IR): END

Asperugo procumbens L., Sp. Pl.: 138 (1753).

Mat.: A-10449	
Hab.: As weed on margin of road and waste places near Dasht	
Dist.: S	Alt.: 1200
Ch.: PL	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Caccinia macranthera (Banks & Sol.) Brand in Engl., Pflanzenreich 78: 90 (1921). Syn.: *Borago macranthera* Banks & Sol. in Russell, Nat. Hist. Aleppo ed. 2, 2: 246 (1794).

Mat.: A-10255; AS-5985; R-52981; W&al-11005	
Hab.: <i>Artemisia-Stipa</i> steppe, subsaline soils, open scrub in Soolegerd, Sharleq and Mirza-Baylu plain	
Dist.: NE, S, E	Alt.: 1000-1600
Ch.: IT	GF.: TSC (or biennial)
Th. (GNP): VUL (4)	Th. (IR): IND

Cerintho minor L., Sp. Pl.: 137 (1753).

Mat.: A-4522, 9704 (only leaves), 9791 (only leaves); U-16001, 16136	
Hab.: Lowland and montane forests, shady places on steep limestone slopes, alpine and subalpine meadows	
Dist.: Map 177	Alt.: 500-2000
Ch.: ES-M	GF.: HSC (or biennial)
Th. (GNP): NOT (27)	Th. (IR): NOT

Cynoglossum creticum Mill., Gard. Dict. ed. 8, n° 3 (1768).

Mat.: A-4409-b, 10950; F-1167; Z-82/212; R-52608, 52466	
Hab.: As a weed in garden and forest openings from Tangerang to Tangegol, Shakha Mountain and Yelkhi (4 km N Tangegol)	
Dist.: W, C	Alt.: 450-1700
Ch.: IT-M	GF.: HSC (biennial)
Th. (GNP): VUL (6)	Th. (IR): SUN

Cynoglossum kandavanensis (Bornm. & Gauba) Akhani com. et stat. nov.

Basionym: *Lindelofia kandavanensis* Bornm. & Gauba, Feddes Repert. 51: 217 (1942).

Fig. 13, J-K.

Holotype: *Persia borealis*, Elburs, Nordhänge des Kandavan, 2300 m, 21.VII.1938, D. E. Gauba 1640 m (B).

Mat.: A-4409-a, 11640; AS-6118	
Hab.: Mountain meadows in forest clearings	
Dist.: Map 178	Alt.: 1600-1900
Ch.: ES ^{HY}	GF.: HSC
Th. (GNP): END (3)	Th. (IR): END

Other material seen outside of Golestan National Park: Iran: Mazandaran, coastal strip between Chalus and Shahsavari, -20 m, alt. *Alnus+Gleditschia* woodland, II-III-1966, D. B. Baker (W); Gilan, Rasht, Gauba K-1773 (W).

Study of the type material of *Lindelofia kandavanensis* and the material studied by Riedl for Flora Iranica and my own gatherings from the Park revealed that the species belongs to *Cynoglossum*. The styles of all studied plants are included into the corolla, at most they are as long as the tube. *C. kandavanensis* is highly similar to *C. officinale*. The differences are the length and shape of the corolla: in *C. kandavanensis* the corolla is tubulate and 7-8 mm in length and the scales located in the middle of the corolla tube. These are arranged alternately between the filament attachments, at some distance from the anthers (cf. Fig. 13, J). In *C. officinale*, on the other hand, the corolla is campanulate, 5-6 mm long, and the scales located alternately between the anthers and in the uppermost parts of the tube, just near the lobes. In our area *C. kandavanensis* is restricted to rather high altitudes above 1600 m. The distribution of the species in W and E parts of the Caspian forest belt suggests that the species is probably distributed in most of the South Caspian forests, but apparently as a rare species.

Echium amoenum Fisch. & C. A. Mey., Ind. Sem. Hort. Petrop. 35 (1837). Fig. 18, A-B.

Mat.: A-9759, 10643	
Hab.: Forest openings	
Dist.: Map 179	Alt.: 900-1550
Ch.: ES ^{HY}	GF.: HSC
Th. (GNP): VUL (6)	Th. (IR): END
LN: Gol-e gav-zaban (گل گاوزبان)	

This is one of the most popular medicinal plants in Iran. The corollas are collected by the local people to use as a sedative tee.

Echium italicum L., Sp. Pl.: 139 (1753). Syn.: *E. altissimum* Jacq.; *E. pyramidatum* DC.

Mat.: A-4341	
Hab.: Disturbed habitats around Soolegerd and Almehr protection station	
Dist.: C, NE	Alt.: 1200-1750
Ch.: IT-M	GF.: HSC
Th. (GNP): END (2)	Th. (IR): NOT

Heliotropium europaeum L., Sp. Pl.: 130 (1753). s. l. (Incl. *H. ellipticum* Ledeb., *H. lasiocarpum* Fisch. & C. A. Mey.).

Mat.: GA-4906	
Hab.: Dry gravelly soils around Old Mirza-Baylu (demolished village) and along the road towards Soolegerd	
Dist.: E	Alt.: 1200-1250
Ch.: IT-M-ES	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Heterocaryum

Heterocaryum is a very difficult genus including 5-6 species. Nearly all species grow in deserts of SW and C Asia. Characters used in identification keys of Flora Iranica and Flora of USSR are not easy to apply. The only easily distinguishable species in our area is *H. sessile* with characteristically sessile fruits. The distinction of *H. szovitsianum*, *H. macrocarpum* and *H. rigidum* is very difficult. Therefore, some of the following cited plants are of doubtful identification.

Heterocaryum macrocarpum Zak., Borag. Serawschan 16 (1941).

Mat.: R-52826 (Det.: K. H. Rechinger)	
Hab.: <i>Artemisia</i> steppe in Mirza-Baylu plain	
Dist.: E	Alt.: 1200
Ch.: IT ^(omni, except W)	GF.: TSC
Th. (GNP): END (1)	Th. (IR): SUN

Heterocaryum rigidum DC., Prodr. 10: 145 (1846).

Mat.: A-10940; AS-5936	
Hab.: <i>Artemisia</i> steppe in Mirza-Baylu plain	
Dist.: E	Alt.: 1200
Ch.: IT ^(omni except W)	GF.: TSC
Th. (GNP): END (2)	Th. (IR): SUN

Heterocaryum subsessile Vatke, Zeitschr. Gesamten Naturwiss (Halle) 45: 129 (1875). Syn.: *H. oliganthum* (Boiss.) Bornm.; *Lappula subsessile* (Vatke) Greuter & Burdet.

Mat.: A-10489 a, 10939	
Hab.: <i>Anabasis aphylla</i> - <i>Artemisia</i> steppe in Mirza-Baylu plain and waste-places around Soolegerd	
Dist.: E, NE	Alt.: 1200
Ch.: IT	GF.: TSC
Th. (GNP): END (2)	Th. (IR): ? RAR

Heterocaryum szovitsianum (Fisch. & C. A. Mey.) DC., Prod. 10: 145 (1846). Syn. *Echinosperrum szovitsianum* Fisch. & C. A. Mey., Ind. Sem. Hort. Petrop. 36 (1835); *Heterocaryum minimum* (Lehm.) DC.

Mat.: A-10489 b (determination doubtful)	
Hab.: Disturbed soils around the Soolegerd station	
Dist.: NE	Alt.: 1200
Ch.: IT	GF.: TSC
Th. (GNP): END (1)	Th. (IR): SUN

Lappula barbata (M. Bieb.) Gürke in Engl. & Prantl, Natürl. Pflanzenfam. ed. 1, 4 (3a): 107 (1897). s.l. Syn.: *Myosotis barbata* M. Bieb., Fl. Taur.-Caucas. 1: 121 (1808); *Echinosperrum cariense* Boiss.

Mat.: A-4371, 9551, 9724, 10315, 10685, 10566, 10819, 11395; R-33155, 52420*, 52839*; Z-83/1382	
Hab.: In various open scrubs, mountain and <i>Artemisia-Stipa</i> steppes	
Dist.: Map 180	Alt.: 700-2180
Ch.: IT-M	GF.: TSC/HSC ^(annual & biennial)
Th. (GNP): NOT (75)	Th. (IR): NOT

* Identified by F. Sadat as *L. microcarpa*.

The specific difference between *L. barbata* und *L. microcarpa* is questionable. The former has been described from the Crimea and Caucasia and the latter from the Altai mountains in Central Asia. The group is well represented in different xeric and mesic communities in our area. Based on my field observations and rich herbarium material with ripe fruits, I think that *L. barbata* & *L. microcarpa* are probably not specifically distinct. The differences given either by Riedl in Fl. Iranica (48: 68-79, 1967) and his recent synopsis of the genus in the Flora Iranica region (Riedl 1996) or by Edmondson

(Fl. Turkey, 6: 257: 1978) are hardly applicable for the material from Iran. The differences given by various authors, like length of nutlets and glochids, number of glochid rows, leaf indumentum and branching are not constant characters, because of overlapping and intermediates. It seems that these differences are ecological variants of a very polymorphic species adapted to various habitats. The plants in xeric conditions are more annual, with smaller fruits and indistinct subsidiary rows, but plants from mesic conditions are often biennial, with taller growth and thicker fruits and more developed subsidiary glochid rows. Probably the more developed subsidiary glochids in mesic populations are caused by the longer life period. A biosystematic study of this group is highly recommended, in particular in Golestan National Park, where both populations and intermediates meet together.

Lappula sinaica (DC.) Asch. ex Schweinf., Mém. Inst. Egypt. 2: 111 (1887). Syn.: *Echinosperrum sinaicum* DC., Prodr. 10: 141 (1846). *E. kotschyi* Boiss.; *Lappula divaricata* (Bunge) B. Fedtsch.

Mat.: A-6229, 10248, 10413, 10522, 10924; AS-6123; R-52957	
Hab.: <i>Artemisia</i> steppe, sandy soils, open scrub, ruderal habitats in steppe zone	
Dist.: Map 181	Alt.: 1000-1500
Ch.: IT	GF.: TSC
Th. (GNP): VUL (7)	Th. (IR): NOT

Lappula spinocarpos (Forssk.) Asch., Verh. Bot. Vereins Prov. Brandenburg 16, Sitzungsber.: 88 (1874). Syn.: *Anchusa spinocarpos* Forssk., Fl. Aegypt.-Arab.: 41 (1775); *Sclerocaryopsis spinocarpos* (Forssk.) Brand.

Mat.: A-10284, 10313, 10419, 10564; R-52872 (Rechinger's specimen was determined by F. Sadat)	
Hab.: <i>Artemisia</i> steppe	
Dist.: Map 182*	Alt.: 1000-1200
Ch.: IT-SS	GF.: TSC
Th. (GNP): VUL (7)	Th. (IR): NOT

* Rechinger's collection cannot be exactly localized. It might be located in Mirza-Baylu plain, eastern parts of the Park.

Lithospermum

Lithospermum is dealt with here in a broad sense, including *Buglossoides*.

Lithospermum arvense L., Sp. Pl.: 132 (1753).
Syn.: *Buglossoides arvense* (L.) I. M. Johnst.

Mat.: A-11290, 11297, 10308; R-53112	
Hab.: Alpine meadows, <i>Stipa</i> steppe, mountain steppe of thorn-cushions and grasses, in mixed formation of grasses and open scrub, <i>Juniperus excelsa</i> woodland	
Dist.: Map 183	Alt.: 1400-2060
Ch.: ES-IT-M (introduced elsewhere)	GF.: TSC
Th. (GNP): RAR (11)	Th. (IR): NOT

Lithospermum officinale L., Sp. Pl.: 132 (1753).

Mat.: A-9640, 9784, 10622, 11550; GA-4979; R-52612	
Hab.: Lowland forest clearings and pioneer scrubs, steep rocky outcrops with <i>Carpinus orientalis</i> and <i>Quercus castaneifolia</i>	
Dist.: Map 184	Alt.: 500-1800
Ch.: ES [IT-M]	GF.: HSC
Th. (GNP): NOT (17)	Th. (IR): NOT

Lithospermum purpureocaeruleum L., Sp. Pl.: 132 (1753). Syn.: *Buglossoides purpureocaeruleum* (L.) I. M. Johnst.

Mat.: A-10387; AS-6011; R-52614; W&a-11027	
Hab.: Closed montane forest; pioneer forest and scrubs (in shady habitats under <i>Paliurus spinachristi</i> and <i>Pteridium aquilinum</i>)	
Dist.: Map 185	Alt.: 500-1880
Ch.: ES	GF.: HCR
Th. (GNP): NOT (23)	Th. (IR): SUN

Lithospermum tenuiflorum L. f., Suppl. Pl. 130 (1782). Syn.: *Buglossoides tenuiflorum* (L.) I. M. Johnst.

Mat.: A-10249, 10404, 10531	
Hab.: <i>Artemisia</i> steppe, disturbed soils, rocky slopes in juniper woodland	
Dist.: Map 186	Alt.: 1000-1460
Ch.: IT-M	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Mattiastrum turcomanicum (Bornm. & Sint.) Brand., Feddes Repert. 14: 155 (1916). Syn.: *Paracaryum turcomanicum* Bornm. & Sint. ex Bornm., Beih. Bot. Centralbl. 20/B: 193 (1906).

Mat.: Z-86/2599	
Hab.: One locality between Mirza-Baylu and Almehr, without habitat information	

Dist.: E	Alt.: 1300?1670
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): END (1)	Th. (IR): END

Recently reported as new record for Iran (Akhani 1996: 103).

Mattiastrum cf. crista-galli Rech. f. & Riedl, Biol. Skr. 13, 4: 207 (1963).

Mat.: A-10514, 10318	
Hab.: <i>Artemisia-Stipa</i> steppe on northern borders of the Park near Soolegerd	
Dist.: N & NE	Alt.: 1150-1300
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): END (2)	Th. (IR): SUN

The identity of the above cited material is uncertain. A comparison with the isotype (Khorasan: M. Kuh-e Neyshabur: Darreh Abshar supra Akhmad, 1600-1800m, Reching 4502 M!) shows following differences: the wing teeth are shallower but denser, flowers are longer, 5-7 mm (in *M. crista-galli* 2-3 mm) and the indumentum is denser. Two other species which have been described from localities closer to our area are: *M. gorganicum* Riedl (Khorasan: Bojnurd: "Ansagarthe" Scharif 5351-E) and *M. pygmaeum* Rech. f. (Gorgan: In declivibus borealis montium Shahvar, supra Ostmaidan, 3500, in saxosis calcareous, 26.-27.viii.1948 Reching 6022, W!). A comparison with the latter species shows that they are completely different species. I have not succeeded to compare my specimens with the type of *M. gorganicum*. Unfortunately, according to the curator of W herbarium (in litt.), the type has not been found there.

Myosotis

All specimens of *Myosotis* have been identified by Prof. Dr. J. Grau (Munich).

Myosotis alpestris F. W. Schmidt, Fl. Bohem. 3: 26 (1794).

Mat.: A-12011	
Hab.: At the bottom of an alpine karstic gully surrounded by montane forest	
Dist.: Map 187	Alt.: 1950
Ch.: ES	GF.: HSR
Th. (GNP): END (1)	Th. (IR): END

Known as a new record for Iran (Akhani 1999).

Myosotis arvensis (L.) Hill., Veg. Syst. 7: 55 (1764).

Mat.: A-10389; R-52630, 52620	
Hab.: Forest and road margin	
Dist.: Map 188	Alt.: 450-750
Ch.: ES-M	GF.: TSC (or biennial)
Th. (GNP): END (3)	Th. (IR): ? VUL

Known as a new record for Iran (Akhani 1999).

Myosotis lithospermifolia (Willd.) Hornem., Hafn. 1: 173 (1813). Syn.: *M. scorpioides* L. var. *lithospermifolia* Willd., Enum. Pl. Horti Berol. 175 (1809).

Mat.: A-11325, 11324	
Hab.: Under the shade of <i>Acer monspessulanum</i> shrubs at top of Divar- Kaji Mountain	
Dist.: C	Alt.: 2370
Ch.: ES ^{EH}	GF.: HSC
Th. (GNP): END (1)	Th. (IR): END

Myosotis minutiflora Boiss. & Reuter, Pug. Pl. Nov. 80 (1852).

Mat.: A-10530, 10985	
Hab.: Juniper woodland on limestone rocks, grassy mountain steppes with thorn-cushions	
Dist.: Map 189	Alt.: 1500-1880
Ch.: IT-M	GF.: TSC
Th. (GNP): END (2)	Th. (IR): SUN

Known as a new record for Iran (Akhani 1999).

Myosotis ramosissima Rochel in Schultes, Österr. Fl. ed. 2, 1: 366 (1814).

Mat.: A-11079; RE-15856; W&al-11033	
Hab.: Open scrub of <i>Paliurus spina-christi</i> , <i>Crataegus-Prunus</i> , forest clearing dominated by <i>Pteridium aquilinum</i>	
Dist.: Map 190	Alt.: 500-1400
Ch.: ES-M	GF.: TSC
Th. (GNP): VUL (5)	Th. (IR): END

Nonea caspica (Willd.) G. Don. Gen. Hist. 4: 336 (1834). Syn.: *Onosma caspica* Willd., Sp. Pl. 1: 775 (1798); *Nonea melanocarpa* Boiss.

Mat.: A-6186, 10250, 10317, 10516; AS-5924, 5974; R-63113; W&al-10968	
Hab.: <i>Artemisia</i> steppe, waste places near the protection stations	
Dist.: Map 191	Alt.: 1200-1400

Ch.: IT	GF.: TCA ^{DW}
Th. (GNP): RAR (10)	Th. (IR): NOT

Nonea lutea (Desr.) DC., Fl. Franc. ed. 3, 3: 626 (1805). Syn.: *Lycopsis lutea* Desr. in Lam., Encycl. 3: 657 (1792). Incl. *N. flavescens* (C. A. Mey.) Fisch. & C. A. Mey.

Mat.: A-10299, 10363; R-33151, 52610 W&al-10936	
Hab.: Forest margin, dry valley with <i>Haloxylon</i> shrubs, open forest with grasses	
Dist.: Map 192	Alt.: 450-1450
Ch.: ? ES ^{EH} [IT]	GF.: TCA
Th. (GNP): VUL (5)	Th. (IR): ?

Nonea turcomanica Popov, Spiske Rast. Herb. Fl. URSS 12, no. 3575 (1953).

Mat.: A-6241, 10410, 10479, 10744; R-52851*	
Hab.: <i>Artemisia-Stipa</i> steppe, dry valley with <i>Haloxylon</i> shrubs	
Dist.: Map 193	Alt.: 1000-1300
Ch.: IT ^{KK}	GF.: TCA ^{DW}
Th. (GNP): RAR (9)	Th. (IR): SUN

* Det.: F. Sadat

Onosma dichroantha Boiss., Diagn. Pl. Orient. Nov. sér. 1, 11: 107 (1849). Fig. 18, C.

Mat.: A-9414, 9557, 10242; AS-5950; F-1074; R-53111*, 52855; Z-82/285, 83/1364	
Hab.: Under the shade of shrubs and trees in open montane scrubs (often <i>Acer monspessulanum</i> , <i>Paliurus spina-christi</i> and <i>Juniperus excelsa</i>), mountain and <i>Stipa</i> steppes	
Dist.: Map 194	Alt.: 700-2170
Ch.: IT ^{C&W}	GF.: HSC (biennial)
Th. (GNP): NOT (37)	Th. (IR): NOT

* Det.: H. Teppner

Onosma longiloba Bunge, Heliocarya: 12 (1871).

Mat.: A-10844, 10544; R-53110*	
Hab.: <i>Juniperus excelsa</i> woodland, <i>Artemisia-Stipa</i> steppe	
Dist.: Map 195	Alt.: 1000-1840
Ch.: IT ^{KK}	GF.: HSC (biennial)
Th. (GNP): RAR (11)	Th. (IR): RAR

Det.: H. Teppner

Rochelia bungei Trautv., Trudy Glavn. Bot. Sada 9, 2: 462 (1886). Syn.: *R. incanum* Bunge; *R. mirheydari* Riedl & Esfand.

Mat.: A-6225; AS-5908; T-33019 (isotype of <i>R. mirheydari</i>)	
Hab.: Dry valley with <i>Haloxylon</i> shrubs, moderately saline soils dominated by <i>Anabasis aphylla</i> and <i>Artemisia</i> , mountain steppe of grasses and thorn-cushions	
Dist.: Map 196	Alt.: 1200-1700
Ch.: IT ^E	GF.: TSC
Th. (GNP): VUL (6)	Th. (IR): VUL

Riedl & Esfandiari (1976: 3) described *R. mirheydari* from Golestan National Park (Isotype: Shahpasand-Bojnurd: l'embranchment de la route Almeh (Dasht), 1200 m, 6.6.1975, Termé. No. 33019, IRAN). It has been separated by longer pedicels (6-9 mm) from *R. bungei*. Studies of the type and several specimens of *R. bungei* in W & M show that the length of the pedicel varied from 3-9 mm, even in the same specimen.

Rochelia cardiosepala Bunge, Mém. Acad. Imp. Sci. Saint-Petersbourg Divers Savans 7: 420 (1851).

Mat.: Z-86/2594	
Hab.: Only one locality between Mirza-Baylu & Almeh	
Dist.: E	Alt.: 1300 ² 1670
Ch.: IT	GF.: TSC
Th. (GNP): END (1)	Th. (IR): RAR

Rochelia disperma (L. f.) K. Koch, Linnaea 22: 649 (1849). Syn. *Lithospermum disperma* L. f.

Mat.: A-10418	
Hab.: <i>Artemisia</i> steppe near Dasht	
Dist.: S	Alt.: 1000-1100
Ch.: IT ^{W&C}	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Rochelia persica Bunge ex Boiss., Fl. Orient. 4: 244 (1879).

Mat.: A-10632	
Hab.: Mountain meadow surrounded by forest, mountain steppe of thorn-cushions and grasses	
Dist.: Map 197	Alt.: 1500-1850
Ch.: IT	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

***Rochelia* sp.**

Mat.: A-10809-b	
Hab.: Moist mountain meadow, ca 2 km W Almeh	

towards Sharleq	
Dist.: S	Alt.: 1750
Ch.: ?	GF.: TSC
Th. (GNP): END (1)	Th. (IR): ?

Differs from all other species by the erect pedicels. Further studies are required for a reliable identification.

Solenanthus circinnatus Ledeb., Fl. Altaica 1: 194 (1829). Syn.: *Cynoglossum circinnatum* (Ledeb.) Greuter & Burdet.

Mat.: A-6159, 10207; AS-6114, 6117; R-53144; W&al-11000; Z&al-86/2605	
Hab.: In shady places in mountain scrub and <i>Quercus macranthera</i> forest	
Dist.: Map 198	Alt.: 1600-2230
Ch.: IT	GF.: HSC
Th. (GNP): RAR (11)	Th. (IR): NOT

Brassicaceae (*Cruciferae*)

Aethionema carneum (Banks & Sol.) B. Fedtsch., Trudy Imp. S.-Peterburgsk. Bot. Sada: 23: 428 (1904). Syn.: *Thlaspi carneum* Banks & Sol. in Russell, Nat. Hist. Aleppo ed. 2: 257 (1794); *Campyloptera carnea* (Banks & Sol.) Botsch. & Vved.; *Aethionema cristatum* DC.

Mat.: A-10694, 10276; R-52902	
Hab.: <i>Juniperus excelsa</i> woodland, <i>Artemisia-Stipa</i> steppe	
Dist.: Map 199	Alt.: 1000-1450
Ch.: IT ^{omni}	GF.: TSC
Th. (GNP): RAR (9)	Th. (IR): SUN

Aethionema trinervium (DC.) Boiss., Fl. Orient. 1: 342 (1867). *Hutchinsia trinervia* DC., Reg. Veg. Syst. Nat. 2: 387 (1821). *Iberidella ovalifolia* Boiss.; *Ae. sagittatum* (Boiss.) Boiss.; *Thlaspi trinervium* (DC.) Mozaff.

Mat.: A-10962	
Hab.: Mountain steppe: mixed of thorn-cushions and grasses	
Dist.: Map 200	Alt.: 1850-2000
Ch.: IT	GF.: ± CHU
Th. (GNP): VUL (4)	Th. (IR): NOT

Alliaria petiolata (M. Bieb.) Cavara & Grande, Bull. Orto Bot. Regia Univ. Napoli 3: 418 (1913).

Syn.: *Arabis petiolata* M. Bieb., Fl. Taur.-Caucas. 2: 126 (1808).

Mat.: A-9241, 10233; AS-6037, 6063; R-52625; RE-15956; U-16002; W&al-10934; Z-83/1352	
Hab.: Lowland and montane deciduous forest and scrub, in shady places, moist soils at margin of streams and rivers in forest and scrub zones of the Park	
Dist.: Map 201	Alt.: 450-2230
Ch.: ES-M-IT	GF.: HSC (biennial)
Th. (GNP): NOT (71)	Th. (IR): NOT

Alyssopsis mollis (Jacq.) O. E. Schulz in Engler, Pflanzenreich, 86: 186 (1924). Syn.: *Sisymbrium molle* Jacq., Icon. Pl. Rar. 1: 12, tab. 122 (1781-86); *Alyssopsis sagittata* (W. T. Aiton) Boiss.; *Arabis secunda* N. Busch.

Mat.: A-9561, 9620, 9686, 9970, 10526, 11612, 19526; GA-4945; R-37638	
Hab.: Rocky lowland and montane forest and scrub, in clefts of vertical cliffs	
Dist.: Map 202	Alt.: 560-2380
Ch.: ES ^{HY}	GF.: TSC-HSC
Th. (GNP): NOT (89)	Th. (IR): NOT

A. mollis was described by Hedge (Fl. Iranica 57: 200, 1968) to be a perennial species. It has been observed in annual, biennial and perennial forms; but predominately as a biennial species. A-19526 is a young gathering, collected in *Juniperus* woodland, a dry habitat for this mesophytic species. Its identification is uncertain.

Alyssum alyssoides (L.) L., Syst. Nat. ed. 10, 2: 1130 (1759). Syn.: *Clypeola alyssoides* L., Sp. Pl. 2: 652 (1753).

Mat.: A-10612-b, 11621	
Hab.: Rocky slopes with open scrub and grassy mountain steppes	
Dist.: Map 203	Alt.: 1400-1920
Ch.: ES-M	GF.: TSC
Th. (GNP): VUL (5)	Th. (IR): ? RAR

Known as new record for Iran (Akhani 1999).

Alyssum dasycarpum Willd., Sp. Pl. 3: 469 (1800).

Mat.: A-6242, 10420, 11063; WF-12720*	
Hab.: <i>Artemisia</i> steppe, dry valley with <i>Haloxylon</i> shrubs	

Dist.: Map 204	Alt.: 1000-1400
Ch.: IT	GF.: TSC
Th. (GNP): VUL (5)	Th. (IR): NOT

* Det.: K. H. Rechinger

Alyssum desertorum Stapf, Akad. Wiss. Wien, Math.-Naturwiss. Kl., Denkschr. 51: 302 (1886). Syn. *A. minimum* Willd.; *A. turkestanicum* Regel & Schmalh. var. *desertorum* (Stapf) Botsch.

Mat.: A-10560, 10883, 10700, 11060, 11306-b; W&al-10944*, 10975*	
Hab.: <i>Artemisia-Stipa</i> steppes, grassy mountain steppes, <i>Juniperus</i> woodland	
Dist.: Map 205	Alt.: 800-1780
Ch.: IT [M-ES]	GF.: TSC
Th. (GNP): RAR (14)	Th. (IR): NOT

* Det.: K. H. Rechinger

Alyssum lanceolatum Baumgartner, Jahresber. Nieder-Österr. Landes-Lehrersemin. Wiener-Neustadt 48: 11 (1911). Syn. *A. muelleri* Boiss.; *A. iranicum* Czerniak.

Mat.: A-11319, 11012; Rz-53193	
Hab.: Rocky limestone ground on exposed mountain summits	
Dist.: Map 206	Alt.: 1950-2380
Ch.: IT ^{KK}	GF.: CHU
Th. (GNP): END (3)	Th. (IR): VUL

Alyssum linifolium Willd., Sp. Pl.: 4,3, 467 (1800).

Mat.: A-11062; R-53031, 52928; U-16084	
Hab.: <i>Artemisia-Stipa</i> steppe, mountain <i>Stipa</i> steppe, <i>Juniperus excelsa</i> woodland, dry valley with <i>Haloxylon</i> shrubs	
Dist.: Map 207	Alt.: 1000-1900
Ch.: IT-M	GF.: TSC
Th. (GNP): NOT (18)	Th. (IR): NOT

Alyssum menioides Boiss. Ann. Sci. Nat. Bot. sér. 2, 17: 158 (1842).

Mat.: A-10271	
Hab.: Waste places around the Soolegerd station	
Dist.: NE	Alt.: 1200
Ch.: IT ^{W&C}	GF.: TSC
Th. (GNP): END (1)	Th. (IR): SUN

Alyssum minus (L.) Rothm., Feddes Repert. 50: (1941). Syn.: *Clypeola minor* L., Fl. Monsp. No. 70, 21 (1756).

The Iranian plants belong to var. *micranthum* (C. A. Mey.) T. R. Dudley

Mat.: A-11061, 10986-b; K-5673 a; R-52786	
Hab.: <i>Paliurus</i> scrub, <i>Stipa</i> steppe, <i>Artemisia-Stipa</i> steppe, mountain steppe of grasses and thorn-cushions, dry valley with <i>Haloxylon</i> shrubs, sandy soils, juniper woodland	
Dist.: Map 208	Alt.: 970-1950
Ch.: IT-M	GF.: TSC
Th. (GNP): NOT (17)	Th. (IR): NOT

Alyssum strigosum Banks & Sol. in Russell, Nat. Hist. Aleppo, ed. 2, 2: 257 (1794). Syn.: *A. micropetalum* Fisch. ex DC.

Mat.: A-9964, 10709, 10612 a, 11573	
Hab.: Rocky outcrops in forests and scrubs, juniper woodland, mountain steppe (dominated by <i>Stipa</i> , <i>Artemisia</i> , <i>Festuca</i>)	
Dist.: Map 209	Alt.: 750-2000
Ch.: M-IT ^w	GF.: TSC
Th. (GNP): RAR (12)	Th. (IR): RAR

A-11573 has been collected on N-facing rocky outcrops, in lowland forest. Although, the dimorphic hairs on fruits of this specimen are obvious, those are not distinctly tuberculate (similar to *A. minus*). This may be due to late gathering (July), or to the mesic conditions of the habitat. As pointed out by Townsend (Fl. Iraq 4: 969, 1980), it would be better to consider *A. strigosum* as a variety of *A. minus*.

Alyssum szovitsianum Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 4: 31 (1837). Syn.: *Alyssum marginatum* Steud. ex Boiss.; *A. pyramidatum* Bornm.; *A. stenostachyum* Botsch. & Vved.

Mat.: A-10256, 11064, 10358, 10817, 10518, 10580-b; R-52871	
Hab.: <i>Artemisia</i> and <i>Stipa</i> steppes, mountain steppe with grasses and thorn-cushions, dry valley with <i>Haloxylon</i> shrubs, disturbed soils around the stations, <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> scrubs	
Dist.: Map 210	Alt.: 970-1850
Ch.: IT ^{w&c}	GF.: TCA
Th. (GNP): NOT (16)	Th. (IR): NOT

R-52871 has been identified by Rechinger as *A. marginatum*. The minor differences given in the key of Fl. Iranica 57: 148, 1968, are very difficult

to apply. In agreement with several authors, I prefer to reduce it to a synonym of *A. szovitsianum* (cf. Ball & Duley in Fl. Europaea ed. 2, 1: 363, 1993; Botschantzev 1978: 151; Nikitin & Geldykhov 1988).

Alyssum tortuosum Willd., Sp. Pl.: 3 (1): 466 (1800). Syn.: *A. inflatum* E. I. Nyárády; *A. nyárádyi* Bornm. & Gauba; *A. decandolleianum* E. I. Nyárády.

Mat.: A-9517, 10407, 10708, 10237, 11011, 11065; R-52858; Rz-53192	
Hab.: <i>Juniperus excelsa</i> woodland, <i>Artemisia</i> , <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes, mountain steppes with grasses and thorn-cushions, mountain meadows	
Dist.: Map 211	Alt.: 1100-2380
Ch.: IT ^{w&c} [ES-M]	GF.: CHU
Th. (GNP): NOT (27)	Th. (IR): NOT

A. inflatum Nyárády has been known in the Flora Iranica, 57: 166, 1968, as an endemic species distributed widely in Iran and adjacent Turkmenistan. On the other hand, *A. tortuosum* Willd. was known in the Russian literature to occur in Turkmenistan (Nikitin & Geldykhov 1988). This is a widespread species distributed from E and E.C. Europe through Turkey and Caucasus to Turkmenistan (Ball & Dudley in Fl. Europaea, ed. 2, vol. 1: 368, 1993). Since *A. inflatum* has been known based on some syntypes from Kopetdagh (Gaudan, Litw., Suluklü ad confines Persiae, Sint. 841, n. v.), there is no doubt that the same species was assigned two different names. Comparing plants from Iran with identical material of *A. tortuosum* from Kopetdagh (v.s. Nikitin & Ivanov 1.6.1975 and Rechinger 4813, both in M) and many specimens from E. Europe and Transcaucasia confirms their identity. The material from the Golestan National Park shows high variation in siliqua form (from elliptic to obovate), in style length (from 0.8 to 1.8 mm long), in inflorescence shape (from subcorymbose and condensed to subracemose and elongate) and indumentum. The very wide ecological adaptation of the species in steppes, grassland, mountain summits, and on different soils suggests that the morphological variation is influenced by the habitat condition. Therefore, I prefer to use the name *A. tortuosum* for the material in Iran, before the group can be critically revised.

Arabidopsis pumila (Willd.) N. Busch, Fl. Caucas. Crit. 3, 4: 465 (1909). Syn.: *Sisymbrium pumilum* Willd., Sp. Pl., 3: 507 (1800).

Mat.: A-6237, 10487, 10519, 10238, 10968	
Hab.: <i>Juniperus excelsa</i> woodland, <i>Artemisia-Stipa</i> steppe, dry valley with <i>Haloxylon</i> shrubs, mountain steppe with grasses and thorn-cushions	
Dist.: Map 212	Alt.: 1150-1900
Ch.: IT ^{omni}	GF.: TSC
Th. (GNP): RAR (15)	Th. (IR): NOT

Arabidopsis thaliana (L.) Heynh. in Holl & Heynh., Fl. Sachsen: 538 (1842). Syn.: *Arabis thaliana* L., Sp. Pl.: 665 (1753).

Mat.: A-10296, 11214	
Hab.: Open woodland with dense stands of grasses in Koilar region	
Dist.: NW	Alt.: 1400-1500
Ch.: PL ^(mainly North Temperate)	GF.: TRO
Th. (GNP): END (3)	Th. (IR): RAR

Arabis

Arabis is dealt with here in a broad sense, including *Turritis*.

Arabis alpina L., Sp. Pl.: 664 (1753).
subsp. *caucasica* (Willd.) Briq., Prodr. Fl. Corse 2 (1): 48 (1913). Syn.: *A. caucasica* Willd., Enum. Hort. Bot. Reg. Berol., Suppl. 45 (1813).

Mat.: A-11267	
Hab.: Found once in a karstic cliff in montane closed forest in Besh Jakhdan	
Dist.: NW	Alt.: 1900
Ch.: IT-M	GF.: HRO
Th. (GNP): END (1)	Th. (IR): NOT

Arabis glabra (L.) Bernh., Syst. Verz. Erfurt 1: 195 (1800). Syn.: *Turritis glabra* L., Sp. Pl. Sp. Pl.: 666 (1753).

Mat.: A-11206, 10652, 11090; Z&al-86/2939	
Hab.: Open scrubs mixed with grasses (mostly <i>Crataegus</i> , <i>Acer monspessulanum</i> , <i>Paliurus spina-christi</i> and <i>Carpinus orientalis</i>)	
Dist.: Map 213	Alt.: 650-1550
Ch.: ES-IT-M	GF.: HSC ^(biennial)
Th. (GNP): RAR (10)	Th. (IR): RAR

Arabis nova Vill., Prosp. Hist. Pl. Dauphiné: 39 (1779). Syn. *A. auriculata* Lam.; *A. montbretiana* Boiss.

Mat.: A-10297, 10525, 10678, 10986-a; Fu-5121 (n.v.); W&al-11046	
Hab.: <i>Paliurus spina-christi</i> scrub, open scrub on steep slopes with <i>Carpinus orientalis</i> and <i>Quercus castaneifolia</i> , <i>Artemisia-Festuca</i> steppe, <i>Juniperus excelsa</i> woodland	
Dist.: Map 214	Alt.: 550-1500
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): VUL (8)	Th. (IR): NOT

Arabis sagittata (Bertol.) DC. in Lam. & DC., Fl. France ed. 3, 5: 592 (1815). Syn.: *Turritis sagittata* Bertol., Pl. Genuenses: 89 (1804).

Mat.: A-9484, 10666, 10786, 11255, 11372, 12010	
Hab.: <i>Stipa</i> steppe, steep slopes with <i>Carpinus orientalis</i> , transitional scrub with <i>Crataegus</i> , moist valley dominated by <i>Acer monspessulanum</i> , mountain meadow surrounded by montane forest	
Dist.: Map 215	Alt.: 1100-1950
Ch.: ES-M [IT]	GF.: HSC ^(biennial)
Th. (GNP): RAR (11)	Th. (IR): ? RAR

Barbarea plantaginea DC., Reg. Veg. Syst. Nat. 2: 208 (1821).

Mat.: A-10794; AS-6120	
Hab.: Bank of mountain springs	
Dist.: Map 216	Alt.: c. 1600
Ch.: IT ^{c&w}	GF.: HSC
Th. (GNP): END (2)	Th. (IR): NOT

Brassica elongata Ehrh., Beitr. Naturk. 7: 159 (1792). Syn.: *B. persica* Boiss.

Mat.: A-9426, 11014, 10731, 10967; R-52850	
Hab.: <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes, grassy mountain steppe with thorn-cushions, mountain meadows, <i>Juniperus excelsa</i> woodland, <i>Acer monspessulanum</i> scrub	
Dist.: Map 217	Alt.: 1200-1880
Ch.: IT-M [ES]	GF.: HSC
Th. (GNP): NOT (18)	Th. (IR): NOT

Camelina rumelica Velen., Sitzungsber. Königl. Böhm. Ges. Wiss. Prag, Math.-Naturwiss. Cl. 1887: 448 (1888). Syn.: *Camelina albiflora* (Boiss.) N. Busch.

Mat.: A-6245, 10875, 11017; AS-5992; R-52952, 52823, 53033 (misidentified as " <i>Neslia apiculata</i> ")	
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Hab.: <i>Artemisia-Stipa</i> steppe, dry valley with <i>Haloxylon</i> shrubs, <i>Acer monspessulanum</i> scrub	
Dist.: Map 218	Alt.: 1150-1830
Ch.: IT-M [ES]	GF.: TSC
Th. (GNP): NOT (18)	Th. (IR): NOT

R-52823 has been treated under *C. microcarpa* DC. subsp. *sylvestris* (Wallr.) Hiitonen by Z. Mirek (1986 in sched.). This material is an inadequate late collection lacking flower and leaf. With respect to indumentum, habit and silicle structure, I cannot separate it from other above cited specimens.

Hedge (Fl. Iranica 57: 339, 1968) distinguished subsp. *transcaspica* (Fritsch) Hedge by the indumentum consisting of simple and branched hairs "Differt a subsp. *rumelica* indumento e pilis ramosis et simplicibus consistente". All above cited material have both simple and branched hairs, of course with different proportion. Usually the hairs on leaf margins are more and denser than those of lamina and stem.

Capsella bursa-pastoris (L.) Medik., Pflanzen-gatt. 85 (1792). Syn.: *Thlaspi bursa-pastoris* L., Sp. Pl.: 647 (1753); *Capsella hyrcana* Grossh.

Mat.: A-10384; Fu-5129 (n.v.)	
Hab.: As a weed in ruderal and waste-places around Tangerang and other disturbed areas	
Dist.: W	Alt.: 450-???
Ch.: COS	GF.: TSC
Th. (GNP): IND (2)	Th. (IR): NOT

Cardaria draba (L.) Desf., J. Bot. Agric. 3: 163 (1814). Syn.: *Lepidium draba* L., Sp. Pl.: 645 (1753).

subsp. **chalepensis** (L.) O. E. Schulz. Syn.: *Lepidium chalepense* L.; *L. repens* (Schrenk) Boiss., *Hymenophysa fenestrata* Boiss.; *H. persica* Gilli.

Mat.: AS-6189	
Hab.: Weed in waste places, for example in Almeh valley and elsewhere	
Dist.: C & elsewhere	Alt.: ?-1700-?
Ch.: IT [M]	GF.: HSC
Th. (GNP): IND	Th. (IR): NOT

Chalcanthus renifolius (Boiss. & Hohen.) Boiss., Fl. Orient. 1: 212 (1867). Syn.: *Hesperis renifolia*

Boiss. & Hohen. in Boiss., Diagn. Pl. Orient. Nov. sér. 1, 8: 22 (1849). *Ch. tuberosus* (Kom.) Kom.

Mat.: W&al-11078	
Hab.: In <i>Acer monspessulanum</i> scrub below Almeh	
Dist.: S	Alt.: 1600
Ch.: IT ^{C & KK}	GF.: GTU
Th. (GNP): END (1)	Th. (IR): IND

Chorispora iberica (M. Bieb.) DC., Reg. Veg. Syst. Nat. 2: 437 (1821). Syn.: *Raphanus ibericus* M. Bieb., Fl. Taur.-Caucas. 2: 129 (1808).

Mat.: A-10227	
Hab.: Mountain steppe with scattered shrubs in Jakhtikalan Pass	
Dist.: NE	Alt.: 1600-1700
Ch.: IT ^{Cauc.-Alborz}	GF.: TCA/HSC
Th. (GNP): END (1)	Th. (IR): END

Chorispora iberica was already known from a few localities in Azerbaijan (Fl. Iranica 57: 242, 1968). Two further specimens, outside the Park, have been seen from Semnan Province: In saxosis calc. jugi Abr a Shahrud boreo-orientem versus, 1950-2000, 22.5.1977, Rechinger 55410 (M); ibid. 2200-2500 m, 6.6.1977, Rechinger 56338 (M).

Chorispora tenella (Pall.) DC., Reg. Veg. Syst. Nat. 2: 435 (1821). *Raphanus tenellus* Pall., Reise Russ. Reich 3: 741 (1776).

Mat.: A-10515, 10273, 10236	
Hab.: <i>Artemisia-Stipa</i> steppe, mountain steppe with scattered shrubs	
Dist.: Map 219	Alt.: 1000-1650
Ch.: IT ^{omni}	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Similar to *Diptychocarpus strictus*, but hairs shorter and glandulose, and mature siliqua lomentaceous, 3-4 (-4.5) cm long.

Clausia turkestanica Lipsky, Trudy Glavn. Bot. Sada 23: 41 (1904). Syn.: *Diptychocarpus hispidus* Regel; *Pseudoclausia turkestanica* (Lipsky) Vassilcz.

Mat.: A-6195, 10210; R-53037*	
Hab.: Mountain steppe with grasses and thorn-cushion, <i>Juniperus excelsa</i> woodland	
Dist.: Map 220	Alt.: 1500-1950
Ch.: IT ^{E & KK}	GF.: HSC
Th. (GNP): RAR (9)	Th. (IR): VUL

* Det.: K. H. Rechinger

Clypeola jonthlaspi L., Sp. Pl.: 652 (1753).

Mat.: U-16150 (p.p. mixed with <i>Alyssum desertorum</i>); W&al-11047	
Hab.: Rocky outcrops in forested parts of the Park, <i>Juniperus</i> woodland	
Dist.: Map 221	Alt.: 550-1600
Ch.: IT-M	GF.: TSC
Th. (GNP): IND (3)	Th. (IR): NOT

Conringia perfoliata (C. A. Mey.) Busch, Fl. URSS 8: 497 (1939). Syn.: *Sisymbrium perfoliatum* C. A. Mey., Verz. Pfl. Cauc. 188 (1831); *Conringia clavata* Boiss.

Mat.: No voucher	
Hab.: <i>Artemisia</i> steppe, <i>Juniperus</i> woodland	
Dist.: NE	Alt.: 1200-????
Ch.: IT	GF.: TSC
Th. (GNP): IND	Th. (IR): NOT

Conringia perfoliata has been collected and been recorded several times in the field in the NE parts of the Park. Unfortunately the presses containing this species and several other plants were stolen! The species has been reported by Zehzad (Hasanzadeh-Kiabi & al. 1994: 109). The occurrence of *C. persica* Boiss. and *C. orientalis* (L.) Anderz. in our area is also very likely.

Conringia planisiliqua Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 3: 32 (1837).

Mat.: A-9544, 10826; R-52853, 53036	
Hab.: <i>Artemisia</i> steppe, mountain steppe with grasses and thorn-cushions, juniper woodland	
Dist.: C, E, S	Alt.: 1200-1700
Ch.: IT ^{C&W}	GF.: TSC
Th. (GNP): ? IND (3)	Th. (IR): IND

Crambe kotschyana Boiss., Diagn. Pl. Orient. Nov. sér. 1, 6: 19 (1845).

Mat.: A-11047; AS-5980; Z&al-86/2592	
Hab.: Juniper woodland, <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> scrubs, gentle slopes between <i>Artemisia</i> steppe and mountain scrub	
Dist.: Map 222	Alt.: 970-1600
Ch.: IT ^{C&E}	GF.: HSC
Th. (GNP): VUL (7)	Th. (IR): RAR

Crambe orientalis L. is a widespread species in Iran. It has not yet been found within the borders of the Park. It differs from *C. kotschyana* by smooth

fruit surface (not rugose), much shorter pedicel 4-10 mm long (not 10-40 mm long) and basal and lower non-cordate leaves.

Descurainia sophia (L.) Prantl in Engl. & Prantl, Nat. Pflanzenfam. 3 (2): 192 (1891). Syn.: *Sisymbrium sophia* L., Sp. Pl.: 659 (1753); *S. persicum* Spreng.

Mat.: No voucher	
Hab.: As weed in waste-places and sandy soils	
Dist.: ? C, E, S	Alt.: ???-1500-???
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): IND	Th. (IR): NOT

Although no herbarium specimen has been collected, the species was observed as a weed around the road and the protection stations. It has been recorded in one phytosociological relevé on sandy soils at the top of a hill, at the beginning of the Almeh valley.

Diptychocarpus strictus (DC.) Trautv., Bull. Soc. Imp. Naturalites Moscou 33 (1): 108 (1860). Syn.: *Chorispora stricta* DC., Syst. Nat. 2: 436 (1821).

Mat.: A-6223	
Hab.: Along the Almeh valley	
Dist.: E	Alt.: 1300-1400
Ch.: IT	GF.: TSC
Th. (GNP): END (1)	Th. (IR): RAR

Superficially very similar to *Chorispora tenella*, but differs by the long simple and multicellular, not glandulose hairs, and 5-6 cm long mature siliqua which are indistinctly lomentaceous.

Draba huetii Boiss., Diagn. Pl. Orient. Nov. sér. 2, 5: 31 (1856).

Mat.: A-6162, 10206; AS-6075	
Hab.: Maple and Juniper scrub, mountain steppe of grasses and thorn-cushions	
Dist.: Map 223	Alt.: 1400-1750
Ch.: IT ^{Cauc.-Turk.}	GF.: TRO
Th. (GNP): VUL (5)	Th. (IR): VUL

Erophila verna (L.) Chevall., Fl. Gén. Env. Paris 2: 898 (1827). Syn.: *Draba verna* L., Sp. Pl.: 642 (1753).

Mat.: A-10309	
Hab.: Open woodland with dense grass stands in Koilar	

Dist.: NW	Alt.: 1400-1450
Ch.: ES-IT-M	GF.: TRO
Th. (GNP): END (1)	Th. (IR): END

Eruca sativa Mill., Gard. Dict. ed. 8: Eruca n° 1 (1768).

Mat.: A-11174	
Hab.: Usually a weed in cultivated lands, but in our area in <i>Stipa</i> steppe near Gorga-Meydan (along Qortoy valley), apparently escaped from surrounding cultivated lands	
Dist.: N	Alt.: 1260
Ch.: PL	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Erysimum ischnostylum Freyn & Sint., Bull. Herb. Boissier, sér. 2, 3: 570 (1903).

Mat.: A-11085, 11278, 11054, 11198, 10498, AS-6069*, F-1199*, R-53034*, 9556*	
Hab.: Steppe (<i>Artemisia</i> , <i>Stipa</i> and grassy mountain steppe with thorn-cushions), alpine meadow, juniper woodland, <i>Acer monspessulanum</i> scrub, rocky outcrops	
Dist.: Map 224	Alt.: 900-2060
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): NOT (68)	Th. (IR): NOT

* Det.: A. Polatschek (Vienna)

Erysimum kerbabaevii Kurbanov & Gudkova. in Bot Zhurn. 68 (2): 236 (1983).

Mat.: A-10888, 11052; R-52831*, 52956*, 52831*	
Hab.: Sandy and gravelly soils at bottom of some dry brooks in N & E parts of Mirza-Baylu plain	
Dist.: Map 225	Alt.: 1200-1300
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): VUL (5)	Th. (IR): END

* Det.: A. Polatschek (Vienna)

The species has recently been recorded as new for Iran (Akhani 1996: 102).

Erysimum repandum L. Demonstr. Pl.: 17 (1753).

Mat.: A-10325	
Hab.: <i>Paliurus spina-christi</i> scrub around Sharleq	
Dist.: S	Alt.: 1000-1100
Ch.: M-IT	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Erysimum sp.

Mat.: Akhani: 12.10.1995	
Hab.: Open scrub of <i>Quercus castaneifolia</i> and <i>Carpinus orientalis</i> , E Beili-Kuh	
Dist.: NW	Alt.: 1010
Ch.: ?	GF.: HSC
Th. (GNP): END (1)	Th. (IR): ?

Above cited plant is an incomplete fragment, collected in a phytosociological relevé. This mesophytic species differs markedly from other species in our area. Further collections are needed to evaluate its status.

Euclidium

The genus *Euclidium* is dealt with here with using a broad concept, including *Litwinowia*.

Euclidium syriacum (L.) R. Br. in Aiton, Hort. Kew. ed. 2, 4: 74 (1812); *Anastatica syriaca* L., Sp. Pl.: ed. 2: 895 (1763).

Mat.: AS-5922; R-52899	
Hab.: <i>Artemisia-Anabasis aphylla</i> steppe, dry valley with <i>Haloxylon</i> shrubs	
Dist.: Map 226	Alt.: 1200-1400
Ch.: IT	GF.: TSC
Th. (GNP): END (3)	Th. (IR): NOT

Euclidium tenuissimum (Pall.) B. Fedtsch., Bull. Herb. Boissier, sér. 2, 4: 915 (1904). Syn.: *Vella tenuissima* Pall., Reise 5: 506 (1793); *Litwinowia tenuissima* (Pall.) Woron. ex Pavlov.

Mat.: AS-5914, 6232; F-1093; W&al-11081	
Hab.: <i>Artemisia-Anabasis aphylla</i> steppe, dry valley with <i>Haloxylon</i> shrubs, <i>Paliurus spina-christi</i> scrub	
Dist.: Map 227	Alt.: 950-1400
Ch.: IT	GF.: TSC
Th. (GNP): VUL (5)	Th. (IR): IND

Goldbachia laevigata (M. Bieb.) DC., Reg. Veg. Syst. Nat. 2: 577 (1821). Syn.: *Raphanus laevigata* M. Bieb., Fl. Taur.-Caucas. 2: 129 (1808).

Mat.: A-6217, 10260; AS-5923, F-1094; W&al-10964	
Hab.: <i>Artemisia-Stipa</i> and <i>Artemisia-Anabasis</i> steppes, dry valley with <i>Haloxylon</i> shrubs, disturbed and ruderal habitats	
Dist.: Map 228	Alt.: 1000-1400
Ch.: IT	GF.: TSC
Th. (GNP): VUL (6)	Th. (IR): NOT

Hesperis hyrcana Bornm. & Gauba, Feddes Repert. 49: 254 (1940).

Mat.: A-9281, 9614, 9349, 9819; R-33141*, 52523*, 52483*	
Hab.: In closed lowland and montane forests, forest margin, moist soils near rivers	
Dist.: Map 229	Alt.: 450-2130
Ch.: ES ^{HY}	GF.: HSC
Th. (GNP): NOT (49)	Th. (IR): NOT

* Det.: F. Dvorák

Hesperis persica Boiss., Ann. Sci. Nat. Bot., ser. 2, 17: 64 (1842). Syn.: *H. alabadensis* Stapf.

Mat.: R-53211 (Det.: Dvorák)	
Hab.: Along Almeh valley (exact habitat is not known)	
Dist.: S.C	Alt.: 1400-1500
Ch.: IT ^{C, Cauc.-Turk.}	GF.: HSC
Th. (GNP): END (1)	Th. (IR): NOT

Isatis

Extremely difficult genus demanding a critical study in Iran. In the Park, there are c. 2-4 species whose boundaries are not clear. Even distinguishing two distinct species, *I. leuconeura* and *I. gaubae*, is often not easy. This may be caused by hybridization. Hedge in Flora Iranica, (57: 79, 1968) separated these species by siliqua length and basal leaves: In *I. gaubae* siliqua are 20-27 x 3-4 mm long and basal leaves oblong-spathulate or elliptic; in *I. leuconeura* siliqua are 12-14 x 3-4 mm, basal leaves oblong. These characters are not applicable in our material. A specimen of *I. leuconeura* Boiss. & Buhse has been identified by Hedge (Tang-e Gol, alt. 1050 m, 30.4.1972, Uotila 16094 (W)). *I. bushiana* and *I. gaubae* have been reported by Zehzad (1994: 125) from our area. Following are the number of specimens collected by the author: 5943, 5953, 6067, 6082, 10211, 10353, 10780, 10781, 10820, 10821, 10913, 10919, 10964, 11053, 11142, 11306.

Lepidium latifolium L., Sp. Pl.: 644 (1753).

Mat.: A-12223; ZK-82131.	
Hab.: In saline soils with <i>Tamarix</i> stands near Cheshmeh Khan and a locality in Almeh valley	
Dist.: S, SC	Alt.: 1200-1300 ?
Ch.: ES-IT-M ^(alien elsewhere)	GF.: HSC
Th. (GNP): END (2)	Th. (IR): NOT

Lepidium perfoliatum L., Sp. Pl.: 643 (1753).

Mat.: A-10942; R-53029; U-16050	
Hab.: In saline soils associated with <i>Anabasis aphylla-Artemisia</i> steppe in Mirza-Baylu plain	
Dist.: E	Alt.: 1200-1500*
Ch.: ES-IT-M ^(alien elsewhere)	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

* 1500 m is based on U-16050, but needs confirmation.

Lepidium persicum Boiss., Ann. Sci. Nat. Bot., sér. 2, 17: 196 (1842).

Mat.: A-4501, 11362; R-52960*	
Hab.: On Almeh road and crevices of rock cliffs surrounded by <i>Juniperus</i> woodland in Qoreh-Darreh, ca. 7 km SW of Soolegerd	
Dist.: E & NE	Alt.: 1300-1450
Ch.: IT ^C	GF.: HSC
Th. (GNP): END (3)	Th. (IR): NOT

Identification of R-52960 is doubtful, further collecting is necessary.

Lepidium sp.

Mat.: A-10749	
Hab.: Rocky limestone in <i>Juniperus</i> woodland	
Dist.: S	Alt.: 1200
Ch.: ? IT ^{KK}	GF.: HSC
Th. (GNP): END (1)	Th. (IR): ?

The above cited material is young, without mature fruits. It is clearly distinct from all other known *Lepidium* in Iran. Further collecting is necessary for reliable identification.

Matthiola alyssifolia (DC.) Bornm. in Bornm. & Gauba, Feddes Repert. 39: 80 (1935). Syn.: *Hesperia alyssifolia* DC. in Del., Icon. Sel. 2, tab. 61 (1823); *M. albicaulis* Boiss. Fig. 18, D.

Mat.: A-10535, 10837-b; K-5727; W&al-11086	
Hab.: <i>Juniperus</i> woodland	
Dist.: Map 230	Alt.: 1450-2020
Ch.: IT ^{E&C}	GF.: HSC
Th. (GNP): VUL (8)	Th. (IR): RAR

As pointed out by Wendelbo (in sched.), *M. alyssifolia* is highly attractive and is a good candidate as a garden plant (see Fig. 18, D).

Matthiola farinosa Bunge ex Boiss., Fl. Orient. 1: 150 (1867).

Mat.: A-10265, 10837-a, 11046, 11699; R-52916, 53032; WF-12827	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes, gravelly soils, bottom of dry brooks	
Dist.: Map 231	Alt.: 1200-1600
Ch.: IT ^C	GF.: CHE
Th. (GNP): RAR (10)	Th. (IR): NOT

Moriera spinosa Boiss., Ann. Sci. Nat. Bot., sér. 2, 17: 182 (1842). Syn.: *Lepidium intricatum* Boiss. & Buhse; *M. transhyrcana* Czerniak.; *M. stenotera* Bornm. Fig. 18, E.

Mat.: A-10889; R-52963	
Hab.: On gypsum hill N of Mirza-Baylu plain	
Dist.: Map 232	Alt.: 1250-1300
Ch.: IT ^C	GF.: CSC TH
Th. (GNP): END (2)	Th. (IR): NOT

Neotorularia dentata (Freyn & Sint.) Hedge & J. Léonard, Bull. Jard. Bot. Nat. Belg. 56: 394 (1986). Syn.: *Cryptospora dentata* Freyn & Sint., Bull. Herb. Boiss. 2, 3: 693 (1903); *Torularia dentata* (Freyn & Sint.) Kitam.

Mat.: A-5838, 10270, 10503	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes	
Dist.: Map 233	Alt.: 1000-1360
Ch.: IT ^{KK & Aralo-Caspian}	GF.: TSC
Th. (GNP): NOT (17)	Th. (IR): RAR

Neslia apiculata Fisch., C. A. Mey. & Avé-Lall., Index Sem. Hort. Petrop. 8: 68 (1842).

Mat.: AS-6083	
Hab.: Found once on southern slopes of Divar-Kaji Mountain	
Dist.: C	Alt.: ?
Ch.: IT-M ^(alien elsewhere)	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Rapistrum rugosum (L.) All., Fl. Pedem. 1: 257 (1785). Syn.: *Myagrum rugosum* L., Sp. Pl.: 257 (1753).

Mat.: A-9856, 10365; R-52508; Z-82/203	
Hab.: Rocky outcrops, weed in disturbed habitats in garden and road margin	
Dist.: Map 234	Alt.: 450-1100
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): RAR (11)	Th. (IR): NOT

Sameraria armena (L.) Desv., J. Bot. Agric. 3: 161 (1815). Syn.: *Isatis armena* L., Sp. Pl.: 670 (1753).

Mat.: A-6243, 10558	
Hab.: <i>Artemisia-Stipa</i> steppe, dry valley with <i>Haloxylon</i> shrubs	
Dist.: Map 235	Alt.: 1000-1350
Ch.: IT ^{W&C}	GF.: TSC
Th. (GNP): END (2)	Th. (IR): VUL

Sinapis arvensis L., Sp. Pl.: 668 (1753).

Mat.: A-10366; F-1186; R-52490	
Hab.: As weed in garden and road margin in Tangerang and Dast-e Shah	
Dist.: W, SW borders	Alt.: 450-1540
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): END (3)	Th. (IR): NOT

Sisymbrium altissimum L., Sp. Pl.: 659 (1753).

Mat.: F-1088; R-52773; U-19168; Z-83/1385	
Hab.: Wet places, as weed in disturbed habitats	
Dist.: Map 236	Alt.: 1000-1700
Ch.: ES-IT-M ^(alien elsewhere)	GF.: TSC ^(or biennial)
Th. (GNP): VUL (4)	Th. (IR): NOT

Sterigmostemum ramosissimum (O. E. Schulz) Rech. f., Fl. Iranica 57: 280 (1968). Syn.: *Anchonium ramosissimum* O. E. Schultz, Bot. Jahr. Syst. 66: 97(1933). *Anchonium sterigmoides* Lipsky.

Mat.: A-6190; Polunin-11805*; T-31906*; R-52977*, 52836*, 52836*; Rz-52836*; WF-12694*; Z-83/1389; Z&al-86/2591.	
Hab.: <i>Juniperus</i> woodland, mountain meadow, <i>Acer monspessulanum</i> scrub	
Dist.: Map 237	Alt.: 1200-2060
Ch.: IT ^{KK}	GF.: TSC
Th. (GNP): NOT (16)	Th. (IR): VUL

* Based on Jacquemoud's monograph (1988).

Strigosella

In recent taxonomic works the genus *Strigosella* has been separated from *Malcolmia* by characters like: not or scarcely saccate inner sepals, branched hairs being stalked, lobes of stigmas not or scarcely carpoidially decurrent, cells of septum elongated transversely across the minor axis and nectary glands furnished with divergent processes. *Malcolmia* is characterized by the strongly saccate

inner sepals, sessile branched hairs, strongly carpi-
dially decurrent stigma lobes and cells of septum
elongated lengthwise along the major axis (Dvořák
1969, 1972, 1973, Botschantzev 1972, Townsend
1980 in Fl. Iraq 4: 1032, 1980). Furthermore
Dvořák (1969, 1972, 1973) has suggested the
separation of the genus *Fedtschenkova*. It has been,
however, neither accepted by Botschantzev (1972)
nor followed here.

Strigosella africana (L.) Botsch., Bot. Zhurn. 57,
9: 1038 (1972). Syn.: *Hesperis africana* L., Sp. Pl.:
663 (1753); *Malcolmia africana* (L.) R. Br.

Mat.: A-6244; R-52896, 52897	
Hab.: <i>Artemisia</i> steppe in Mirza-Baylu plain and Almeh valley with <i>Haloxylon</i> shrubs	
Dist.: E	Alt.: 1200-1350
Ch.: M-SS-IT	GF.: TSC
Th. (GNP): END (3)	Th. (IR): NOT

R-52897 is characterized by the glabrous silique
and very sparse indument on leaves and stem. It has
been determined by Rechinger as var. *intermedia*
(C. A. Mey.) Boiss. Botschantzev (1972: 1040)
raised its taxonomic value to species level "*St.*
intermedia (C. A. Mey.) Botsch."

Strigosella turkestanica (Litv.) Botsch. Syn.:
Malcolmia turkestanica Litv.

It has been found from two localities in West and
East of the Park, outside the official borders: In
Artemisietis, 62 km E Loveh, 1200 m, Rechinger
33175 (W); Gonbad-e Kavus, Ghalamekhor, Sahrif
5636-E (W) (cf. Rechinger in Fl. Iranica 57: 245 &
349, 1968). Therefore its occurrence in the Park is
not unexpected. The large purplish petals are
distinctive.

Tauscheria lasiocarpa Fisch. ex DC., Reg. Veg.
Syst. Nat. 2: 563 (1821).

Mat.: AS-5910	
Hab.: Moderately saline soils in <i>Artemisia-Anabasis</i> <i>aphylla</i> steppe, dry valley with <i>Haloxylon</i> shrubs	
Dist.: Map 238	Alt.: 1200-1400
Ch.: IT	GF.: TSC
Th. (GNP): END (2)	Th. (IR): IND

Thlaspi

The genus *Thlaspi* s.l. has been split into several
genera by Meyer (1973, 1979, 1991), based on the
morphological and seed-coat anatomy criteria. This
generic segregation has recently been supported by
chloroplast DNA sequencing (Mummenhoff &
Koch 1994). Our species could be categorized into
two genera i.e. "*Microthlaspi*" and "*Kotschyella*".
This distinction, however, has not been followed
here.

Thlaspi perfoliatum L., Sp. Pl.: 646 (1753). Syn.:
Microthlaspi perfoliatum (L.) F. K. Mey.

Mat.: A-10239, 10304; F-1095; U-15999	
Hab.: <i>Juniperus</i> woodland, <i>Acer monspessulanum</i> and <i>Paliurus spina-christi</i> scrubs, <i>Quercus</i> <i>macranthera</i> forest, transition between mountain forest and mountain steppe (open woodland with grasses)	
Dist.: Map 239	Alt.: 800-1820
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): NOT (17)	Th. (IR): NOT

Thlaspi stenocarpum (Boiss.) Hedge, Fl. Iranica
57: 116 (1967). Syn.: *Carpoceras stenocarpum*
Boiss., Diagn. Pl. Nov. Ser. 1, 8: 38 (1849);
Kotschyella stenocarpa (Boiss.) F. K. Mey.

Mat.: A-11257	
Hab.: Mountain meadow surrounded by montane forest	
Dist.: Map 240	Alt.: 1950
Ch.: IT ^{KK-Alborz}	GF.: HSC
Th. (GNP): END (1)	Th. (IR): RAR

The annual weedy species "*T. arvensis*" has not yet
been found within the borders of the Park. It is
widely distributed around our area, its occurrence
is expected. The species is distinguished from *T.*
perfoliata by a larger silicle 10-15 mm long (not 5-
7 mm) and distinctly striate seeds (not smooth).

Doubtful or misidentified records

Hirschfeldia incana Lagr.-Foss. and *Neotorularia*
torulosa (Desf.) Hedge & J. Léonard (under
Torularia torulosa) have been reported by Zehzad
(in Hasanzadeh-Kiabi & al. 1994: 123, 154). I have
not seen any material, even among Zehzad's
collection.

Campanulaceae

Asyneuma amplexicaule (Willd.) Hand.-Mazz., Ann. Naturhist. Mus. Wien, 27: 431 (1913). Syn.: *Phyteuma amplexicaule* Willd., Sp. Pl.: 1: 925 (1798); *Phyteuma kotschyi* Boiss. Fig. 18, F.

Mat.: A-11765, 11786	
Hab.: <i>Quercus macranthera</i> forest	
Dist.: Map 241	Alt.: 2100-2300
Ch.: ? ES ^{HY}	GF.: HSC
Th. (GNP): END (2)	Th. (IR): IND

Campanula glomerata L., Sp. Pl.: 166 (1753).

Mat.: A-4387, 9612, 9673, 9889, 11604, 11752, 11497, 11539, 11613, 11795; Z-85/175, 82/290	
Hab.: Closed lowland and montane forest	
Dist.: Map 242	Alt.: 700-2230
Ch.: ES	GF.: HSC
Th. (GNP): NOT (24)	Th. (IR): NOT

Campanula latifolia L., Sp. Pl.: 165 (1753).

Mat.: A-4434, 11605; F-1180; W&C-14395	
Hab.: Closed montane forest	
Dist.: Map 243	Alt.: 1400-1900
Ch.: ES	GF.: HSC
Th. (GNP): RAR (9)	Th. (IR): END/VUL

Campanula lourica Boiss., Diagn. Pl. Orient. Nov. sér. 1, 11: 70 (1849). Fig. 18, G.

Mat.: A-10853, 11396, 11450; R-53130, 52676, 52736; Rz-53176	
Hab.: In crevices of limestone rocks and limestone cliffs	
Dist.: Map 244	Alt.: 700-2100
Ch.: IT ^{Alborz}	GF.: CHU
Th. (GNP): NOT (20)	Th. (IR): NOT

Campanula rapunculus L., Sp. Pl.: 164 (1753). According to Fl. Iranica 13: 34, 1965, the Iranian plants belong to subsp. *lambertiana* (DC.) Rech. f.

Mat.: F-1046; R-52742; Z&al-86-2931	
Hab.: Often in open scrub (<i>Acer monspessulanum</i> and <i>Paliurus spina-christi</i>)	
Dist.: Map 245	Alt.: 650-1200
Ch.: ES-M ^(species range)	GF.: HSC (biennial)
Th. (GNP): VUL (5)	Th. (IR): IND

Capparidaceae

Capparis spinosa L., Sp. Pl.: 503 (1753).

Mat.: Wa-200 (n. v., in Fl. Iranica 68, 5, 1970)	
Hab.: Road margin and sandy-gravelly soils in dried-up stream beds from Sharleq to Mirza-Baylu	
Dist.: S	Alt.: 1000-1200
Ch.: PL	GF.: PSS TH
Th. (GNP): IND	Th. (IR): NOT

Although Walton's specimen has not been seen, the species has been observed in several places along the southern border of the Park.

Cleome coluteoides Boiss., Diagn. Pl. Orient. Nov. sér. 1, 1: 3 (1842). Syn.: *Buhsea coluteoides* (Boiss.) Bunge.

Mat.: F-1155	
Hab.: <i>Artemisia</i> steppe and ruderal places around the Soolegerd station	
Dist.: NE	Alt.: 1200
Ch.: IT ^C	GF.: HSC
Th. (GNP): END (1)	Th. (IR): NOT

Caprifoliaceae

Lonicera bracteolaris Boiss. & Buhse, Mém. Soc. Imp. Naturalites Moscou 2, 12: 106 (1860).

Mat.: A-9399; AS-6104; GA-4866; Z&al-86/2622; WF-12571	
Hab.: <i>Juniperus</i> woodland, <i>Quercus macranthera</i> forest, <i>Acer monspessulanum</i> scrub, mountain steppe (mixed of grasses, thorn-cushions and scattered shrubs)	
Dist.: Map 246	Alt.: 1600-2380
Ch.: IT ^{E & KK}	GF.: PSS
Th. (GNP): NOT (17)	Th. (IR): RAR

Lonicera floribunda Boiss. & Buhse, Mém. Soc. Imp. Naturalites Moscou 2, 12: 107, tab. 8 (1860).

Mat.: A-4438, , 11939, 11940, 10785, 11032, 11204, 11102, 11772, 10798; F-1053; GA-4898; R-52659, 53170; 53169; WF-12610; Z-83/1370, 83/1365; Z&al-86/2590	
Hab.: Associated with different types of scrubs	
Dist.: Map 247	Alt.: 660-2230
Ch.: ES ^{HY} /IT ^{Cauc.-Turk.}	GF.: PSS
Th. (GNP): NOT (54)	Th. (IR): NOT

Lonicera iberica M. Bieb., Fl. Taur.-Caucas. 1: 158 (1808). Fig. 18, H.

Mat.: A-11350, 11101, 10790	
Hab.: <i>Quercus macranthera</i> forest, juniper woodland, rocky outcrops, open <i>Acer monspessulanum</i> shrubby mountain summit	
Dist.: Map 248	Alt.: 1400-2380
Ch.: ES ^{HY} /IT ^{Cauc.-Alborz}	GF.: PSS
Th. (GNP): NOT (20)	Th. (IR): NOT

Lonicera nummulariifolia Jaub. & Spach, Ill. Pl. Orient. 1: 132, tab. 70 (1842-1843). Syn.: *L. persica* Jaub. & Spach; *L. bornmuelleri* Gand.

Mat.: A-11033; R-53172; WF-12612*	
Hab.: Mixed of various shrubs in Almehr valley, just below the station	
Dist.: C	Alt.: 1700-1750
Ch.: IT [M ^E]	GF.: PSS
Th. (GNP): END (3)	Th. (IR): NOT

* Det.: P. Wendelbo

Sambucus ebulus L., Sp. Pl.: 269 (1753).

Mat.: A-9976; Moghadam-4.8.1972; U-18945	
Hab.: As weed in gardens, ruderal places, road margin and wet places from Tangerang to Tangegol and around Sulukli Lake	
Dist.: Map 249	Alt.: 450-1500
Ch.: M-ES	GF.: GRH
Th. (GNP): NOT	Th. (IR): NOT

Caryophyllaceae

Acanthophyllum glandulosum Bunge ex Boiss., Fl. Orient. 1: 565 (1867). Syn.: *A. fontanesii* Boiss. & Buhse.

Mat.: A-4310, 4507, 11700, 11744, 9430; GA-4892; K-4894; W&C-14215; WF-12756	
Hab.: Mountain steppe with grasses and thorn-cushions, <i>Juniperus</i> woodland, <i>Artemisia</i> steppe	
Dist.: Map 250	Alt.: 1300-2020
Ch.: IT ^{E&C}	GF.: CSC TH
Th. (GNP): RAR (10)	Th. (IR): NOT

Acanthophyllum microcephalum Boiss., Diagn. Pl. Orient. Nov. Sér. 1, 1: 43 (1843).

Mat.: A-9472; K-7712; R-52842; W&C-14225; ZK-82-317	
Hab.: Mountain and <i>Artemisia</i> steppes, sandy-gravelly soil in dry valley in Mirza-Baylu plain to	

Almehr	
Dist.: S, E	Alt.: 1200-1700
Ch.: IT ^{C&KK}	GF.: CSC TH
Th. (GNP): VUL (6)	Th. (IR): NOT

Acanthophyllum pungens (Bunge) Boiss., Fl. Orient. 1: 561 (1867) s. l. Syn.: *Saponaria pungens* Bunge in Ledeb., Icon. Pl. Fl. Ross. 1: tab. 4 (1829) et in Ledeb., Fl. Altaica 2: 133 (1830); *A. brevibracteatum* Lipsky. Fig. 18, I.

Mat.: A-4442, 11388, 11139, 10746; R-52912*, 53041**; T-34228	
Hab.: <i>Artemisia</i> steppe, mountain steppe with grasses and thorn-cushions, <i>Juniperus</i> woodland	
Dist.: Map 251	Alt.: 1100-1700 ?
Ch.: IT ^{C&E}	GF.: CSC TH
Th. (GNP): NOT	Th. (IR): NOT

* (under *A. brevibracteatum* in Flora Iranica)

** (under *A. pachystegium* in Flora Iranica)

Schiman-Czeika (Fl. Iranica 163, 1988) and Schischkin (Flora of USSR, 6, 1936) have dealt with the *Acanthophyllum pungens* group (incl. *A. pungens* Bunge, *A. brevibracteatum* Lipsky, *A. adenophorum* Freyn, *A. lilacinum* Schischk., *A. korshinskyi* Schischk., *A. pachystegium* Rech. f., *A. speciosum* Rech. f. & Schiman-Czeika, *A. mikeschinianum* Yukhan. & Kuv. and *A. subglabrum* Schischk.) using a very narrow concept. Four of these species have been reported in Flora Iranica from our area. Based on rich material collected from that area and my own observations in the field and the study of nearly all determined plants by Schiman-Czeika from the Park, I am not convinced of the specific separation of these species (at least in the Park). Calyx length and glandulose hairs, as have been widely used in the identification key of Flora Iranica, are not useful characters. Members of *Acanthophyllum* are xeromorphic species adapted to a wide range of dry habitats with very high altitudinal amplitude. Habit, sizes of leaves, bracts and calyx, and indumentum of these plants vary strongly in different habitats. A critical overall review of this group, together with field and cytological studies is required in order to reduce the number of species. Therefore, I put all my own plants under *A. pungens* s. l. (incl. *A. brevibracteatum*), and the cited plants under *Acanthophyllum adenophorum* and *A. lilacinum* in Flora Iranica are mentioned below.

R-53041 is treated by Schiman-Czeika under *A. pachystegium* Rech. f. This specimen differs markedly from the type (Koelz 12940 W) by the much longer hairs and shorter leaves. The plant matches well with specimens named under *A. lilacinum*.

Acanthophyllum adenophorum Freyn, Bull. Herb. Boissier, sér. 2, 3: 867 (1903).
T-34227, 44509 (Schiman-Czeika in Fl. Iranica 163: 313-314 (1988).

Acanthophyllum lilacinum Schischk., Fl. URSS 6: 787 (1936).
R-52909, 52910; WF-12676, 12717 (Schiman-Czeika in Fl. Iranica 163: 1988: 311-312).

Agrostemma githago L., Sp. Pl.: 435 (1753).
Syn.: *Githago segetum* Desf.; *Lychnis githago* (L.) Scop. Fig. 18, J.

Mat.: A-11091	
Hab.: Open woodland (transition between forest and steppe)	
Dist.: Map 252	Alt.: 1500-1880
Ch.: ES-M	GF.: TSC
Th. (GNP): END (3)	Th. (IR): VUL

Arenaria leptoclados (Rchb.) Guss., Fl. Sic. Syn. 2: 824 (1845). Syn.: *A. serpyllifolia* L. var. *leptoclados* Rchb., Icon. Fl. Germ. 5: 32 (1841).

Mat.: A-10453-b, 11448; R-52629 (n.v.)	
Hab.: <i>Juniperus</i> woodland in Dasht, steep rocky outcrops in Tangegol and Adam-Chaqran rocks	
Dist.: C & S	Alt.: 750- ?
Ch.: ES-IT-M	GF.: TCA
Th. (GNP): IND	Th. (IR): NOT

Arenaria serpyllifolia L., Sp. Pl.: 423 (1753).

Mat.: A-11212, 11077, 10654, 10290, 11622; AS-6065; K-5764 (n.v.); TM-34770*	
Hab.: Rocky outcrops and vertical cliffs, <i>Paliurus</i> scrub, <i>Quercus macranthera</i> forest, transition shrubland between forest and steppe	
Dist.: Map 253	Alt.: 700-1920
Ch.: PL	GF.: TCA
Th. (GNP): NOT (24)	Th. (IR): NOT

* Det: Mc Neil

Rechinger (Fl. Iranica, 163: 14, 1988) speculated that two of the plants from the Park (TM-34770 & K-5764) are intermediate between *A. serpyllifolia* and *A. leptoclados*, probably due to hybridization.

Such a possibility has not been observed in my rather rich material. However, the problem is open to further studies.

Buffonia sintenisii Freyn, Bull. Herb. Boissier, sér. 2, 3: 1054 (1903).

Mat.: A-11070, 11712; R-52993, WF-12816	
Hab.: Stony ground and sandy gravelly soils in <i>Artemisia</i> steppe, mountain steppe of thorn-cushions and grasses	
Dist.: Map 254	Alt.: 1200-1550
Ch.: IT ^{KK}	GF.: CHE
Th. (GNP): VUL (6)	Th. (IR): RAR

Cerastium dichotomum L., Sp. Pl.: 438 (1753).

Mat.: A-6169, 6187, 10222; R-53104; TM-34757	
Hab.: <i>Juniperus</i> woodland, mountain steppe of thorn-cushions and grasses	
Dist.: Map 255	Alt.: 1600-1950
Ch.: IT-M	GF.: TSC
Th. (GNP): VUL (5)	Th. (IR): NOT

Cerastium glomeratum Thuill., Fl. Env. Paris ed. 2: 226 (1799).

Mat.: A-10400; TM-34764	
Hab.: Lowland forest in Tangerang	
Dist.: W	Alt.: 500-600
Ch.: COS	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

Cerastium inflatum Link ex Desf., Cat. Hort. Paris 462 (1829). Syn.: *C. dichotomum* L. subsp. *inflatum* (Link) Cullen .

Mat.: A-10476, 10405	
Hab.: Rocky outcrops, <i>Juniperus excelsa</i> woodland, open scrub in transition between forest and steppe, <i>Artemisia</i> steppe	
Dist.: Map 256	Alt.: 1000-1980
Ch.: IT	GF.: TSC
Th. (GNP): RAR (11)	Th. (IR): NOT

Cerastium perfoliatum L., Sp. Pl.: 437 (1753).

Mat.: A-10200; AS-5945; D-38550; TM-34760; 34767	
Hab.: <i>Paliurus spina-christi</i> scrub, mountain steppe of thorn-cushions and grasses, <i>Stipa</i> steppe, road margin and weed in garden	
Dist.: Map 257	Alt.: 800-1700
Ch.: IT-M	GF.: TSC
Th. (GNP): VUL (8)	Th. (IR): NOT

Dianthus crinitus Sm., Trans. Linn. Soc. London, Bot 2: 300 (1794). subsp. **turcomanicus** (Schischk.) Rech. f., Pl. Syst. Evol. 151: 287 (1986). Syn.: *D. turcomanicus* Schischk., Fl. URSS 6: 687 (1936).

Mat.: A-4330, 4458, 9527, 9532, 9463, 9379, R-53043, 52997	
Hab.: <i>Artemisia</i> steppe, <i>Artemisia-Stipa</i> steppe, mountain steppe with thorn-cushions and grasses, <i>Juniperus</i> woodland	
Dist.: Map 258	Alt.: 1200-1800
Ch.: IT ^{KK} (as subsp.)	GF.: ± CHU
Th. (GNP): RAR (14)	Th. (IR): NOT

Dianthus orientalis Adams in Weber & Mohr, Beitr. Naturk. 1: 54 (1805).

D. orientalis s. l. occurs in the Park in different ecological conditions and represents different morphological forms. These can be categorized into three more or less distinct groups:

1) Forest race, growing on rocky outcrops in the forested zone of the Park (Map 260). These are characterized by the 1-2.5 mm broad, grass-like leaves, 25-30 mm long calyx length, 8-10 bracts and to 50 cm tall growth. This group is known by Rechinger (1986, and in Fl. Iranica 163: 162, 1988) as subsp. *gorganicus* Rech. f.

2) Steppe race, occurs in mountain steppe zone of the Park in an altitude from 1400-2000 m. This group is characterized by a branched inflorescence (usually in groups of (1-) 3-5 flowers), intermediate growth to a maximum of 30 cm tall, 20-25 mm long calyx length and 6-8 (-10) bracts. These plants can be classified either with the subsp. *gilanicus* Rech. f. or subsp. *stenocalyx* (Boiss.) Rech. f., according to Rechinger's classification (1986 and Fl. Iranica 163: 158 & 164, 1988).

3) The third group includes typical subalpine plants, growing in altitudes from 1800 to 2400 m. These plants are characterized by dwarf, 10-20 (-27) cm growth, often solitary inflorescence, 20-25 mm long calyx length and having 4-6 bracts. Two of these plants have been seen by Rechinger. One of them was treated under *D. orientalis* subsp. *stenocalyx* (Boiss.) Rech. f. (R-53046) and another as *D. polylepis* (E-770). The number of bracts of

the latter specimen is 6-8 and the calyx length ± 27 mm. As the plant has been collected from the watershed of Almeh in more or less moist condition, it shows an intermediate form between subsp. *gorganicus* and subsp. *stenocalyx*. Therefore the existence of *D. polylepis* in our area is not confirmed.

For practical reasons, I follow here the subspecific classification of Flora Iranica. The first above mentioned group is placed under subsp. *gorganicus* and the second and third groups (marked by ***) are provisionally placed under subsp. *stenocalyx* (Map 262). However, these two latter groups are heterogeneous. Golestan National Park is a suitable place for biosystematic research on the influence of environmental conditions on morphological variation of *D. orientalis* s. l.

subsp. *gorganicus* Rech. f., Pl. Syst. Evol. 151: 291 (1986).

Mat.: A-9588, 9562, 9645, 9950, 9720, 11465, 11646*, 12030; E-717; GA-4975, 4981; K-7676; R-52444, 52594; TM-35067; WF-12674; Z-83-1373	
Hab.: Rocky outcrops in forest and scrub zone of the Park	
Dist.: Map 260 & 259	Alt.: 600-2000
Ch.: ES ^{HY} (as subsp.)	GF.: CHU
Th. (GNP): NOT	Th. (IR): NOT

11644-intermediate between subsp. *stenocalyx* and subsp. *gorganicus*.

subsp. *stenocalyx* (Boiss.) Rech. f., Pl. Syst. Evol. 151: 292 (1986). Syn: *D. fimbriatus* M. Bieb. var. *stenocalyx* Boiss., Fl. Orient. 1: 495 (1867); *D. macromyx* Fenzl; *D. pulverulentus* Stapf.

Mat.: A-4457, 9380*, 9527, 11787***, 11358***, 11327***, 11914; E-770**, R-53046, Z-82/259*	
Hab.: Mountain steppe	
Dist.: Map 261 & 259	Alt.: 1400-2380
Ch.: IT ^{Alborz & Khorasan}	GF.: CHU
Th. (GNP): NOT	Th. (IR): NOT

* ± intermediate between subsp. *stenocalyx* and subsp. *gorganicus*

** named by Rechinger under *D. polylepis* Bienert ex Boiss.

*** belong to the third above described group.



Fig. 18: A-B, *Echium amoenum*; C, *Onosma dichroantha*; D, *Matthiola alyssifolia*; E, *Moriera spinosa*; F, *Asyneuma amplexicaule*; G, *Campanula lourica*; H, *Lonicera iberica*; I, *Acanthophyllum pungens*; J, *Agrostemma githago*.

Diaphanoptera stenocalycina Rech. f. & Schiman-Czeika, Fl. Iranica 163: 334 (1988).

Mat.: AS-5925; F-1174; 1084; R-52881, 52996	
Hab.: Moderately saline soils in <i>Anabasis-aphylla-Artemisia</i> steppe	
Dist.: Map 262	Alt.: 1200-???
Ch.: IT ^{KK}	GF.: CHU
Th. (GNP): VUL (6)	Th. (IR): END

A local endemic, known only in a small area, in the easternmost parts of the Park. F-1174 was mentioned to have been gathered from Almehr, in an altitude of 1600 m. This might be wrong.

Gypsophila aretioides Boiss., Diagn. Pl. Orient. Nov. sér. 1, 1: 9 (1843). Syn.: *G. raddeana* Regel. Fig. 19, A.

Mat.: A-9466, 10537, 10990, 11348, 11941	
Hab.: Vertical rock cliffs, exposed mountain summits	
Dist.: Map 263	Alt.: 800-2400
Ch.: IT ^C	GF.: CSC
Th. (GNP): RAR (11)	Th. (IR): NOT

The specific separation between *G. pulvinaris* Rech. f. from *G. aretioides* Boiss. is doubtful. According to my observations in different populations of *G. aretioides* in the Park, the variation of leaves shapes and leaves length -as have been used by Rechinger as differential characters between *G. aretioides* and *G. pulvinaris* - are influenced by the age of the plants. Usually young plants have larger and non imbricate leaves, with distinct internodes. On the other hand, the old plants are strongly pulvinate with short and strongly imbricate leaves. Usually marginal young parts of the same cushion differ markedly from old and central parts. A detailed field investigation is required within the range of this group, particularly in the type locality of *G. pulvinaris*, before reducing it to a synonym of *G. aretioides*.

Gypsophila bicolor (Freyn & Sint.) Grossh., Vestn. Tblissk. Bot. Sada 13-14: 60 (1919). Syn.: *G. paniculata* L. var. *bicolor* Freyn & Sint., Bull. Herb. Boissier, sér. 2, 3: 864 (1903).

Mat.: A-4337, 4497, 9421; R-52802; W&C-14228; WF-12241; Z-82-276	
Hab.: As weed in disturbed soils around the protection stations, moist soils in stream bed	

Dist.: Map 264	Alt.: 900-1750
Ch.: IT ^(omni except east)	GF.: HSC
Th. (GNP): RAR (9)	Th. (IR): NOT

Herniaria cashemiriana J. Gay, Duch., Rev. Bot. 2: 370 (1847). Syn.: *H. afghana* Hermann.

Mat.: A-9552	
Hab.: Mountain steppes with grasses and thorn-cushions, <i>Acer monspessulanum</i> open shrubland; <i>Quercus macranthera</i> forest	
Dist.: Map 265	Alt.: 1500-2000
Ch.: IT ^{KK & Afghanistan}	GF.: CHU
Th. (GNP): VUL (6)	Th. (IR): SUN

Herniaria incana Lam., Encycl. Meth. Bot. 3: 124 (1789). *H. multicaulis* Kit. ex Kanitz; *H. densiflora* William.

Mat.: A-4525, 9408; R-53175-b, WF-12261	
Hab.: Mountain steppe with grasses and thorn-cushions, mountain meadows, rocky outcrops, open montane woodland (<i>Quercus macranthera-Q. castaneifolia</i>)	
Dist.: Map 266	Alt.: 1400-2050
Ch.: IT-M	GF.: CHU
Th. (GNP): RAR (13)	Th. (IR): NOT

Holosteum glutinosum (M. Bieb.) Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 6: 52 (1839). Syn.: *Arenaria glutinosa* M. Bieb., Fl. Taurc. Cauc. 1: 344 (1808).

Mat.: A-6204, 10221, 10262	
Hab.: <i>Artemisia</i> , <i>Stipa</i> (or mixed of both) steppes, <i>Juniperus</i> woodland, mountain steppe with grasses and thorn-cushions, mountain meadows, weed in waste-places	
Dist.: Map 267	Alt.: 1000-1800
Ch.: IT	GF.: TSC
Th. (GNP): NOT (18)	Th. (IR): NOT

Lepyrodiclis stellarioides Schrenk in Fisch. C. A. Mey., Enum. Pl. Nov. Schrenk 1: 93 (1841); *Lepyrodiclis cerastioides* Kar. & Kir.; *L. cerastioides* Stapf.

Mat.: A-6194; So-7057, 7058 (both n.v.)	
Hab.: Thorn-cushion formation dominated by <i>Astragalus verus</i> (soil disturbed by Wild boar), shrubby valley	
Dist.: Map 268	Alt.: 1500-2170
Ch.: IT ^{KK & Afghanistan}	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Mesostomma kotschyana (Fenzl ex Boiss.) Vved., Bot. Mat. Herb. Bot. Inst. Uzbek. Fil. Akad. Nauk SSSR. 3: 4 (1941). Syn.: *Stellaria kotschyana* Fenzl in Boiss., Fl. Orient. 1: 705 (1867). only subsp. *afghanica* Rech. f., Pl. Syst. Evol. 137: 137 (1981) occurs in our area.

Mat.: A-9411; R-53155, 53154; WF-12689	
Hab.: Mountain steppe with grasses and thorn-cushions rarely in <i>Juniperus</i> woodland	
Dist.: Map 269	Alt.: 1700-1950
Ch.: IT ^{KK} & Afghanistan (as subspecies)	GF.: TSC
Th. (GNP): RAR (12)	Th. (IR): VUL

Minuartia hamata (Hausskn.) Mattf., Bot. Jahr. Syst. 57, Beibl. 126: 29 (1921). Syn.: *Scleranthus hamatus* Hausskn., Mitt. Geogr. Ges. (Thüringen) Jena 9: (2): 17 (1891).

Mat.: A-10434, 10610; R-53164	
Hab.: Steep rocky outcrops in forested zone, mountain steppes and mountain summits, <i>Artemisia-Stipa</i> steppe	
Dist.: Map 270	Alt.: 700-2380
Ch.: IT-M	GF.: TSC
Th. (GNP): NOT (29)	Th. (IR): NOT

Minuartia hybrida (Vill.) Schischk., Fl. URSS 6: 488 (1936). Syn.: *Arnaria hybrida* Vill.; *A. tenuifolia* L.; *Arenaria hybrida* Vill., Prsop. Pl. Dauph. 48 (1779).

Mat.: A-10580-a	
Hab.: <i>Paliurus spina-christi</i> scrub in Sharleq	
Dist.: S	Alt.: 1000
Ch.: IT-M	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Minuartia meyeri (Boiss.) Bornm., Beih. Bot. Centralbl. 27, 2: 318 (1910). Syn.: *Alsine meyeri* Boiss., Diagn. Pl. Orient. Nov. sér. 1, 8: 96 (1849); *A. billardieri* Boiss.; *A. brevis* Boiss.; *A. rudbarensis* Stapf.

Mat.: A-10453-a; R-52955	
Hab.: <i>Artemisia</i> and <i>Stipa</i> steppes, <i>Juniperus</i> woodland, dry valley with <i>Haloxylon</i> shrubs, sandy soils, exposed mountain summits	
Dist.: Map 271	Alt.: 1200-1600
Ch.: IT ^{omni}	GF.: TSC ^{DW}
Th. (GNP): RAR (13)	Th. (IR): NOT

Moehringia trinervia (L.) Clairv., Man. Herbor. Suisse: 150 (1811). Syn.: *Arenaria trinervia* L., Sp. Pl.: 423 (1753).

Mat.: A-9248, 9739, 11451	
Hab.: Lowland forest, rarely montane forest	
Dist.: Map 272	Alt.: 550-1200(-1800)
Ch.: ES-M	GF.: HSC
Th. (GNP): NOT (26)	Th. (IR): RAR

Petrorhagia alpina (Hablitz) P. W. Ball. & Heywood, Bull. Brit. Mus. (Nat. Hist.) Bot. 3, 4: 145 (1964). Syn.: *Gypsophila alpina* Hablitz, Neue Nord. Beytr. Phys. Geogr. Erd.-Völkerbeschreib. 4: 57 (1783).

Mat.: A-11343; WF-12650	
Hab.: Mountain steppes in Almeh and in meadows, margin of <i>Quercus macranthera</i> forest in Divar-Kaji	
Dist.: C	Alt.: 1850-2200
Ch.: IT	GF.: HSC (biennial)
Th. (GNP): END (2)	Th. (IR): RAR

Petrorhagia cretica (L.) P. W. Ball. & Heywood, Bull. Brit. Mus. (Nat. Hist.), Bot. 3, 4: 142 (1964). Syn.: *Saponaria cretica* L., Sp. Pl.: ed. 2, 1: 584 (1762); *Tunica brachypetala* Jaub. & Spach.

Mat.: So-7206	
Hab.: ? Steppe in S parts of Park near Dasht	
Dist.: S	Alt.: ?
Ch.: IT-M	GF.: TSC
Th. (GNP): END (1)	Th. (IR): RAR

Known only from Soják's collection. Further study is required to be certain its occurrence in the area.

Petrorhagia prolifera (L.) P. W. Ball & Heywood, Bull. Brit. Mus. (Nat. Hist.), Bot. 3,4: 161 (1964). Syn.: *Dianthus prolifera* L., Sp. Pl.: 410 (1753).

Mat.: A-11447, 11626, 11814, 11923; R-52426; So-7202	
Hab.: Limestone rocky outcrops, <i>Acer monspessulanum</i> and <i>Crataegus</i> scrubs, forest openings with <i>Petridium aquilinum</i>	
Dist.: Map 273	Alt.: 450-1920
Ch.: ES-M	GF.: TSC
Th. (GNP): RAR (9)	Th. (IR): VUL

Petrorhagia saxifraga (L.) Link, Handbuch 2: 235 (1829). Syn.: *Dianthus saxifraga* L., Sp. Pl.: 413 (1753).

Mat.: So-7199	
Hab.: ? Steppe in S parts of the Park	
Dist.: S	Alt.: ?
Ch.: ES-M	GF.: ± CHU-CHE
Th. (GNP): END (1)	Th. (IR): NOT

Known only from Soják's collection. Further study is required to be certain its occurrence in the area.

Saponaria bodeana Boiss., Fl. Orient. 1: 527 (1867). Syn.: *S. ignea* Rech. f. Fig. 19, B.

Mat.: A-4414, 4555, 11092, 11775; WF-12730	
Hab.: Montane woodland (<i>Quercus macranthera</i> , or mixed of <i>Q. macranthera</i> , <i>Q. castaneifolia</i> and <i>Carpinus orientalis</i>)	
Dist.: Map 274	Alt.: (1000-)1500-2230
Ch.: ES ^{HY}	GF.: HSC
Th. (GNP): NOT (28)	Th. (IR): VUL

Saponaria floribunda (Kar. & Kir.) Boiss., Fl. Orient. 1: 553 (1867). Syn.: *Dichoglottis floribunda* Kar. & Kir., Bull. Soc. Imp. Naturalites Mosc. 14: 165 (1841). *S. filipes* Boiss.

Mat.: R-52970	
Hab.: <i>Artemisia</i> steppe in Mirza-Baylu plain	
Dist.: E	Alt.: 1200
Ch.: IT ^{E&C}	GF.: TSC ^{DW}
Th. (GNP): END (1)	Th. (IR): RAR

Saponaria orientalis L., Sp. Pl.: 409 (1753).

Mat.: R-53106, 53209; Z&al-2608	
Hab.: Alme valley	
Dist.: S.C	Alt.: 1400-1600 ?
Ch.: IT ^{W&C}	GF.: TSC ^{DW}
Th. (GNP): END (2)	Th. (IR): NOT

Silene aucheriana Boiss., Diagn. Pl. Orient. Nov. sér. 1, 1: 27 (1843) ex parte et l.c., 8: 87 (1849); *S. hohenackeri* Boiss.; *S. rudbarica* Boiss. & Buhse.

Mat.: A- 6184, 10971, 10850; R-53047, 53048; TM-34760-E.	
Hab.: Mountain steppes of thorn-cushions and grasses, <i>Acer monspessulanum</i> and <i>Juniperus excelsa</i> woodlands	
Dist.: Map 275	Alt.: 1500-1800
Ch.: IT ^{C&W}	GF.: ± CHU
Th. (GNP): VUL (8)	Th. (IR): NOT

Silene bupleuroides L., Sp. Pl.: 421 (1753).

Syn.: *S. megalocalyx* Freyn; *S. viscariaefolia* Boiss.

Only subsp. *bupleuroides* occurs in our area.

Mat.: A-9547, 4548; R-53042.	
Hab.: mountain steppes and shrublands	
Dist.: C	Alt.: 1300-1900
Ch.: M-IT ^{W&C}	GF.: HSC
Th. (GNP): ? NOT	Th. (IR): NOT

Unfortunately due to a mistake in the field, I had confused *S. bupleuroides* and *S. swertiifolia*. Therefore the maps for these species are not provided. One of them or both have been recorded in many mountain steppes and shrublands in the Park.

Silene conica L., Sp. Pl.: 418 (1753).

Mat.: Fu-7314 (n.v. cf. Melzheimer in Fl. Iranica 163: 483, 1988)	
Hab.: As weed in gardens and waste-places	
Dist.: ? W	Alt.: ?
Ch.: ES-M	GF.: TSC
Th. (GNP): END (1)	Th. (IR): RAR

Silene conoidea L., Sp. Pl.: 418 (1753).

Mat.: F-1183	
Hab.: As weed around Soolegerd station	
Dist.: NE	Alt.: 1200
Ch.: M-IT	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Silene coronaria (L.) Clairv., Man. Herbor. Suisse: 145 (1811). Syn.: *Agrostema coronaria* L., Sp. Pl.: 436 (1753); *Lychnis coronaria* (L.) Desr.

Mat.: A-4366, 9295, 9728, 9610, 9818; E-725; R-52660; WF-12845; Z-82/202.	
Hab.: Open scrubs with grasses, rocky outcrops, margins and openings in lowland and montane forests	
Dist.: Map 276	Alt.: 550-2050
Ch.: M-ES ^{EH}	GF.: HSC
Th. (GNP): NOT (37)	Th. (IR): VUL

Silene cyri Schischk., Fl. Tiflisisensis 1: 202 (1925).

Mat.: A-9591, 9434, 10337, 10697; R-53038, 53045	
Hab.: Mountain meadow, mountain steppe with grasses and thorn-cushions, <i>Stipa</i> steppe, <i>Juniperus</i>	

woodland, <i>Paliurus</i> and <i>Acer monspessulanum</i> scrubs	
Dist.: Map 277	Alt.: 700-1880
Ch.: ? IT	GF.: HSR (biennial)
Th. (GNP): NOT (20)	Th. (IR): NOT

Silene indepressa Schischk., Trudy Bot. Inst. Akad. Nauk SSSR, ser. 1, 3: 178 (1937).

Mat.: A-10528, 10999, 11341, 10717, 10750; R-52994	
Hab.: Limestone rocks in <i>Juniperus excelsa</i> woodland and exposed mountain summits	
Dist.: Map 278	Alt.: 1200-2400
Ch.: IT ^{KK}	GF.: CHU
Th. (GNP): VUL (6)	Th. (IR): END

Silene indepressa and *S. tenella* are superficially very similar and inhabit often similar habitats, on stony mountain summits, usually exposed to strong wind. The latter is almost exclusively restricted to the top of mountains, but the former grows also on gentle slopes.

Silene italica (L.) Pers., Syn. Pl. 1: 498 (1805). Syn.: *Cucubalus italicus* L., Syst. Nat. ed. 10: 1030 (1759).

Mat.: A-11389, 10617, 10638, 11117; R-52524, 52609, 52654; Z&al-86/2926	
Hab.: Lowland and montane forest and scrubs (open and closed), rocky outcrops with shrubby vegetation	
Dist.: Map 279	Alt.: 500-2230
Ch.: ES-M	GF.: HCR
Th. (GNP): NOT (98)	Th. (IR): NOT

Silene latifolia Poir., Voy. Barb. 2: 165 (1789). s. l.

Mat.: A-10341 (sterile)	
Hab.: Under the shade of trees and shrubs in forested and scrub zone of the Park	
Dist.: Map 280	Alt.: 750-1920
Ch.: ES-IT-M	GF.: HSC
Th. (GNP): NOT (29)	Th. (IR): NOT

The following subspecies are known to occur in our area:

subsp. *alba* (Mill.) Greuter & Burdet, Willdenowia 12: 189 (1982). Syn.: *Lychnis alba* Mill., Gard. Dict. Abr. ed. 8, n° 4 (1768).

Mat.: F-1157; Fu-7288 (n.v.), 7368 (n.v.)	
Ch.: ES-IT-M	

subsp. *ericalycina* (Boiss.) Greuter & Burdet, Willdenowia 12: 189 (1982). *M. ericalycinum* Boiss., Diagn. Pl. Orient. Nov. sér. 2, 1: 78 (1854).

Mat.: A-6191; K-5771 (n.v.)	
Ch.: IT ^{C&W} -ES ^{HY}	

subsp. *persica* (Boiss. & Buhse) Melzh., Fl. Iranica 163: 473 (1988). Syn.: *Melandium ericalycinum* Boiss. var. *persicum* Boiss. & Buhse, Nouv. Mém. Soc. Imp. Naturalistes Moscou, 12: 9 (1860); *M. persicum* (Boiss. & Buhse) Bornm.

Mat.: A-5987; F-1126; R-53208, 52439; TM-34769; U-16033 (n.v.), 16123(n.v.); W&al-11003	
Ch.: IT ^{C&W} -ES ^{HY}	

Silene noctiflora L., Sp. Pl.: 419 (1753). Syn.: *Elisanthe noctiflora* (L.) Rupr., Fl. Ingr. 161 (1860); *Melandium noctiflorum* (L.) Fries, Bot. Not. 10: 178 (1842).

Mat.: A-9814, 9609, 11579, 11979, 11295, 11897; R-52652; So-7232 (n.v.), 7235 (n.v.)	
Hab.: Lowland and montane forest and scrub, particularly with <i>Carpinus orientalis</i> forest, forest margin, mountain meadow	
Dist.: Map 281	Alt.: 800-2000
Ch.: ES-M ^[N America]	GF.: TSC (or biennial)
Th. (GNP): NOT (17)	Th. (IR): RAR

The general distribution of *S. noctiflora* given by Melzheimer (Fl. Iranica 163: 475) as endemic in the Flora Iranica region is certainly wrong. The species is distributed in Europe, SW Asia and N America.

Silene odontopetala Fenzl, Pugillus 9 (1842). subsp. *odontopetala*

Mat.: A-12028	
Hab.: Found once at the highest point of an escarpment in the eastern corner of Qorqon cliffs with <i>Sedum spurium</i> , <i>Dianthus orientalis</i> , <i>Juniperus sabina</i> and <i>Laser rechingeri</i>	
Dist.: NW	Alt.: 2010
Ch.: IT	GF.: HRO/CHU
Th. (GNP): END (1)	Th. (IR): RAR

Silene sojakii Melzh., Pl. Syst. Evol. 150: 317 (1985).

Mat.: So-7254.	
Hab.: Unknown, 3 km from Dasht	
Dist.: Prob. S	Alt.: ?

Ch.: IT ^{TKK}	GF.: CHU
Th. (GNP): END/EXT	Th. (IR): END/EXT

This curious plant is known only from the type collection, probably at the southern border of the Park: Golestan, 3 km ab oppido Dasht, Soják 7254 (Holo.: PR, Iso.: W). My intensive attempts to rediscover it in the type locality have failed. The following speculations may explain its rarity: i) the species may be restricted to a very small area and extremely rare (or even extinct!); ii) it might have resulted from an unusual hybridization between the species growing in the area; and iii) the label may be wrong and the species may indeed have been collected somewhere outside the Park. In the last case, other localities in Iran, where Dr Soják has travelled, should be searched for the species.

Silene swertiifolia Boiss., Diagn. Pl. Orient. Nov. sér. 1, 1: 32 (1843).

Mat.: A-11044; R-52857, 53978	
Hab.: Steppe, open scrub	
Dist.: E, S	Alt.: 1200-1700?
Ch.: IT ^{W&C}	GF.: HSC
Th. (GNP): ? NOT	Th. (IR): NOT

See notes under *S. bupleuroides*.

Silene tenella C. A. Mey., Verz. Pfl. Cauc. 226 (1831).

Mat.: A-11000, 10710, 11342; Rz-53182	
Hab.: Limestone ground at mountain summits in juniper woodland, mountain meadows and mountain steppes	
Dist.: Map 282	Alt.: 1450-2400
Ch.: IT ^{Alborz}	GF.: CHU
Th. (GNP): RAR (10)	Th. (IR): ? END

See notes under *S. indepressa*.

Silene viscosa (L.) Pers. Syn. Pl. 1: 497 (1805).
Cucubalus viscosa L., Sp. Pl.: 414 (1753).
subsp. *viscosa*. Fig. 19, C.

Mat.: A-11333, 11359, 11768, 12069	
Hab.: Top of mountain in montane scrubs	
Dist.: Map 283	Alt.: 2000-2400
Ch.: ES-IT ^{? subalpine}	GF.: HSC (biennial)
Th. (GNP): VUL (4)	Th. (IR): RAR

Silene vulgaris (Moench) Garcke, Fl. N. Mitt.-Deutschland ed. 9: 64 (1869).

subsp. *vulgaris*

Mat.: A-4379, 11224, 11094	
Hab.: Montane forest	
Dist.: Map 284	Alt.: 1500-2200
Ch.: ES-M [IT]	GF.: HSC
Th. (GNP): NOT (27)	Th. (IR): NOT

Spergularia media (L.) Presl., Fl. Sic. 161 (1826).
Syn.: *Arenaria media* L., Sp. Pl.: ed. 2: 606 (1762).

Mat.: A-12167	
Hab.: Brackish water at the beginning of Mirza-Baylu brooklet	
Dist.: E	Alt.: 1200
Ch.: COS	GF.: ARH ^{SU} /HSC
Th. (GNP): END (1)	Th. (IR): NOT

Stellaria holostea L., Sp. Pl.: 422 (1753).

Mat.: A-6015, 9700, 9709, 9789, 10303; D-38553; R-52647; TM-34768; WF-12776	
Hab.: Closed montane forest, rarely closed lowland forest and open scrub	
Dist.: Map 285	Alt.: (650-)1000-2230
Ch.: ES [M]	GF.: HGR
Th. (GNP): NOT (96)	Th. (IR): NOT

Stellaria media (L.) Vill., Hist. Pl. Dauphiné 3: 615 (1789). Syn.: *Alsine media* L., Sp. Pl.: 272 (1753).

Mat.: A-10395, 10350; K-5758 (n.v.); R-52641, TM-34765	
Hab.: Lowland forest (<i>Quercus castaneifolia-Carpinus betulus</i>), closed <i>Carpinus orientalis</i> forest (steep slopes with brown soils), open scrub (<i>Acer monspessulanum-Paliurus spina-christi</i>)	
Dist.: Map 286	Alt.: 450-1550
Ch.: COS	GF.: TSC
Th. (GNP): RAR (9)	Th. (IR): NOT

Stellaria pallida (Dumort.) Piré, Bull. Soc. Roy. Bot. Belgique 2: 43 (1863). Syn.: *Alsine pallida* Dumort., Fl. Belg. 109 (1827); *Stellaria media* L. subsp. *pallida* (Dumort.) Asch. & Graeb.

Mat.: So-7023, 7030	
Hab.: ? No information, probably S of the Park	
Dist.: ? S	Alt.: ?
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): END (1)	Th. (IR): RAR

Vaccaria oxyodonta Boiss., Diagn. Pl. Orient. Nov. sér. 2,1: 68 (1854). Syn.: *V. brachycalyx* Pau; *V. hispanica* var. *oxyodonta* (Boiss.) J. Léonard .

Mat.: R-52766	
Hab.: Usually weed in cultivated and waste-lands, in our area in <i>Paliurus spina-christi</i> scrub near Sharleq (likely road margin)	
Dist.: S	Alt.: 1000
Ch.: IT	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Velezia rigida L., Sp. Pl.: 332 (1753).

Mat.: R-52418	
Hab.: Rocky outcrops, open montane forest (<i>Quercus castaneifolia</i> - <i>Carpinus betulus</i>)	
Dist.: Map 287	Alt.: 450-1530
Ch.: M-IT	GF.: TSC
Th. (GNP): VUL (6)	Th. (IR): NOT

Celasteraceae

Euonymus latifolia Mill., Gard. Dict. ed. 8: n° 2 (1768). Syn.: *Kalonymus latifolia* (Mill.) Proh.

Mat.: A-9755, 9913, 9972, 10600, 11084, 11264, 11301, 11608, 11888, 11996, 12044, AS-6050; W&C-14303	
Hab.: Montane forest, steep closed forest of <i>Carpinus orientalis</i> , cliffs and rocky outcrops, river and stream valley, open scrub	
Dist.: Map 288	Alt.: 800-2200
Ch.: ES ^{EH} -M	GF.: PSS/CFR/CSP
Th. (GNP): NOT (70)	Th. (IR): NOT

Euonymus velutina (C. A. Mey.) Fisch. & C. A. Mey., Byull. Moskovsk. Obshch. Isp. Prir.11: 337 (1838). Syn.: *E. europaeus* L. var. *velutinus* C. A. Mey., Verz. Pfl. Cauc. 134 (1831).

Mat.: A-9332, 9642, 9801, 9757, 11299, ; R-52574; ZK-82/119 (cult.).	
Hab.: Open lowland and montane forests, steep rocky outcrops, stream valley, open scrubs of <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> and <i>Crataegus</i>	
Dist.: Map 289	Alt.: 450-2000
Ch.: ES ^{HY}	GF.: PSS
Th. (GNP): NOT (33)	Th. (IR): SUN

The altitudinal range of *E. velutina* as quoted by Browicz (1986: 13) from 650-1300 m, should be extended herewith up to 2000 m.

Ceratophyllaceae

Ceratophyllum submersum L., Sp. Pl.: ed. 2: 1409 (1763).

Mat.: A-12351	
Hab.: Submerged aquatic associated with <i>Potamogeton natans</i> , <i>Lemna minor</i> , <i>Schoenoplectus lacustris</i> and <i>Ricciocarpus natans</i>	
Dist.: Map 290	Alt.: 1380
Ch.: SCO	GF.: APL
Th. (GNP): END (1)	Th. (IR): END

Known as new record for Iran (Akhani 1999).

Chenopodiaceae

Although only a small part of the Park is covered by salty soils, the members of *Chenopodiaceae* with 54 species (about one- third of all known Iranian species) are well represented there. This is because of the diversity of suitable saline and subsaline and xeric biotops in the Park, although in a very small area. Some species are very rare in other parts of Iran or are even unknown elsewhere such as: *Suaeda physophora*, *S. linifolia*, *S. gemmascence*, *Anabasis jaxartica*, *Atriplex ornata* and *Petrosimonia* sp. All these species should be classified into the endangered/ threatened species of Iran, with high conservation value. Some species like *Anabasis aphylla*, *Salsola dendroides* and *Suaeda physophora* play a remarkable role in the plant communities in the southern parts of the Park. *Anabasis aphylla*, *Salsola dendroides*, *Salsola kali*, *Chenopodium* spp., and *Girgensohnia oppositiflora* indicate the degree of human influence and erosion (Akhani & Ghorbanli 1993). Therefore, these are more common around the road and in disturbed habitats. Furthermore, long term monitoring of halophytes could be a good tool to study the salinization and desertification processes caused by climatic factors in the Park with different climatic regimes.

Anabasis aphylla L., Sp. Pl.: 223 (1753).

Mat.: A-9470, 12127, 12155, 10947; GA-4850, R-37612; TM-35106	
Hab.: Saline soils in E and S of Mirza-Baylu plain, often mixed with <i>Artemisia</i>	
Dist.: Map 291	Alt.: 1200-1250
Ch.: IT ^{C&E}	GF.: CSE ^{SU}
Th. (GNP): NOT	Th. (IR): NOT
LN: Ordoluk (اردلوك)	

A grey form within the populations of *A. aphylla* has been seen during my field studies in May 1995 (A-10947). Unfortunately, I could not trace fruiting plants of this form in autumn 1995, 1996.

Anabasis eriopoda (Schrenk) Benth. ex Volkens in Engl. & Prantl, Natürl. Pflanzenfam. ed. 1, 3, 1a: 87 (1893).

Mat.: A-12117, 12285	
Hab.: <i>Artemisia</i> steppe, <i>Suaeda physophora</i> comm., gypsum hills	
Dist.: Map 292	Alt.: 1200-1250
Ch.: IT ^{C&E}	GF.: HSC ^{SU}
Th. (GNP): END (3)	Th. (IR): END

Anabasis jaxartica (Bunge) Benth. ex Volkens in Engl. & Prantl, Natürl. Pflanzenfam. ed. 1, 3, 1a: 87 (1893). Syn.: *Brachylepis jaxartica* Bunge, Trudy Glavn. Bot. Sada 6: 443 (1879); *Anabasis hispidula* (Bunge) Benth. ex Volkens.

Mat.: A-4323, 4521	
Hab.: <i>Artemisia-Stipa</i> steppe	
Dist.: Map 293	Alt.: 1000-1350
Ch.: IT ^{KK&E}	GF.: HSC ^{SU}
Th. (GNP): END (3)	Th. (IR): END

Atriplex aucheri Moq., Chenopod. Monogr. 51 (1840).

Mat.: A-12158, 12215; R-37619; TM-35096; ZA-15875	
Hab.: Salt steppes and waste places in S border of the Park, <i>Tamarix</i> stands	
Dist.: Map 294	Alt.: 1200-1210
Ch.: IT ^{C&E}	GF.: TSC
Th. (GNP): VUL (6)	Th. (IR): NOT

Atriplex canescens (Pursh) Nutt., Gen. N. Amer. Pl. 1: 197 (1818). Syn.: *Calligonum canescens* Pursh, Fl. Amer. Septent. 2: 370 (1814).

The species has been cultivated during the eighties in the S of the Park. Unfortunately, it is now naturalized in this area. As the species is highly invasive, its elimination from the natural vegetation is strongly recommended.

Atriplex dimorphostegia Kar. & Kir., Bull. Soc. Imp. Naturalites Moscou 15: 438 (1842). Syn.: *A. bracteosa* Trautv.

Mat.: No voucher	
Hab.: Dry steppe, S of the Park near Cheshmeh-Khan	
Dist.: S	Alt.: 1200
Ch.: IT-SS	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

No herbarium specimen of this ephemeral species of dry and salty steppes has been provided. But the species has been recorded during the field studies.

Atriplex flabellum Bunge ex Boiss., Fl. Orient. 4: 912 (1879).

Mat.: A-10884; TM-34916	
Hab.: Margin of a salt spring in N parts of Mirza-Baylu plain	
Dist.: E	Alt.: 1250-1290
Ch.: IT ^{KK&E}	GF.: TSC
Th. (GNP): END (2)	Th. (IR): RAR

Atriplex micrantha Ledeb., Icon. Pl. Fl. Ross. 1: 11 (1829).

Mat.: A-9859; TM-35102; Z-82/1195	
Hab.: Banks of Madrasu river and Qez-Qaleh stream	
Dist.: S	Alt.: 1000-1500 ?
Ch.: IT	GF.: TSC
Th. (GNP): END (3)	Th. (IR): IND

Atriplex ornata Iljin, Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, Fl. Sisi. Vyss. Rast. 2: 124 (1936).

Mat.: WF-12820	
Hab.: <i>Artemisia</i> steppe	
Dist.: ? N	Alt.: 1250-1300
Ch.: IT ^{KK&E}	GF.: TSC
Th. (GNP): END (1)	Th. (IR): END

Atriplex ornata was only known from Iran based on the above cited material (cf. Hedge in Fl. Iranica 172: 80, 1997). Unfortunately it cannot be

localized exactly. The locality is probably off the present border of the Park.

Atriplex patula L., Sp. Pl.: 1053 (1753).

Mat.: 12184, 12198, 12382 a-b, 12310, 12272	
Hab.: <i>Paliurus spina-christi</i> - <i>Crataegus</i> scrubs, ± open lowland forest (<i>Quercus castaneifolia</i> - <i>Carpinus betulus</i>)	
Dist.: Map 295	Alt.: 700-1000
Ch.: ES-M [IT]	GF.: TCR
Th. (GNP): VUL (5)	Th. (IR): RAR

A prostrate plant with branches up to 210 cm.

Atriplex tatarica L., Sp. Pl.: 1053 (1753). Syn.: *A. incisa* M. Bieb., *A. olivieri* Moq., *A. multicolora* Aellen.

Mat.: A-12159, 12160; Wa-181; Z-82/1194	
Hab.: Waste places in protection stations, bank of brackish brooklet, saline flats	
Dist.: Map 296*	Alt.: 1000-1200
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

*Wa-181 and Z-82/1194 are not shown in the map. The latter was collected between Sharleq and Tangeol and the former lacks an exact locality.

Atriplex verrucifera M. Bieb., Fl. Taur. Cauc. 2: 441 (1808). Syn.: *Obione verrucifera* (M. Bieb.) Moq., *Halimione verrucifera* (M. Bieb.) Aellen.

Mat.: A-10892, 10927, 12143, 12290; GA-4862	
Hab.: salty soil, gypsum hill, <i>Artemisia</i> steppe	
Dist.: Map 297	Alt.: 1200-1400
Ch.: IT	GF.: CHU/CSC/HSC
Th. (GNP): VUL (5)	Th. (IR): NOT

Bassia eriantha (Fisch. & C. A. Mey.) N. Pavlov, Trudy Sredne-Aziatsk. Gosud. Univ., Ser. 8b, Bot., 22: 28 (1935). Syn.: *Londesia eriantha* Fisch. & C. A. Mey., Index Sem. Hort. Horti Petrop. 2: 40 (1835).

Mat.: A-6218	
Hab.: Under the shade of <i>Haloxylon ammodendron</i> in Almeh valley	
Dist.: E	Alt.: 1350
Ch.: IT	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Hedge (Fl. Iranica 172: 101-102, 1997) placed *B. eriantha* as a synonym of *B. eriophora* (Schrad.)

Asch. without any comment on his objection. Based on my field studies in many populations in Iran and examination of a lot of herbarium specimens, I am convinced of the specific separation of these species. The horny perianths in *B. eriophora* versus not horny perianth in *B. eriantha* is a constant character distinguishing them. Furthermore these species show a geographically distinct distribution and are only sympatric in S Iran (and probably S Afghanistan and N. Pakistan). *B. eriantha* is an Irano-Turanian element but *B. eriophora* is a Saharo-Sindian one.

Camphorosma monspeliaca L., Sp. Pl.: 122 (1753).

Mat.: A-4443, 10736, 11242	
Hab.: <i>Artemisia</i> steppe, moderately salty soils	
Dist.: Map 298	Alt.: 1150-1250
Ch.: IT-M	GF.: CHU
Th. (GNP): VUL (4)	Th. (IR): RAR

Ceratocarpus arenarius L., Sp. Pl.: 969 (1753). Syn.: *C. utriculosus* Bluk.; *C. turkestanicus* Sav.-Rycz.

Mat.: AS-5920, GA-4842; R-52844; 37613; WF-12711; Z-82/147	
Hab.: Dry steppe in Mirza-Baylu plain, particularly road margin and waste places from Cheshmeh Khan to Mirza-Baylu station	
Dist.: S, E	Alt.: 1150-1250
Ch.: IT [M-ES]	GF.: TCA
Th. (GNP): VUL (6)	Th. (IR): NOT

Chenopodium album L., Sp. Pl.: 219 (1753).

Mat.: A-11581, 12114; Korhonen-1093 (n.v.), U-19019 (n.v.), 19037 a (n.v.)	
Hab.: Waste places, weed garden, open scrub in more disturbed soils (either by man or wildlife)	
Dist.: Map 299	Alt.: 450-1000
Ch.: COS	GF.: TSC
Th. (GNP): RAR (13)	Th. (IR): NOT

Chenopodium aff. album L.

Mat.: 12197, 12232, 12392	
Hab.: Open scrub (<i>Paliurus spina-christi</i> - <i>Crataegus</i>), steep slopes (with different shrubs), between Tangerang to Tangeol	
Dist.: W, C	Alt.: 650-800
Ch.: ?	GF.: TSC
Th. (GNP): END (3)	Th. (IR): ?

Chenopodium botrys L., Sp. Pl.: 219 (1753).

Mat.: IZ-15289; Wa-161, 184 (n.v.)	
Hab.: Waste places	
Dist.: Prob. W or C	Alt.: 500- ?
Ch.: PL	GF.: TSC
Th. (GNP): END (3)	Th. (IR): NOT

Chenopodium foliosum Asch., Fl. Brandenb. 1: 572 (1864). Syn.: *Blitum virgatum* L.; *Chenopodium virgatum* (L.) Amberosi, non Thunb.; *C. blitum* F. Muell. Fig. 19, F.

Mat.: A-6097, 9554, 10802; R-53049 (n.v.); U-19162 (n.v.)	
Hab.: Mountain meadow	
Dist.: Map 300	Alt.: 1650-2400
Ch.: PL	GF.: TSC
Th. (GNP): VUL (7)	Th. (IR): NOT

Chenopodium novopokrovskyanum (Aellen) Uotila, Ann. Bot. Fennici 30: 192 (1993). Syn.: *C. album* subsp. *novopokrovskyanum* Aellen, Trudy Rostovskogo Oblast. Biol. Obch. 2: 3 (1938).

Mat.: A-12264 (determination uncertain)	
Hab.: Open scrub on steep slopes in Adam-Chaqran cliffs	
Dist.: C	Alt.: 800
Ch.: IT	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Chenopodium opulifolium Schrad. ex K. Koch & Ziz, Cat. Pl.: 6 (1814).

Mat.: A-12214, 12161; U-19031 (n.v.)	
Hab.: Road margin and saline steppe in Mirza-Baylu plain and Tangegol (? garden weed)	
Dist.: S, C	Alt.: 650-1240
Ch.: PL	GF.: TSC
Th. (GNP): END (3)	Th. (IR): RAR

Chenopodium vulvaria L., Sp. Pl.: 220 (1753).

Mat.: A-9768, 12393; R-52666	
Hab.: Forest margin (pioneer forest)	
Dist.: Map 301	Alt.: 750
Ch.: ES-IT-M ^(alien elsewhere)	GF.: TSC
Th. (GNP): END (3)	Th. (IR): NOT

Climacoptera

Freitag (Fl. Iranica 172: 246, 1997) argued that it would be better to include the species of *Climacoptera* within *Halanthium*. However, he treated them under *Salsola*. I believe that before new evidence against the proposed classification of Botschantzev in Sborn. Posv. Akad. Sukachevu: 108-118 (1956) and Prato (1986) within *Salsola* and related genera is available, any other changes only cause further confusion.

Climacoptera brachiata (Pall.) Botsch., Sborn. Posv. Akad. Sukachevu: 114 (1956). Syn.: *Salsola brachiata* Pall., Illustr. Pl.: 30 (1803). Fig. 19, D.

Mat.: A-12128, 12157, 12219; GA-4834, 4851; R-37621 (n.v.); TM-35105 (n.v.)	
Hab.: <i>Artemisia</i> -steppe, garden weed in Mirza-Baylu station, <i>Artemisia-Anabasis aphylla</i> saline steppe	
Dist.: Map 302	Alt.: 1100-1250
Ch.: IT	GF.: TSC ^{SU}
Th. (GNP): RAR (11)	Th. (IR): RAR

Climacoptera turcomanica (Litw.) Botsch., Sborn. Posv. Akad. Sukachevu: 112 (1956). Syn.: *Salsola turcomanica* Litw. in Sched. Herb. Fl. Ross. 2: no. 230 (1900). *Climacoptera transoxana* Iljin; *Salsola transoxana* Iljin; *S. crassa* M. Bieb. subsp. *turcomanica* (Litw.) Freitag. Fig. 19, E.

Mat.: A-12121, 12129, 12225	
Hab.: Wet saline soils around salt springs, saline flats with <i>Suaeda physophora</i> , dry and moderately saline soils on remnant of waste-places before establishment of the Park	
Dist.: Map 303	Alt.: 1200-1280
Ch.: IT ^{C & Aralo-Caspian}	GF.: TCA/TSC ^{SU}
Th. (GNP): VUL (4)	Th. (IR): NOT

Girgensohnia oppositiflora (Pall.) Fenzl in Ledeb., Fl. Ross. 3: 835 (1851). Syn.: *Salsola oppositiflora* Pall., Reise 2: 735 (1773). *Anabasis heteroptera* Jaub. & Spach.

Mat.: A-12294	
Hab.: Margin of Almeh road, just before entering the Almeh valley in Mirza-Baylu plain	
Dist.: E	Alt.: 1250
Ch.: IT	GF.: TSC ^{±TH}
Th. (GNP): END (1)	Th. (IR): NOT

Halimocnemis pilifera Moq. in Hist. & Mém. Acad. Roy. Sci. Toulouse 5, 1: 181 (1839). Syn.: *H. pilosa* Moq., *H. gibbosa* Woloszczak, *Halotis pilosa* (Moq.) Iljin, *Halotis pilifera* (Moq.) Botsch.

Mat.: A-12124; R-37599, 37600; U-19136 (n.v.)	
Hab.: Very rare in <i>Artemisia</i> steppe and moderately saline soils in Mirza-Baylu plain	
Dist.: S & E	Alt.: 1100-1200
Ch.: IT ^{C&E}	GF.: TCA
Th. (GNP): VUL (5)	Th. (IR): NOT

Halocharis hispida (Schrenk) Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, sér. 7, 4, 11: 62 (1862). Syn.: *Halimocnemis hispida* Schrenk, Bull. Cl. Phys.-Math. Acad. Imp. Sc. Pétersb. 1: 360 (1843).

Mat.: R-37601; Z-?*	
Hab.: <i>Artemisia</i> steppe in Mirza-Baylu plain	
Dist.: E, S	Alt.: 1200
Ch.: IT ^{E & Aralo-Caspian}	GF.: TCA
Th. (GNP): END (2)	Th. (IR): RAR

* A specimen collected from the Park by Zehzad has been seen some years ago. It is not available at the time being to provide its exact locality and number.

Halocnemum strobilaceum (Pall.) M. Bieb., Fl. Taur.-Caucas. 3: 3(1819). Syn.: *Salicornia strobilacea* Pall., Reise 1: 481, tab. B, fig. 1-2 (1771).

Mat.: A-10899, 12132	
Hab.: Found once on muddy high saline soils around a saline spring in N Mirza-Baylu plain	
Dist.: E	Alt.: 1250
Ch.: IT-M-SS	GF.: CSC ^{SU}
Th. (GNP): END (1)	Th. (IR): NOT

Halothamnus glaucus (M. Bieb.) Botsch., Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR 18: 157 (1981). Syn.: *Salsola glauca* M. Bieb.; Tabl. Prov. Mer Casp.: 112 (1798); *Caroxylon glaucum* (M. Bieb.) Moq.; *Aellenia glauca* (M. Bieb.) Aellen

Mat.: A-4344, 4517, 4836, 9458*, 9503**, 9515*, 12168*, R-52884*, TM-35097*; W&C-14237*, WF-12710*	
Hab.: <i>Artemisia</i> and salt steppes, dry valley with <i>Haloxylon</i> shrubs	
Dist.: Map 304	Alt.: 1100-1400
Ch.: IT	GF.: CSE/CSC ^{SU}
Th. (GNP): NOT (18)	Th. (IR): NOT

* subsp. *glaucus*

** subsp. *hispidulus* (Bunge) Kothe-Heinr. [Syn.: *Aellenia hispidula* (Bunge) Botsch., *Halothamnus hispidulus* (Bunge) Botsch.]

Haloxylon ammodendron (C. A. Mey.) Bunge ex Fenzl in Ledeb., Fl. Ross. 3: 820 (1851). Syn.: *Anabasis ammodendron* C. A. Mey. in Ledeb., Fl. Altaica 1: 375 (1829); *Arthrophytum ammodendron* (C. A. Mey.) Litw. var. *aphyllum* Minkw.; *Haloxylon aphyllum* (Minkw.) Iljin. Figs 10, D-E; 19, G.

Mat.: A-6211, 12279; GA-4900; K-5704; T-41538; TM-35104; U-18170 (n.v.)	
Hab.: Beginning of Almeh valley and a few stands on subsandy soils in W of Mirza-Baylu plain	
Dist.: Map 305	Alt.: 1200-1450
Ch.: IT	GF.: PTS/PSS ^{SU}
Th. (GNP): RAR (10)	Th. (IR): IND

Kalidium caspicum (L.) Ung.-Sternb., Atti Congr. Bot. Firenze 1874: 317 (1876). Syn.: *Salicornia caspica* L., Sp. Pl.: 4 (1753); *Salicornia arabica* Pall.

Mat.: A-10891, 12120, 12284	
Hab.: Salty clay soils with <i>Suaeda physophora</i> stands	
Dist.: Map 306	Alt.: 1200
Ch.: IT	GF.: CSC ^{SU}
Th. (GNP): VUL (5)	Th. (IR): VUL

Kochia prostrata (L.) Schrad., Neues J. Bot. 3, (3 & 4): 85 (1809). Syn.: *Salsola prostrata* L., Sp. Pl.: 222 (1753); *Bassia prostrata* (L.) A. J. Scott.

Mat.: A-4332, 9868, 12311; TM-35103	
Hab.: Waste places and roadside, dry limestone ground, steep limestone rocks <i>Artemisia</i> steppe, margin of stream and springs in steppe parts, <i>Stipa</i> steppe with scattered <i>Rhamnus pallasii</i> shrubs	
Dist.: Map 307	Alt.: 950-1550
Ch.: IT	GF.: CHU
Th. (GNP): RAR (11)	Th. (IR): NOT

Kochia scoparia (L.) Schrad., Neues J. Bot. 3, 3-4: 85 (1890). Syn.: *Chenopodium scoparium* L., Sp. Pl.: 221 (1753).

Mat.: A-11853	
Hab.: Roadside weed, 3 km E Tangerang	
Dist.: W	Alt.: 500
Ch.: PL	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Krascheninnikovia ceratoides (L.) Gueld enst., *Novi Comment. Acad. Sci. Imp. Petrop.* 16: 555 (1772). Syn.: *Axyris ceratoides* L., *Sp. Pl.*: 979 (1753); *Eurotia ceratoides* (L.) C. A. Mey.

Mat.: A-12276; GA-4903; R-52885; T-41539; U-19175 (n.v.); WF-12824	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppe, <i>Juniperus</i> woodland, dry valley with <i>Haloxylon</i> shrubs	
Dist.: Map 308	Alt.: 1150-1600
Ch.: IT-M	GF.: CSC
Th. (GNP): NOT (25)	Th. (IR): IND

Noaea mucronata (Forssk.) Asch. & Schweinf., *Mém. Inst. Égypt.* 2: 131 (1887). Syn.: *Salsola mucronata* Forssk., *Fl. Aegypt.-Arab.* 56 (1775).

Mat.: GA-4848; TM-35101; U-19135 (n.v.), 19183 (n.v.)	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes, <i>Stipa</i> steppe with scattered <i>Rhamnus pallasii</i> shrubs, mountain steppe with thorn cushions and grasses, <i>Juniperus</i> woodland	
Dist.: Map 309	Alt.: 1100-1880
Ch.: IT [M-SS]	GF.: CSE/CSC TH
Th. (GNP): NOT (36)	Th. (IR): NOT

Petrosimonia brachiata (Pall.) Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, sér. 7, 4, 11: 59 (1862). Syn.: *Polycnemum brachiatum* Pall., *Illustr. Pl.* 62 (1803); *Halimocnemis brachiata* (Pall.) C. A. Mey.

Mat.: A-12224	
Hab.: Dry saline soils north Cheshmeh Khan	
Dist.: S	Alt.: 1210
Ch.: IT	GF.: TCA ^{SU}
Th. (GNP): END (2)	Th. (IR): VUL

Petrosimonia glauca (Pall.) Bunge, *Mém. Acad. Imp. Sci. Saint Pétersbourg*, sér. 7, 4, 11: 58 (1862). Syn.: *Polycnemum glaucum* Pall., *Illustr. Pl.* 63 (1803).

Mat.: A-12221; GA-4839	
Hab.: Dry and disturbed salty steppes north Cheshmeh Khan	
Dist.: S	Alt.: 1150-1200
Ch.: IT	GF.: TCA ^{SU}
Th. (GNP): END (2)	Th. (IR): NOT

Petrosimonia spec.

Mat.: A-12314	
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Hab.: Steep slopes in *Artemisia-Festuca* steppe, just below *Juniperus* zone

Dist.: S	Alt.: 1250
Ch.: IT	GF.: TCA ^{SU}
Th. (GNP): END (1)	Th. (IR): ?

The cited specimen was collected very late in the middle of November, on a steep slope associated with *Artemisia*. It has alternate leaves (unlike *P. brachiata*) and two perianths (unlike *P. glauca*). The habit and habitat of the plant is also very different from two mentioned species, as I have seen in many parts of Iran. The specimen is overripe and therefore the number of stamens cannot be determined.

Salsola arbusculiformis Drobow, in *Trudy Bot. Muz. Imp. Akad. Nauk* 16: 142 (1916).

Mat.: A-9512; Moghadam-1354; Polunin-11883; R-52835 (n.v.); ZK-82/316	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppe, dry valley with <i>Haloxylon</i> shrubs	
Dist.: Map 310	Alt.: 1000-1400
Ch.: IT ^{E&KK}	GF.: CFR/CSC
Th. (GNP): NOT (17)	Th. (IR): NOT

Salsola aucheri (Moq.) Bunge ex Iljin, *Bot Zhurn.* 18: 275 (1933). Syn.: *Noaea aucheri* Moq. in *DC.*, *Prodr.* 13, 2: 207 (1849).

Mat.: A-9840, 10771, 11056, 12131, 12153, 12149	
Hab.: <i>Artemisia</i> steppe, dry valley with <i>Haloxylon</i> shrubs, gypsum and limestone hills, NW Mirza-Baylu plain	
Dist.: Map 311	Alt.: 1000-1500
Ch.: IT ^C	GF.: CSE/CSC ^{SU}
Th. (GNP): RAR (13)	Th. (IR): NOT

Salsola dendroides Pall., *Illustr. Pl.*: 22 (1803). Fig. 19, H.

Mat.: Anderson & Peterson-313 (n.v.); GA-4847, 4901; Pabot-7789 (n.v.); R-37608 (n.v.); TM-35098, 35099 (n.v.); U-19177 (n.v.)	
Hab.: As rather pure stands in saline soils north Cheshmeh Khan, scattered in moderately saline soils in <i>Artemisia</i> steppe, waste places, <i>Tamarix</i> thicket, streamside with <i>Phragmites australis</i> , saline and clay soils with <i>Suaeda physophora</i>	
Dist.: Map 312	Alt.: 1100-1500
Ch.: IT	GF.: CHU ^{SU}
Th. (GNP): NOT (20)	Th. (IR): NOT

Salsola gemmascens Pall., Illustr. Pl.: 24 (1803).

Mat.: A-11241	
Hab.: Very dry <i>Artemisia</i> steppe in northern border of the Park between Soolegerd and Lohondor	
Dist.: N	Alt.: 1150
Ch.: IT ^E	GF.: CSC ^{SU}
Th. (GNP): END (1)	Th. (IR): END

Only one locality was cited for this species from Iran by Freitag in Fl. Iranica 172: 216, 1997.

Salsola kali L., Sp. Pl.: 222 (1753).

Mat.: No voucher	
Hab.: Waste places and roadside	
Dist.: E & S	Alt.: 1200 - ?
Ch.: PL	GF.: TCA ^{TH-SU}
Th. (GNP): IND	Th. (IR): NOT

Although no herbarium voucher has been provided from the Park and no specimen has been seen by the author, the species has been observed in some places within and along the margin of the Park i.e. Mirza-Baylu station.

Salsola montana Litw., Nov. gorn. solj.: 3 (1917).
Syn.: *S. masenderanica* Botsch., *S. botschantzevii* Kurbanov.

Mat.: A-12281	
Hab.: Very rare, found once on clay saline soils in NW of Mirza-Baylu plain	
Dist.: SE	Alt.: 1250
Ch.: IT	GF.: CHE ^{SU}
Th. (GNP): END (2)	Th. (IR): RAR

Salsola nitraria Pall., Illustr. Pl.: 25 (1803). Syn.: *S. spissa* M. Bieb.; *S. macera* Litw.; *S. pseudo-nitraria* Aellen.

Mat.: A-12283, 12218, 12156; TM-41540	
Hab.: Moderately saline soils in <i>Artemisia</i> steppe and disturbed places near the road and the stations	
Dist.: Map 313	Alt.: 1200-1250
Ch.: IT [SS]	GF.: TCA ^{SU}
Th. (GNP): VUL (4)	Th. (IR): NOT

Salsola orientalis S. G. Gmel., Reise Russland 4: 47 (1784). Syn.: *S. rigida* Pall.

Mat.: 12133, 12292; R-52882 (n.v.)	
Hab.: <i>Artemisia</i> steppe	
Dist.: Map 314	Alt.: 1200-1280
Ch.: IT ^{C&E}	GF.: CSE ^{SU}
Th. (GNP): VUL (4)	Th. (IR): NOT

Salsola tomentosa (Moq.) Spach in Kotschy, Exsicc. Pl. Alepp. Kurd. Moss. no. 346 p. p. (1843). Syn.: *Halimocnemis tomentosa* Moq., Hist. & Mém. Acad. Roy. Sci. Toulouse 5: 180 (1839); *Noaea tomentosa* (Moq.) Moq.; *S. aurantiaca* Bunge; *S. kopetdaghensis* (Botsch.) Botsch.

Mat.: A-9844, 12144, 12287; GA-4832; Pabot-7792 (n.v.), 7808 (n.v.)	
Hab.: <i>Artemisia</i> and <i>Artemisia-Anabasis aphylla</i> and <i>Artemisia-Stipa</i> steppes, saline and clay soils with <i>Suaeda physophora</i> , <i>Juniperus</i> woodland	
Dist.: Map 315	Alt.: 1100-1460
Ch.: IT	GF.: CHE/CHU ^{SU}
Th. (GNP): RAR (14)	Th. (IR): NOT

Seidlitzia florida (M. Bieb.) Bunge ex Boiss., Fl. Orient. 4: 950 (1879). Syn.: *Anabasis florida* M. Bieb., Mém. Soc. Imp. Naturalites Moscou 1: 147 (1806); *Salsola florida* (M. Bieb.) Poir.; *Anabasis cinerea* (Moq.) Moq.; *Seidlitzia cinerea* (Moq.) Bunge ex Botsch.

Mat.: A-9848; Z-82/223	
Hab.: Very rare, found as roadside weed in Sharleq and Dasht	
Dist.: S	Alt.: 1000-1100
Ch.: IT ^{W&C}	GF.: TCA ^{SU}
Th. (GNP): END (2)	Th. (IR): NOT

Spinacia turkestanica Iljin, Trudy Bot. Inst. Akad. Nauk SSSR, Ser. I, 2: 123 (1936).

Mat.: A-10946; WF-12825	
Hab.: Clay and moderately saline soils in <i>Anabasis aphylla-Artemisia</i> steppe in Mirza-Baylu plain	
Dist.: E	Alt.: 1200-1300
Ch.: IT ^E	GF.: TSC
Th. (GNP): END (2)	Th. (IR): VUL

Suaeda altissima (L.) Pall., Illustr. Pl.: 49 (1803). Syn.: *Chenopodium altissimum* L., Sp. Pl.: 221 (1753); *S. heterocarpa* Fenzl. Fig. 19, I.

Mat.: A-4334, 9838, 9514; GA-4860; R-37606, 52959; U-19179; W&C-14238; Z-82/249; 82/230	
Hab.: Saline soils under <i>Haloxylon</i> and <i>Tamarix</i> shrubs, around saline and brackish streams and springs, <i>Artemisia-Salsola dendroides</i> patches, saline waste places	
Dist.: Map 316	Alt.: 1000-1400
Ch.: IT-M	GF.: TSC ^{SU}
Th. (GNP): RAR (12)	Th. (IR): NOT

Suaeda linifolia Pall., Illustr. Pl. 47 (1803). Syn.: *Schanginia linifolia* (Pall.) C. A. Mey.

Mat.: A-12145	
Hab.: Around a saline spring N of Mirza-Baylu plain in patches of <i>Phragmites australis</i> and <i>Glycyrrhiza glabra</i>	
Dist.: Map 317	Alt.: 1280
Ch.: IT ^E	GF.: TSC ^{SU}
Th. (GNP): END (1)	Th. (IR): END

The species was known only from one locality by Akhani & Podlech (Fl. Iranica 172: 141, 1997) in C of Iran: Kashan, 25 km after Delijan to Esfahan, 1325 m, Kavousi 6853. This population in the center of Iran is associated with *Tamarix* thickets, in a saline river bed (own observation). Unfortunately there are very few specimens of *S. linifolia* and its close relative *S. paradoxa* in European herbaria. It is very difficult to draw the range of distribution and the range of variation of these species with the present material. It is rather curious that *S. paradoxa* was known from Turkmenistan, but until now *S. linifolia* has not been reported from there.

Suaeda microphylla Pall., Illustr. Pl.: 52 (1803).

Mat.: A-4445, 9839; Anderson & Peterson-312; GA-4841, 4854; R-37602, 37618	
Hab.: Clay saline soils with <i>Suaeda physophora</i> , salty-gypsum soils with <i>Salsola aucheri</i> and <i>Artemisia</i> , <i>Salsola dendroides</i> stands around brackish stream	
Dist.: Map 318	Alt.: 1000-1250
Ch.: IT	GF.: PSS/CFR ^{SU}
Th. (GNP): RAR (11)	Th. (IR): NOT

Suaeda microsperma (C. A. Mey.) Fenzl in Ledeb., Fl. Ross. 3: 785 (1851). Syn: *Schoberia microsperma* C. A. Mey. in Eichw., Pl. Nov. Casp.-Caucas. 1: 14 (1831).

Mat.: A-12134; GA-4856, 4857; W&C-14239; R-37604	
Hab.: Around brackish and saline stream and springs, remnant waste places before establishment of the Park with a thin layer of salt	
Dist.: Map 319	Alt.: 1200-1280
Ch.: IT ^{Aralo-Caspian}	GF.: TSC ^{SU}
Th. (GNP): VUL (5)	Th. (IR): NOT

Suaeda physophora Pall., Illustr. Pl.: 51 (1803).

Mat.: A-10890, 12291, 12125; Anderson & Peterson-314; Babakhanlou & Pabot -23721	
Hab.: Clay saline soils	
Dist.: Map 320	Alt.: 1200
Ch.: IT ^{±E}	GF.: CFR ^{SU}
Th. (GNP): VUL (6)	Th. (IR): END

The records of *Suaeda physophora* published by Akhani & Podlech (Fl. Iranica 172: 146, 1997) from Gorgan and Khorasan have not been exactly localized. Very likely, Babakhanlou & Pabot 23721 and Anderson & Peterson 314 have been collected from the present boundaries of the National Park. *S. physophora* is very rare in Iran. It has been known only from the National Park and one further locality in W Iran: Azerbaijan: 30 m from Ahar to Tabriz, 1600-2000 m, Assadi & Sardabi 24426 (TARI).

Cistaceae

Fumana arabica (L.) Spach, Ann. Sci. Nat. Bot. ser. 2, 6: 239 (1836). Syn.: *Cistus arabicus* L., Cent. Pl. 1: 14 (1755).

Mat.: A-11430	
Hab.: Rocky outcrops	
Dist.: Map 321	Alt.: 700-1620
Ch.: M-ES ^{EH}	GF.: ± CSC
Th. (GNP): VUL (5)	Th. (IR): ? RAR

Fumana procumbens (Dun.) Gren. & Godr., Fl. France 1: 173 (1847). Syn.: *Helianthemum procumbens* Dunal in DC., Prodr. 1: 275 (1824); *H. fumana* (L.) Mill.

Mat.: A-10543	
Hab.: In crevices of steep rocky outcrops or exposed limestone ground in open scrub (<i>Acer monspessulanum</i> , <i>Carpinus orientalis</i> , <i>Crataegus</i>) and <i>Juniperus</i> woodland	
Dist.: Map 322	Alt.: 600-1840
Ch.: ES [M-IT]	GF.: CSP
Th. (GNP): NOT (19)	Th. (IR): SUN

Helianthemum nummularium (L.) Mill., Gard. Dict. ed. 8: n° 12 (1768). *Cistus nummularius* L., Sp. Pl.: 527 (1753); *Helianthemum graecum* Boiss. & Heldr.

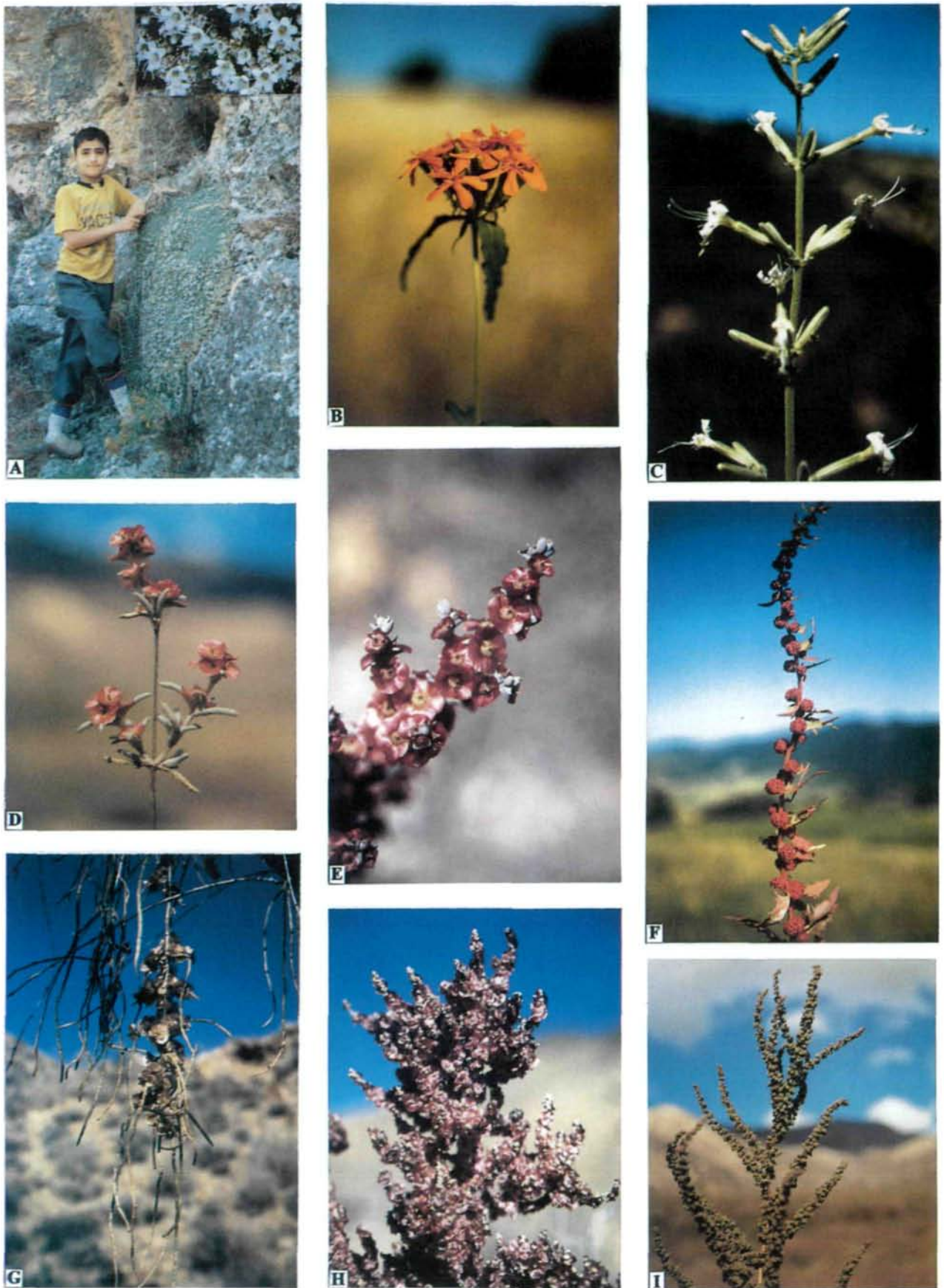


Fig. 19: A, *Gypsophila aretioides* with the authors's brother (Ehsan); B, *Saponaria bodeana*; C, *Silene viscosa*; D, *Climacoptera brachiata*; E, *Climacoptera turcomanica*; F, *Chenopodium foliosum*; G, *Haloxylon ammodendron*; H, *Salsola dendroides*; I, *Suaeda altissima*.

Mat.: A-4554, 4465, 10597	
Hab.: Open scrubs with developed soil (<i>Acer monspessulanum</i> , <i>Carpinus orientalis-Quercus castaneifolia</i>), grassy mountain steppes (<i>Festuca valesiaca-Stipa lessingiana</i>)	
Dist.: Map 323	Alt.: 860-1700
Ch.: ES [M]	GF.: CHE
Th. (GNP): VUL (6)	Th. (IR): NOT

Helianthemum salicifolium (L.) Mill., Gard. Dict. ed. 8: n° 21 (1768). Syn.: *Cistus salicifolius* L., Sp. Pl. : 527 (1753).

Mat.: A-10286, 10463, 10565	
Hab.: <i>Crataegus-Acer monspessulanum</i> thicket, <i>Paliurus</i> scrub, <i>Juniperus</i> woodland, <i>Artemisia-Stipa</i> steppe, rarely <i>Quercus castaneifolia-Carpinus betulus</i> forest margin	
Dist.: Map 324	Alt.: 700-1630
Ch.: IT-M	GF.: TSC
Th. (GNP): NOT (23)	Th. (IR): NOT

Convolvulaceae

Calystegia sylvatica (Kit.) Griseb., Spic. Fl. Rumel. 2: 74 (1844). Syn.: *Convolvulus sylvaticus* Kit. in Neues J. Bot. 1 (1): 163 (1805).

Mat.: A-9971, 10951	
Hab.: Lowland forest and forest margin, forest openings with <i>Pteridium aquilinum</i> , garden weed in forested part	
Dist.: Map 325*	Alt.: 450-1250
Ch.: M-ES ^{EH}	GF.: GSC
Th. (GNP): NOT (23)	Th. (IR): SUN

* Very few material has been collected. *C. sepium* (L.) R. BR. may also occur in our area.

Cressa cretica L., Sp. Pl.: 223 (1753).

Mat.: No voucher	
Hab.: Margin of a salty brooklet near Mirza-Baylu	
Dist.: E	Alt.: 1200
Ch.: PL	GF.: TSC/HSC
Th. (GNP): END (1)	Th. (IR): NOT

The only specimen of this plant collected from saline soils around the Mirza-Baylu brooklet has been lost.

Convolvulus arvensis L., Sp. Pl.: 153 (1753).

Mat.: A-10931; No collector 1326 (MMTT)	
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Hab.: In general in habitats with well developed soil layer: garden weed, mountain steppes with thorn-cushions and grasses, moist subalpine meadows, open scrubs, rarely in <i>Quercus macranthera</i> forest	
Dist.: Map 326	Alt.: 450-2060
Ch.: SCO	GF.: GSC
Th. (GNP): NOT (26)	Th. (IR): NOT

Convolvulus cantabrica L., Sp. Pl. : 158 (1753).

Mat.: A-4526, 9787, 9957, R-52638	
Hab.: Rocky outcrops (often with <i>Carpinus orientalis-Quercus castaneifolia</i>), transition scrubs between forest and steppe, mountain meadow (<i>Festuca valesiaca-Thymus kotschyanus</i>), over-grazed open <i>Crataegus</i> scrub, rarely in closed lowland forest	
Dist.: Map 327	Alt.: 450-2050
Ch.: ES ^{EH} -M	GF.: HSC/HCR
Th. (GNP): NOT (66)	Th. (IR): NOT

Convolvulus commutatus Boiss., Diagn. Pl. Orient. Sér. 1, 11: 81(1849). Syn.: *C. modestus* Boiss.

Mat.: A-10338, R-53003, 53147	
Hab.: <i>Acer monspessulanum</i> thickets, juniper woodland, mountain steppe of thorn-cushion and grasses, <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes	
Dist.: Map 328	Alt.: 1200
Ch.: IT ^C	GF.: ± HCR
Th. (GNP): NOT (34)	Th. (IR): NOT

Convolvulus pseudocantabrica Schrenk in Fisch. & Mey., Enum. Pl. Nov. 1: 21 (1841).

Mat.: A-4328, 9409-a; R-52915, 52818, 53148; WF-12677	
Hab.: <i>Stipa</i> and <i>Artemisia</i> (or mixed) steppes, mountain steppe with grasses and thorn-cushions, transition thickets between forest and steppe, very open <i>Juniperus</i> woodland	
Dist.: Map 329	Alt.: 1000-2000
Ch.: IT ^E	GF.: HSC
Th. (GNP): NOT (50)	Th. (IR): SUN

Convolvulus subhirsutus Regel & Schmalh. in Regel, Descr. Pl. Nov. Turk. 7: 53 (1879).

Mat.: A-4453; R-52817; WF-12842; Z-82/247	
Hab.: <i>Paliurus spina-christi</i> scrub, road margin and waste places near the station	
Dist.: Map 330	Alt.: 900-1700
Ch.: IT ^{KK & E}	GF.: HSC
Th. (GNP): VUL (6)	Th. (IR): SUN

Cornaceae

Cornus sanguinea L. subsp. *australis* (C. A. Mey.) Jáv. in Soó & Jáv., Magyar Növ. Kéz.: 398 (1951). Syn.: *C. australis* C. A. Mey. in Bull. Cl. Phys.-Math. Acad. Imp. Sci. Saint-Pétersbourg 3: 372 (1845).

Mat.: A-4407, 4464, 9898, 11160, 11411, 11617, 11947; GA-4912, 4987, 4997; K-7682; R-52536	
Hab.: Closed and open woodlands (lowland and montane)	
Dist.: Map 331	Alt.: 750-1980
Ch.: ES ^{EH}	GF.: PSS
Th. (GNP): NOT (51)	Th. (IR): NOT

Corylaceae

Carpinus betulus L., Sp. Pl.: 998 (1753). Syn.: *C. caucasica* Grossh.

Mat.: A-9304; GA-4954	
Hab.: Lowland and montane closed forests, usually with developed soils	
Dist.: Map 332	Alt.: 450-2200
Ch.: ES	GF.: PTS
Th. (GNP): NOT (110)	Th. (IR): NOT
LN.: Mamraz (ممرز)	

Carpinus orientalis Mill., Gard. Dict. ed. 8 n° 3 (1768).

Mat.: A-4370, 9626, 9651, 9954, 10668; AS-6077, 6088; GA-4985	
Hab.: The most important element in gentle and steep rocky outcrops, often with <i>Quercus castaneifolia</i> (shrub form), in clefts of vertical cliffs	
Dist.: Map 333	Alt.: 500-2050
Ch.: M ^E -ES ^{EH} [ES]	GF.: PSS/PTS
Th. (GNP): NOT (84)	Th. (IR): NOT
LN.: "Taqaar" or "Nelm" ("تغرا" یا "نلم")	

Crassulaceae

Pseudosedum multicaule (Boiss. & Buhse) Boriss., Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, 1: 112 (1933). Syn.: *Umbilicus multicaulis* Boiss. & Buhse, Nouv. Mém. Soc. Imp. Naturalistes Moscou, 12: 93 (1860).

Mat.: F-1188; Z- 82/267; Rz-53181	
Hab.: Three localities in Alneh and between Sharleq and Cheshmeh Khan (without details), more likely on rocky ground	
Dist.: C, S	Alt.: 1600-?
Ch.: IT ^C	GF.: HRO ^{SU}
Th. (GNP): END (3)	Th. (IR): IND

Rosularia radicata (Boiss. & Hohen.) Eggeli, Monog. Study Gen. Rosularia (Crassulac.) Bradleya Suppl. 6: 76 (1988). Syn. *Sedum radicosum* Boiss. & Hohen., Diagn. Pl. Orient. Nov. sér. 2 10: 15 (1849). *R. paniculata* (Regel & Schmalh.) A. Berger.

Mat.: A-4474, 9442, 9478; R-53015, 53052*; R-53180*; W&C-14222*	
Hab.: Juniper woodland, maple scrub valley, mountain scrub (<i>Acer monspessulanum</i> and <i>Lonicera iberica</i>), <i>Artemisia-Festuca</i> steppe and grassy mountain steppe with thorn-cushions	
Dist.: Map 334	Alt.: 1200-2100
Ch.: IT ^{KK&E}	GF.: HRO ^{SU}
Th. (GNP): RAR (11)	Th. (IR): VUL

* Det.: U. Eggeli (Zürich).

Rosularia sempervivum (M. Bieb.) A. Berger in Engl. & Prantl, Natürl. Pflanzenfam. 18a: 466 (1930).

Mat.: A-10770, 11141; R-52677	
Hab.: Rocky ground and rock crevices	
Dist.: Map 335	Alt.: 750-1450
Ch.: IT ^C	GF.: HRO ^{SU}
Th. (GNP): VUL (8)	Th. (IR): NOT

Sedum pallidum M. Bieb., Fl. Taur.-Caucas. 1: 353 (1808). Fig. 20, A.

Mat.: A-9616, 9719, 11093, 10657, 11839	
Hab.: On steep rocky slopes and mountain meadows, above escarpments (often at forest margin or woodlands)	
Dist.: Map 336	Alt.: 750-1960
Ch.: IT ^W	GF.: TCA ^{SU} (biennial)
Th. (GNP): RAR (13)	Th. (IR): NOT

S. pallidum and some allied species such *S. hispanicum*, *S. rubens*, *S. pallidum*, *S. pentapetalum* and *S. caespitosum* are very close and not easy to distinguish in our area. The interpretation of these species and their boundaries are different in the Flora Iranica, 72, 1970 (by Janson &

Rechinger), Flora of Turkey, 4: 224-243, 1972 (by Chamberlain) and Flora Europaea, ed. 2, 1: 429-439, 1993 (by Webb, Akeroyd and H. Thart). Many of the Golestan plants can easily be classified into two species by the following characters:

Group A: (*S. pallidum*)

Biennial or perennial, much branched from base; follicles erect to patent, obscurely granulate spreading; stamens 10

Group B: (*S. pentapetalum*)

Annual, branched only in inflorescence; follicles stellate, distinctly granulate; stamens 5

The group needs a critical review based on good collections and field observations in Iran.

Sedum pentapetalum Boriss., Fl. URSS 9: 481 (1939).

Mat.: A-10693, 10576; W&al-11044; Z&al-86/2934	
Hab.: Rocky ground, at forest margin, juniper woodland	
Dist.: Map 336	Alt.: 550-1450
Ch.: IT ^{KK}	GF.: TCA ^{SU}
Th. (GNP): IND	Th. (IR): SUN

Sedum spurium M. Bieb., Fl. Taur.-Caucas. 1: 352 (1808).

Mat.: A-12022	
Hab.: Found once at the highest point of an escarpment in the eastern corner of Qorqon rocks	
Dist.: NW	Alt.: 2010
Ch.: ES ^{EH} /IT ^{Cauc.-Alborz}	GF.: HCR ^{SU}
Th. (GNP): END (1)	Th. (IR): END/VUL

The large, 8-10 mm long flowers are characteristic.

Sedum stoloniferum S. G. Gmel., Reise Rußland 3: 311 (1774).

Mat.: A-11272, 11647; W&C-14321; Z-82/267*	
Hab.: Rocky ground, particularly at margin of forest and above forest escarpments	
Dist.: Map 337	Alt.: 1000-2130
Ch.: ES ^{EH}	GF.: HRO/HCR ^{SU}
Th. (GNP): RAR (12)	Th. (IR): IND

* The locality of Z-82/267 (between Sharleq and Cheshmeh Khan) cannot be localized exactly for large scale mapping.

Sedum tetramerum Trautv., Trudy Glavn. Bot. Sada 7: 2 (1881). Syn.: *Macrosepalum turkes-tanicum* Regel & Schmalh.

Mat.: A-10579	
Hab.: On soil in <i>Paliurus</i> thickets in Sharleq	
Dist.: S	Alt.: 1000
Ch.: IT ^{omni}	GF.: TCA ^{SU, DW}
Th. (GNP): END (1)	Th. (IR): ? VUL

Sedum tetramerum was known by Jansson & Rechinger (Fl. Iranica 72, 16, 1970) only from one locality in Fars. The author has collected the species in Ilam province as well. The plant is very short (less than 5 cm), with a short life cycle, therefore it is easily overlooked by collectors.

Sempervivum iranicum Bornm. & Gauba, Feddes Rept. 49: 257 (1940). Fig. 20, A-C.

Mat.: A-11332, 11353, 11790, 12047	
Hab.: Limestone rocky ground with scattered <i>Juniperus excelsa</i> , <i>J. communis</i> , <i>J. sabina</i> and <i>Q. macranthera</i>	
Dist.: Map 338	Alt.: 2000-2400
Ch.: IT ^{Alborz}	GF.: HSR ^{SU}
Th. (GNP): VUL (6)	Th. (IR): END

Cucurbitaceae

Bryonia aspera Steven ex Ledeb., Fl. Ross. 2: 140 (1843). Syn.: *B. haussknechtiana* Bornm.; *B. macrostylis* Heilbr. & Bilger; *B. afghanica* Podlech.

Mat.: A-4489, R-53158; TM-35081; WF-12755; ZK-82134, Z&al-86/2600	
Hab.: Mountainous scrub valley	
Dist.: Map 339	Alt.: 1350-1750
Ch.: IT	GF.: HST
Th. (GNP): VUL (7)	Th. (IR): NOT

Cuscutaceae

Unfortunately, the author had only little opportunity to collect and study *Cuscuta* plants. The following list and identification should be considered as provisional. Probably, more species can be expected in the area.

Cuscuta approximata Bab., Ann. Mag. Nat. Hist. 13: 253 (1844). Syn. *C. schiraziana* Boiss., *C. urceolata* G. Kunze.

Mat.: R-52789*, 52788*	
Hab.: Parasite on <i>Polygonum hyrcanicum</i> and <i>Astragalus</i> in Sharleq	
Dist.: S & ?	Alt.: 1000-?
Ch.: M-IT	GF.: TST (holoparasite)
Th. (GNP): SUN	Th. (IR): NOT

Det.: M. Iranshahr (under var. *urceolata* (Kunze) Yunck.

Cuscuta campestris Yunck., Mem. Torrey Bot. Club 18: 138, f. 14 (1932).

Mat.: ZK-82/123	
Hab.: Parasite on <i>Verbena officinalis</i> etc. in Tangeqol and elsewhere ?	
Dist.: C	Alt.: 680
Ch.: COS	GF.: TST (holoparasite)
Th. (GNP): SUN	Th. (IR): NOT

This species was reported by Iranshahr (1983) from several localities in N Iran. The material is young, without capsule; the determination is therefore uncertain.

Cuscuta europaea L., Sp. Pl. 124 (1753).

Mat.: A-9980	
Hab.: Parasite on <i>Sambucus ebulus</i> etc. in Kondeskuh	
Dist.: W	Alt.: 1100
Ch.: ES-IT-M	GF.: TST (holoparasite)
Th. (GNP): SUN	Th. (IR): NOT

Cuscuta monogyna Vahl, Symb. Bot. 2: 32 (1791).

Mat.: A-4455, 9493	
Hab.: On <i>Glycyrrhiza glabra</i> etc.	
Dist.: Map 340	Alt.: 950-1200
Ch.: ES-IT-M	GF.: GSC/TST (holoparasite)
Th. (GNP): SUN	Th. (IR): NOT

Dipsacaceae

Cephalaria microcephala Boiss., Diagn. Pl. Orient. Nov. sér. 2, 2: 123 (1856). Syn.: *C. hirsuta* Stapf; *C. axillaris* Hausskn. ex Bornm.; *C. sublanata* (Bornm.) Szabó.

Mat.: A-9401, 11798; R-53103; WF-12627	
Hab.: Mountain meadows, mountain steppe with grasses and thorn-cushions, <i>Quercus macranthera</i> forest	
Dist.: Map 341	Alt.: 1700-2200
Ch.: IT ^C	GF.: HSC
Th. (GNP): NOT (21)	Th. (IR): NOT

Dipsacus laciniatus L., Sp. Pl.: 97 (1753).

Mat.: GA-4889; W&C-14257; R-53175	
Hab.: Moist and disturbed places around Almeq spring and Sulukli lake	
Dist.: C, NW	Alt.: 1380-1700
Ch.: ES-IT-M	GF.: HSC TH
Th. (GNP): VUL (7)	Th. (IR): NOT

Dipsacus strigosus Willd. ex Roem. & Schult., Syst. Veg. 3: 520 (1818). Syn.: *Virga strigosa* (Willd. ex Roem. & Schult.) Holub.

Mat.: A- 9788, 11651, 11818; GA-4888; W&C-14275; R-52472	
Hab.: Forest margin, waste places, garden weed, closed and open lowland and mountain forest, stream and riverside	
Dist.: Map 342	Alt.: 450-2000
Ch.: ? ES ^{EH}	GF.: HSC
Th. (GNP): NOT (38)	Th. (IR): NOT

Pteroccephalus plumosus (L.) Coult., Mém. Dipsac. 31 (1823). Syn.: *Knautia plumosa* L., Mantissa 147 (1767); *P. caramanicus* Boiss. & Heldr.

Mat.: R-52591; T-34740	
Hab.: On rocky outcrops between Tangerang and Tunnel	
Dist.: C	Alt.: 450-1100
Ch.: IT [M]	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Scabiosa columbaria L., Sp. Pl.: 99 (1753). Syn.: *S. amoena* Jacq. f.; *S. hyrcanica* Steven, *S. koelzii* Rech. f.

Mat.: A-4511, 4512, 9485	
Hab.: Shrubby vegetation on steep rocky outcrops, <i>Crataegus</i> and <i>Acer monspessulanum</i> scrubs; <i>Juniperus sabina</i> & <i>J. communis</i> scrub, top of mountain; <i>Quercus macranthera</i> forest	
Dist.: Map 343	Alt.: 900-2080
Ch.: ES-M	GF.: HSR
Th. (GNP): NOT (21)	Th. (IR): NOT

Scabiosa micrantha Desf., Ann. Mus. Natl. Hist. Nat. 11: 168 (1808). Syn.: *S. sicula* M. Bieb., non L.; *S. brevipora* Freyn.

Mat.: A-9741, 11179, 11575; R-52406; T-34741; TM-34677, 41530	
Hab.: Rocky outcrops, <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes	
Dist.: Map 344	Alt.: 450-1820
Ch.: IT-ES ^{EH}	GF.: TSC
Th. (GNP): NOT (30)	Th. (IR): NOT

Scabiosa rotata M. Bieb., Fl. Taur.-Cauc. 3: 102 (1819). Syn.: *S. anatolica* Boiss.

Mat.: A-4316, 6238, 9524, 11178; R-52931; 52768; WF-12679	
Hab.: <i>Paliurus spina-christi</i> scrub, <i>Juniperus</i> woodland, <i>Artemisia</i> and <i>Stipa</i> (or mixed) steppes, grassy mountain steppes with thorn-cushions, dry valley with <i>Haloxylon</i> shrubs	
Dist.: Map 345	Alt.: 970-1750
Ch.: IT	GF.: TSC
Th. (GNP): NOT (17)	Th. (IR): NOT

Ebenaceae

Diospyrus lotus L., Sp. Pl.: 1057 (1753).

Mat.: A-9274, 9307, 9336, 9305, 11836; GA-4941, 5012	
Hab.: Alluvial lowland forest, particularly along the Madrasu river basin	
Dist.: Map 346	Alt.: 450-1060
Ch.: ES ^{EH} (disjunctly occurs in the Himalaya)	GF.: PTS
Th. (GNP): NOT (25)	Th. (IR): IND

Elaeagnaceae

Elaeagnus angustifolia L., Sp. Pl.: 121 (1753).

Mat.: A-10767, 10834	
Hab.: Along streams and valleys	
Dist.: S	Alt.: 1100-1400
Ch.: M-IT	GF.: PTS/PSS
Th. (GNP): END (2)	Th. (IR): NOT

Euphorbiaceae

Andrachne telephioides L., Sp. Pl.: ed. 1: 1014 (1753). Syn.: *A. rotundifolia* C. A. Mey.; *A. virescens* Stapf.

Mat.: A-9833, 10896, Z-82/225	
Hab.: Dry sandy or gravelly soils in <i>Artemisia</i> steppe, known from Dasht, Sharleq and Mirza Baylu plain	
Dist.: S	Alt.: 900-1300
Ch.: IT-M-SS	GF.: HCR
Th. (GNP): END (3)	Th. (IR): NOT

Chrozophora tinctoria (L.) A. Juss., Euphorb. Gen.: 84 (1824). Syn.: *Croton tinctorius* L., Sp. Pl.: 1004 (1753); *C. hierosolymitana* Spreng.; *C. obliqua* (Vahl) Spreng.

Mat.: A-11858; Z-82/227	
Hab.: On scree at base of vertical cliffs in Golzar and along the river in Sharleq	
Dist.: S	Alt.: 900-1000
Ch.: IT-M-SS	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

Euphorbia

Mostly identified by Mr. B. Zehzad (Tehran).

Euphorbia amygdaloides L., Sp. Pl.: 463 (1753).

Mat.: A-9779, 9243; F-1002; GA-4960	
Hab.: Usually in closed lowland and montane forests, but absent in forests above 1920 m	
Dist.: Map 347	Alt.: 500-1920
Ch.: ES [M]	GF.: CHE ^(ever-green)
Th. (GNP): NOT (86)	Th. (IR): NOT

Euphorbia buhsei Boiss. in DC., Prodr. 15, 2: 167 (1862).

Mat.: A-10773, 11045, 11172, 10799, 11075 (young, determination uncertain), 11082	
Hab.: Open woodland (<i>Acer</i> , <i>Crataegus</i> , <i>Paliurus</i>), <i>Stipa</i> steppe and mountain steppe with grasses and thorn-cushions	
Dist.: Map 348	Alt.: 1300-2170
Ch.: IT	GF.: HSC
Th. (GNP): RAR (11)	Th. (IR): SUN

Euphorbia bungei Boiss. in DC., Prodr. 15, 2: 115 (1862)

Mat.: A-9397 (sterile), 10266, 11083, 10979	
Hab.: <i>Artemisia</i> and <i>Stipa</i> (or mixed) steppes, mountain steppe with grasses and thorn-cushions, <i>Juniperus excelsa</i> woodland, open scrubs with grasses	
Dist.: Map 349	Alt.: 1000-2170
Ch.: IT ^{W&C}	GF.: HSC
Th. (GNP): NOT (37)	Th. (IR): NOT

Euphorbia falcata L., Sp. Pl.: 456 (1753).

Mat.: A-9961, 11138, 11472, 11579	
Hab.: Disturbed clay soils at margin of road, pioneer lowland forest, rocky outcrops, <i>Stipa</i> steppe	
Dist.: Map 350	Alt.: 780-1250
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): VUL (5)	Th. (IR): NOT

Euphorbia granulata Forssk., Fl. Aegypt.-Arab.: 94 (1775). Syn.: *E. turcomanica* Boiss.

Mat.: A-12237	
Hab.: Roadside weed on sandy soils near Tangerang	
Dist.: W	Alt.: 450
Ch.: IT-SS	GF.: TCR
Th. (GNP): END (1)	Th. (IR): NOT

Euphorbia helioscopia L., Sp. Pl.: 459 (1753).

Mat.: Noll-1269, Salehi 3364	
Hab.: Weed garden in Tangegol and probably other waste places	
Dist.: C & ?	Alt.: ?-670-?
Ch.: PL	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

Euphorbia humilis C. A. Mey. ex Ledeb., Icon. Pl. Fl. Ross. 2: 25 (1830).

Mat.: A-10608, 10235, 11400, 10706, 10348, 11167, 11692	
Hab.: <i>Paliurus</i> and maple scrubs, <i>Juniperus</i> woodland, mountain steppe with grasses and thorn-cushions, <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes, mountain meadows	
Dist.: Map 351	Alt.: 1000-2000
Ch.: IT ^E	GF.: HSC
Th. (GNP): NOT (22)	Th. (IR): SUN

Known as new record for Iran (Akhani 1999).

Euphorbia marschalliana Boiss., Diagn. Pl. Orient. Nov. sér. 1, 7: 94 (1846).

Mat.: A-10279; AS-5989	
Hab.: Crevices of steep and vertical limestone cliffs	
Dist.: Map 352	Alt.: 600-1460
Ch.: IT/ES ^{HY, Alborz}	GF.: HSC ^{SU}
Th. (GNP): NOT (19)	Th. (IR): RAR

Euphorbia seguieriana Neck. in Hist & Commentat. Acad. Elect. Sci. Theod.-Palat. 2: 493 (1770).

Mat.: A-4549	
Hab.: Found once in open woodland with grasses in Koilar	
Dist.: N	Alt.: 1350-1450
Ch.: ES-IT [M]	GF.: HSC
Th. (GNP): END (1)	Th. (IR): NOT

Euphorbia szovitsii Fisch. & Mey., Ind. Sem. Hort. Petrop. 1: 27 (1835).

Mat.: A-10562	
Hab.: <i>Artemisia-Stipa</i> steppe in Nekarbandi (7-8 km NW Soolegerd)	
Dist.: NE	Alt.: 1000-1050
Ch.: IT ^{omni}	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Euphorbia virgata Waldst. & Kit., Descr. Icon. Pl. Hung.: 176 (1805). Syn. *E. boissieriana* (Woron.) Prokhanov.

Mat.: A-12179	
Hab.: In mountain meadow (with <i>Elymus elongatiforme</i> and <i>Crocus speciosus</i>) in Almeh (Karkouli spring), road and forest margin near Golestan Parking	
Dist.: C, W	Alt.: 500-1700
Ch.: ES-IT-M	GF.: HSC
Th. (GNP): END (2)	Th. (IR): NOT

Fabaceae (*Leguminosae*, *Papilionaceae*)

Alhagi maurorum Medik., Vorles. Churpfälz. Phys.-Ökon. Ges. 2: 397 (1787) sensu Léonard (1986: 47). Syn.: *A. pseudoalhagi* (M. Bieb.) Fisch.; *A. camelorum* Fisch.

Mat.: A-12135; G. Kowalski 1246	
Hab.: Waste places, sandy and saline soils	
Dist.: S, E	Alt.: 1000-1300

Ch.: IT [partly M-SS]	GF.: HSC TH
Th. (GNP): END (2)	Th. (IR): NOT

A. maurorum is an extremely invasive plant in arid and semi-arid parts of Iran. In our area, it is very rare, most likely because of its poor competition with the natural vegetation.

Astragalus

Mostly determined or revised by Prof. Dr D. Podlech (Munich).

The genus *Astragalus*, with c. 45 species in the area, is the largest genus in the Park. However, it is more likely that further species will be found in the future. Particularly, some of the described endemic species in the Kopetdagh-Khorasan Range and further annual species are expected here. Unfortunately, the very dry and unsuitable climatic conditions in 1995 (and the years before), when I made a great part of my field studies, prevented the growth and the completion of the life cycles of many annuals and perennials. Fortunately, the area has been visited several times by the most inveterate investigator of Iranian *Astragalus*, Dr A. A. Maassoumi (Research Institute of Forests and Rangelands, Tehran). His complete collection in TARI was not available to us. But many of his duplicates are available in Munich and have already been studied by Prof. Podlech for Flora Iranica and his revisions of individual sections. A few specimens which are not available to us, were reported in Maassoumi's Persian publication on the Iranian *Astragalus* (Maassoumi 1986, 1989, 1995). These are mentioned here for documentation, but should be checked in the future. Unfortunately, the localities given by Maassoumi and Rechinger are not suitable for large scale mapping and providing detail information on altitude and habitat. Therefore these data should be compiled and improved with future investigations.

Sect.: Alopecuroidei

Astragalus schahrudensis Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, sér. 7, 15, 1: 103 (1869).

Mat.: Dewey, 869 (based on cultivated material from the Park.); WF-12821 (n.v.), WF-12702 (n.v.)
Hab.: Road margin and scrub valley in Almehr valley and Yakhtikalan Pass
Dist.: NE, E, C? Alt.: 1250-1600

Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): VUL (5)	Th. (IR): IND

No herbarium specimen have been provided by the author, however, I have seen the species in the NE border of the Park, in Yakhtikalan Pass.

Becht (1978: 134) reported *A. macrocephalus* Willd. from the Park: Below Almehr, 1600 m, 19.6.1974, Wendelbo & Foroughi 12702 (W, TARI, n.v.). The same specimen was cited by Maassoumi (1995: 106) under *A. schahrudensis*. The distribution map given by Becht (1978: Karte 8) shows that *A. macrocephalus* is distributed in Turkey, Transcaucasia and W. Iran. The distribution of *A. schahrudensis* (Becht 1978, Karte 12) is restricted to NE Iran and the Turkmenistan parts of Kopetdagh.

Sect.: Ammodendron

Astragalus podolobus Boiss. & Hohen. in Boissier, Diagn. Pl. orient., ser. 1, 9: 49 (1849).

Mat.: A-10763, 10922, 11055; AS-5957; F-1072; R-53026
Hab.: Sandy and gravelly soils, dry <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppe, road margin
Dist.: Map 353 Alt.: 1000-1500
Ch.: IT ^{KK} or Aralo-Caspian GF.: CSE/CFR
Th. (GNP): RAR (9) Th. (IR): SUN

Sect.: Ankylotus

Astragalus commixtus Bunge, Arbeiten Naturf. Vereins Riga 1: 246 (1848). Syn.: *A. intermedius* Boiss.; *A. brahuicus* Boiss.; *A. affghanus* Boiss.; *A. afghanicus* Bornm.

Mat.: Ma-47563(n.v.); R-53091; R-52869 (n.v.); T-40833 (n.v.). cf. Podlech (1994)
Hab.: <i>Artemisia</i> steppe, ? mountain steppe
Dist.: S, E, C Alt.: 1000-1600 ?
Ch.: IT ^{± omni} GF.: TSC ^{DW}
Th. (GNP): VUL (5) Th. (IR): NOT

Astragalus stalinskyi Širj., Repert. Spec. Nov. Regni Veg. 53: 75 (1944).

Mat.: A-6246*; Ma-47559, 47562
Hab.: Along Almehr valley and probably in Mirza-Baylu plain
Dist.: E, CE, ? SE Alt.: 1100-1300
Ch.: IT ^E GF.: TSC ^{DW}
Th. (GNP): VUL (4) Th. (IR): VUL

A-6246 was wrongly reported as *A. commixtus* in Podlech (1994: 45) (Podlech pers. comm.).

Sect.: Annulares

Astragalus campylorrhynchus Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 1: 23 (1835) et in Ann. Sci. Nat. Bot., sér. 2, 4: 340 (1835). Syn.: *A. leiolobus* Bunge; *A. nadirius* Parsa.

Mat.: A-6247, 10838; Ma-47575, 47551; R-52900; TM-34854	
Hab.: <i>Artemisia</i> steppe, scrub valley with scattered <i>Haloxylon</i> shrubs, ? open <i>Juniperus</i> woodland	
Dist.: Map 354	Alt.: 1200-1350
Ch.: IT ^{omni}	GF.: TSC
Th. (GNP): ? VUL (7)	Th. (IR): NOT

Astragalus crenatus Schult., Obs. Bot.: 156 (1809). Syn.: *A. corrugatus* Bertol., *A. cruciatus* Link, *A. quadrisulcatus* Bunge, *A. tenuirugis* Boiss.

Mat.: Ma-47572	
Hab.: Collected once from Sharleq without detail information	
Dist.: S	Alt.: ? 1300
Ch.: IT-SS	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Sect.: Anthylloidei

Astragalus khoshyailensis Širj. & Rech. f., Anz. Österr. Akad. Wiss. Math.-Naturwiss. Kl. 66 (1954). Fig. 20, D.

Mat.: A-9435, 10497; AS-6054; R-53093; Rz-53972, 53977	
Hab.: <i>Juniperus</i> woodland, mountain meadow, transition zone between broad-leaved forest and <i>Juniperus</i> woodland, <i>Acer monspessulanum</i> scrub, mountain steppe of grasses and thorn-cushions, <i>Stipa</i> steppe	
Dist.: Map 355	Alt.: 1280-2180
Ch.: IT ^{KK}	GF.: CSC
Th. (GNP): NOT (31)	Th. (IR): SUN

According to personal communication with Mr Sh. Zarre, the specific separation between *A. khoshyailensis* and *A. daghestanicus* Grossh. (known from E Caucasus, Daghestan) is questionable.

Sect.: Astragalus

Astragalus basineri Trautv., Trudy Imp. S.-Peterburgsk. Bot. Sada 9: 444 (1884). Syn.: *A.*

stephenianus Aitch. & Baker; *A. ekatherinae* Fedtsch.; *A. michelsoni* B. Fedtsch. Fig. 20, E.

Mat.: A-10765	
Hab.: Found once at margin of the road towards Qez-Qaleh Dasht	
Dist.: S	Alt.: 1050
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): END (1)	Th. (IR): IND

Astragalus retamocarpus Boiss., Diagn. Pl. Orient. Nov. sér. 1, 9: 68 (1849). Syn.: *A. leucomelas* Bunge; *A. askabadensis* Kuntze. Fig. 20, F.

Mat.: A-5960; AS-6103; R-52763	
Hab.: <i>Paliurus</i> , <i>Crataegus</i> and <i>Acer monspessulanum</i> (or mixed) scrubs, transition zone between <i>Artemisia</i> steppe and montane scrub	
Dist.: Map 356	Alt.: 1000-2000
Ch.: IT ^{E&KK}	GF.: HSC
Th. (GNP): RAR (14)	Th. (IR): NOT

This species has a disjunct distribution: between Iran and Turkmenistan in one site and E Afghanistan, Tajikistan and NE Pakistan in another site. (see map 10 in Agerer-Kirchhoff 1975: page 180, Karte 10). The species grows in shrubby vegetation in our area. This condition is evidently not available in the arid and desertic environments in the lowlands of NE Iran, S & E Turkmenistan and central Afghanistan.

Sect.: Bucerates

Astragalus hamosus L., Sp. Pl.: 758 (1753). Syn.: *A. buceras* Willd.; *A. arnoceras* Bunge.

Mat.: A-10448, 10764; Ma-47540, 47577; TM-34872* (n.v.)	
Hab.: <i>Artemisia</i> steppe, <i>Paliurus spina-christi</i> scrub	
Dist.: Map 357	Alt.: 580-1350
Ch.: IT-M-SS	GF.: TSC
Th. (GNP): VUL (6)	Th. (IR): NOT

* No information is available on the habitat of this specimen collected in Tangerang (westernmost area of the Park).

Sect.: Caprini

Astragalus cartilagineus Gontsch., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 9: 99 (1941) subsp. *cartilagineus*

Mat.: A-10440	
Hab.: <i>Artemisia</i> steppe, NW of Dasht	

Dist.: S	Alt.: 1100?1300
Ch.: IT ^{KK}	GF.: HAC
Th. (GNP): END (1)	Th. (IR): END

Only subsp. *cartilagineus* occurs in Iran. Subsp. *honigbergeri* (Širj. & Rech. f.) Podlech is distributed in Center and East Afghanistan (cf. Podlech 1988: 639, Karte 92).

Astragalus citrinus Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11, 16: 34 (1868) in clave et l.c. 15, 1: 42 (1869) cum descriptione. Syn.: *A. angustidens* Freyn & Sint.; *A. subangustidens* V.V.Nikitin .

Mat.: AS-6001, 6002, A-4536, 6157, 9581, 10205, 10997, 11125*; Ma-47564, 47556; R-53083; Rz-53977. (Podlech 1988: 553 cited more material from the area)

Hab.: *Artemisia*, *Artemisia-Festuca* and *Stipa* steppes, *Juniperus* woodland, mountain steppe with grasses and thorn-cushions, *Acer monspessulanum* scrub

Dist.: Map 358	Alt.: 800-2020
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): NOT (41)	Th. (IR): NOT

* A-11125 has been collected in grassland with scattered shrub and trees in Koilar and belongs to subsp. *barrowianus* (Aitch. & Baker) Podlech; all other cited material belong to the typical subspecies.

Astragalus curvipes Trautv., Trudy Imp. S.-Petersburgsk. Bot. Sada 9: 446 (1886). Syn.: *A. supralanatus* Freyn & Sint.

Mat.: A-10423 (det.: Sh. Zarre); Ma-47553 (n.v.)	
Hab.: <i>Artemisia</i> steppe in NW of Dasht and between Sharleq and Cheshmeh Khan	
Dist.: S	Alt.: 1000-1350
Ch.: IT ^{KK}	GF.: HAC
Th. (GNP): END (2)	Th. (IR): RAR

Astragalus kopetdaghi Boriss., Fl. URSS 12: 185 (1946). Syn.: *A. glabriusculus* Gontsch. Only var. *orientikopetdaghiensis* V. V. Nikitin occurs in our area.

Mat.: A-9389, 11304, 10998, 11118, 10973; AS-6056; R-53084 (n.v.); WF-12693	
Hab.: Montane forest (<i>Quercus castaneifolia</i> and <i>Q. macranthera</i>), mountain steppe with grasses and thorn-cushions	

Dist.: Map 359	Alt.: 1550-2230
Ch.: IT ^{KK}	GF.: HAC/HCR
Th. (GNP): RAR (13)	Th. (IR): VUL

Astragalus nephtonensis Freyn, Bull. Herb. Boissier, sér. 2, 4: 760 (1904). Syn.: *A. faryabensis* Podlech; *A. maymanensis* Podlech; *A. golestanicus* Maassoumi & Podlech. **syn. nov.** Fig. 20, G.

Mat.: A-6181, 6208, 10208, 10354, 10441; AS-5996; Fu-5140; Ma-47569 (isotype of *A. golestanicus*), 47574, 47578; R-53018, 52863, 52864, 53081; W&a1-10995

Hab.: *Artemisia* steppe, dry gravelly valley with *Juniperus* and *Haloxylon* shrubs, *Paliurus spinachristi* scrub

Dist.: Map 360	Alt.: 900-1500
Ch.: IT ^{KK}	GF.: HAC
Th. (GNP): NOT (21)	Th. (IR): NOT

A. golestanicus Maassoumi & Podlech (Podlech & Ramak Maassoumi 1987: 101) which has been described from the Park, shows no differences with *A. nephtonensis*.

Astragalus pellitus Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11, 16: 33 (1868) in clave et l.c. 15, 1: 39 (1869) cum descriptione. Syn.: *A. kuca-nensis* Rech. f.; *A. pubifolius* V. V. Nikitin .

Mat.: R-53017 (n.v.)	
Hab.: Probably <i>Artemisia</i> steppe	
Dist.: E	Alt.: 1200
Ch.: IT ^C	GF.: HAC
Th. (GNP): END (1)	Th. (IR): RAR

Astragalus pseudoindurascens Širj. & Rech. f., Anz. Österr. Akad. Wiss. Math.-Naturwiss. Kl. 1953: 119 (1953). Syn.: *A. subinduratus* Gontsch. var. *pseudoindurascens* sphalm. '*pseudoinduratus*' (Širj. & Rech. f.) Parsa .

Mat.: A-6209, 10916, 11035; R-52866	
Hab.: Scrub valley with scattered <i>Haloxylon</i> , <i>Acer monspessulanum</i> and <i>Juniperus excelsa</i>	
Dist.: Map 361	Alt.: 1200
Ch.: IT ^{KK}	GF.: ± HAC
Th. (GNP): VUL (4)	Th. (IR): END

Outside the Park, *A. pseudoindurascens* has been known from Darreh Abshar supra Akhlamad and Esfarayen, Kuh-e Shah Jahan, Sarcheshmeh village (Podlech 1988: 267).

Astragalus spec.

Mat.: A-11041	
Hab.: <i>Juniperus excelsa</i> woodland	
Dist.: E	Alt.: 1640
Ch.: ? IT ^{KK}	GF.: HAC
Th. (GNP): END (1)	Th. (IR): ?

An incomplete specimen, but evidently differs from other known species in the area.

Sect. Caraganella

Astragalus memoriosus Pakravan, Nasseh & Maassoumi, Iranian J. Bot. 6, 2 : 257 (1994) publ. 1995.

Type: Golestan Forest, Cheshmeh-Khan, 1000 m, 25.7.1994, Maassoumi, Pakravan & Nasseh 72314 (TARI).

Mat.: Ma & al. 72314 (n.v.); Pabot 12545	
Hab.: Known only from Cheshmeh Khan, probably in <i>Artemisia</i> steppe with scattered <i>Juniperus excelsa</i> trees	
Dist.: Map S	Alt.: 1000-1100
Ch.: IT ^{KK}	GF.: CSE TH
Th. (GNP): END (2)	Th. (IR): END

Sect.: Cremoceras

Astragalus ochreatus Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, 15 (1): 224 (1869). Syn.: *A. venustus* Maassoumi & Podlech.

Mat.: A-11049; Ma-47584 (type of <i>A. venustus</i>); R-53079	
Hab.: Scattered <i>Juniperus</i> woodland with <i>Artemisia</i> (A-11049) in Almeh valley and Sharleq (Ma-47584)	
Dist.: E, S	Alt.: 1300-1700
Ch.: IT ^{KK} or Alborz	GF.: ± HSC
Th. (GNP): END (3)	Th. (IR): END

Astragalus pendulinus Popov & B. Fedtsch., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 10: 14 (1947). Syn.: *A. cercidophacos* Podlech & Maassoumi.

Mat.: A-10274, 11038, 10510; Ma-47554 (type of <i>A. cercidophacos</i>), 47547	
Hab.: <i>Artemisia-Festuca-Cousinia</i> steppe, <i>Juniperus</i> woodland	
Dist.: Map 362*	Alt.: 1200-1500
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): VUL (6)	Th. (IR): VUL

* The locality between Sharleq and Cheshmeh Khan is not shown in the treated map.

Sect. Cystodes

Astragalus alamliensis Rech.f., Repert. Spec. Nov. Regni Veg. 50: 255 (1941).

Mat.: A-10902	
Hab.: In dry valley with <i>Haloxylon</i> shrubs mixed with <i>Artemisia</i> and <i>Krascheninnikovia</i>	
Dist.: E	Alt.: 1400
Ch.: IT ^{KK}	GF.: CHU
Th. (GNP): END (1)	Th. (IR): ? END

The type specimen of *A. alamliensis* (Khorasan, zwischen Kuchan [Quchan] und Lutfabad, am Paß Alamli, 2000 m, 14.7.1937, Reching 1674, W) has not been seen. The material matches well with the original description.

Sect. Cytisodes

Astragalus stenocarpus Gontsch., Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 9: 143 (1946).

Mat.: A-10813; R-53087	
Hab.: Mountain steppe with grasses and thorn-cushions in Almeh	
Dist.: C	Alt.: 1700-1750
Ch.: IT ^E	GF.: HCR
Th. (GNP): VUL (4)	Th. (IR): END

No authenticated specimens of *A. stenocarpus* have been seen and those cited above have been named according to description. The species was known in Kuhitang and Pamir-Alai (from Mt. Shakhriyabz to Kuhitang). Such a disjunction is very rare and therefore the identifications need critical future examination. Another record of the species has been given in Ramak Maassoumi (1987: 191): Khorasan: ca. 45 km N. of Shirvan, Golool-Sarani Protected Area, 1600-2300 m, 26.5.1984, Assadi & Maassoumi 50458 (TARI, n. v.).

Sect.: Dissitiflori

Astragalus sumbari Popov, Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk SSSR 10: 10. (1947).

Mat.: A-5956, 6153, 6202, 10354, 10316, 10509, 10959, 11156, 10275; R-53022, 53086; Rz-53975	
Hab.: <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> scrub, mountain steppe with grasses and thorn-cushions, <i>Artemisia</i> and <i>Stipa</i> steppes, dry valley with scattered <i>Juniperus excelsa</i>	

trees	
Dist.: Map 363	Alt.: 1000-1900
Ch.: IT ^{KK}	GF.: HSR
Th. (GNP): RAR (13)	Th. (IR): VUL

Astragalus ufraensis Freyn & Sint., Bull. Herb. Boissier., sér. 2, 5: 568 (1905).

Mat.: AS-5929; A-10835, 10895-a; R-53023	
Hab.: Margin of dry brooklets on sandy soils and moderately saline soils in <i>Artemisia</i> steppe	
Dist.: Map 364	Alt.: 1200
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): VUL (6)	Th. (IR): ? END

The identity of above cited plants need confirmation. A new record for Iran; *Astragalus ufraensis* was not known by Pakravan (in Ghahreman & al 1996) in her synopsis of the Sect. *dissitiflora* "xiphidium" in Iran. The species is easily distinguished from other species by distinctly upward curved to semi-circular pods, leaves with (4-) 5-6 pairs and habitat on sandy soil in Mirza-Baylu plain.

Astragalus xiphidioides Freyn & Sint., Bull. Herb. Boissier, sér. 2, 5: 786 (1905).

Mat.: A-9410, 10460, 10427, 10789, 10726, 10987, 11169, 11310; R-53088, 53089, 53090, 52760	
Hab.: Mountain steppe with grasses and thorn-cushions, <i>Stipa</i> steppe, mountain meadow, juniper woodland, maple scrub	
Dist.: Map 365	Alt.: 1000-2020
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): RAR (13)	Th. (IR): ? RAR

Sect.: Glycyphyllos

Astragalus glycyphyllos L. Spec. Plan.: 758 (1753).

Mat.: A-4390, 4441, 9891, 11483, 11493, 11656, 11668, 11809; R-52516; WF-12773	
Hab.: ± Closed lowland and montane forest, forest margin, forest openings with dense patches of <i>Pteridium aquilinum</i>	
Dist.: Map 366	Alt.: 600-1550
Ch.: ES	GF.: HSC/HCR
Th. (GNP): RAR (13)	Th. (IR): IND

Sect.: Incani

Astragalus jolderensis B. Fedtsch., Bot. Mater. Gerb. Glavn. Bot. Sada RSFSR 2: 52 (1921). Syn.: *A. lovensis* Rech. f.

Mat.: A-6200, 9593, 10234, 10335, 10444, 10507, 10593, 11303, 11405, 12318; AS-6061, 6062; Fu-5091; R-53073, 52436, 52436; Rz-53976, 53189	
Hab.: Steep and gentle rocky outcrops, <i>Juniperus excelsa</i> and <i>J. communis</i> - <i>J. sabina</i> woodlands, <i>Artemisia-Festuca</i> , <i>Stipa</i> (or mixed) steppes, various open and dense scrubs, mountain steppe with grasses and thorn-cushions, mountain meadows, lime soils around the road	
Dist.: Map 367	Alt.: 400-2200
Ch.: IT ^{KK} /ES ^{HY}	GF.: HSR
Th. (GNP): NOT (70)	Th. (IR): NOT

Astragalus mercklinii Boiss. & Buhse, Nouv. Mém. Soc. Imp. Naturalistes Moscou, 12: 70 (1860). Fig. 20, H.

Mat.: A-11320	
Hab.: Rocky limestone ground and on <i>Gypsophila aretioides</i> cushions in mixed formations of shrubs, thorn-cushions and grasses at top of Divar-Kaji mountain	
Dist.: C	Alt.: 2380
Ch.: IT ^C	GF.: HSR
Th. (GNP): END (1)	Th. (IR): ? VUL

Sect.: Malacothrix

Astragalus iranicus Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11 (16): 56 (1868) et l.c. 15 (1): 92. 1869.

Mat.: A-10903, 10904 (determination provisional)	
Hab.: Almeh valley with scattered <i>Juniperus excelsa</i> and <i>Haloxylon ammondendron</i> shrubs on gravelly soils, margin of a dry brooklet	
Dist.: C	Alt.: 1400-1450
Ch.: IT ^C	GF.: HSR
Th. (GNP): END (2)	Th. (IR): ? RAR

Astragalus rawlinsianus Aitch. & Baker, Trans. Linn. Soc. London, Bot. 3: 51 (1888). Fig. 20, I.

Mat.: A-6234, 6151, 6152, 6174, 10356, 11166, 10788; F-1056; Ma-47548, 47587, 47591; R-52764, 53092; Rz-53968; TM-34865; W&al-11057	
Hab.: <i>Paliurus-Acer monspessulanum</i> scrub; mountain steppe with grasses and thorn-cushions, dry valley with <i>Haloxylon</i> shrubs, <i>Stipa</i> steppe with scattered <i>Rhamnus pallasii</i> shrubs, <i>Artemisia-Festuca</i> steppe	
Dist.: Map 368	Alt.: 900-1850
Ch.: IT ^{KK}	GF.: HSR
Th. (GNP): NOT (30)	Th. (IR): NOT



Fig. 20: A, *Sedum pallidum*; B-C, *Sempervivum iranicum*; D, *Astragalus khoshyailensis*; E, *Astragalus basineri*; F, *Astragalus retamocarpus*; G, *Astragalus nephtonensis*; H, *Astragalus mercklinii* (grows on *Gypsophila aretioides*); I, *Astragalus rawlinsianus*.

Maassoumi (1987: 191) reported *A. pseudo-becki* Širj. & Rech. f. based on one of the above cited specimens (Maassoumi 47591). The specimen was named later on as *A. rawlinsianus* and cited in Maassoumi (1993: 195). However, no information is given on *A. pseudo-becki* in this review of the Sect. *Malacothrix* in Iran.

Sect. *Onobrychoidei*

Astragalus brevidens Freyn & Sint., Bull. Herb. Boissier, sér. 2, 4: 1118 (1904).

Mat.: A-6235, 9428, 9534, 10719, 10787, 10989; AS-5955; R-53019, 53075; Rz-53187; T-41412

Hab.: Mountain steppes with grasses and thorn-cushions, *Stipa* steppe, *Juniperus* woodland, *Acer monspessulanum* scrub, transition zone between *Artemisia* steppe and open scrub

Dist.: Map 369 Alt.: 1200-2100

Ch.: IT^{KK} GF.: HSR

Th. (GNP): NOT (40) Th. (IR): SUN

Sect. *Oxyglottis*

Astragalus biserrula Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 15 (1): 9 (1869). Syn.: *A. oxyglottoides* Bornm. & Gauba; *A. biserruloides* Bornm. & Gauba.

Mat.: R-53069; T-41415 (n.v.)

Hab.: Collected two times from the Almeš area (without exact locality and habitat)

Dist.: C Alt.: ? 1550

Ch.: IT^C GF.: TSC^{DW}

Th. (GNP): END (2) Th. (IR): ? NOT

Astragalus oxyglottis M.Bieb., Fl. Taur.-Caucas. 2: 192 (1808). Syn.: *A. psiloglottis* DC.; *A. abbasriazi* Parsa.

Mat.: A-10895-b; Ma-47571, 47550; R-52865

Hab.: *Artemisia* steppe in Mirza-Baylu plain and probably in *Juniperus* woodland or mountain steppe or *Paliurus* or *Acer monspessulanum* scrubs in Almeš and Sharleq

Dist.: S, C Alt.: 1200-1600

Ch.: IT [M] GF.: TSC^{DW}

Th. (GNP): ? VUL (5) Th. (IR): NOT

Astragalus schmalhauseni Bunge, Trudy Glavn. Bot. Sada 7: 369 (1880). Syn.: *Sewerzowia turkes-tanica* Regel & Schmalh.

Mat.: A-10815; R-53139; T-41437, 41448 (n.v.); WF-12673 (n.v.)

Hab.: Known only in Almeš area in mountain steppe with grasses and thorn-cushions and steep slopes on clay soils

Dist.: C Alt.: 1500-1700

Ch.: IT^E GF.: TSC

Th. (GNP): VUL (5) Th. (IR): NOT

Astragalus vicarius Lipsky, Trudy Imp. S.-Petersburgsk. Bot. Sada 18: 25 (1900).

Mat.: A-10707; Ma-47570; TM-34853 (n.v.)

Hab.: *Artemisia* steppe in Derazi, Dasht and between Sharleq and Cheshmeh Khan

Dist.: S Alt.: 1000-1300

Ch.: IT^E GF.: TSC

Th. (GNP): VUL (4) Th. (IR): END

Sect. *Platyglottis*

Astragalus camptoceras Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg 11 (16): 12 (1868) in clave et l.c. 15 (1): 12 (1869). Syn.: *A. bungei* C. Winkler & B. Fedtsch.; *A. spirorrhynchus* Bornm.

Mat.: Ma-47538, 47576 (n.v.)

Hab.: Known from Sharleq and between Sharleq and Cheshmeh Khan

Dist.: S Alt.: ? 1300-1350

Ch.: IT^{± omni} GF.: TSC

Th. (GNP): END (2) Th. (IR): NOT

Sect. *Rhacophorus* (Syn.: *Astracantha*)

Astragalus verus Oliv., Voy Emp. Ottoman 3: tab. 44 (1807). Syn.: *Astragalus brachycentra* (Fisch.) Kuntze; *A. meschedensis* Bunge; *A. lasiocaulos* Bunge; *A. chorassanicus* Bunge; *A. serpentinicus* Širj. Rech. f.; *A. longemucronulatus* Širj. & Rech. f. (only a few synonyms are mentioned here, according to the unpublished data from Mr. Sh. Zarre).

Mat.: A-9396, 9464, 9506, 9516, 9537, 10812, 10923, 11050, 11728, 11797; R-53085 (all det.: Sh. Zarre)

Hab.: Mountain steppe, *Juniperus* woodland, *Artemisia-Stipa* steppe, sandy soils

Dist.: Map 370 Alt.: 1280-2380

Ch.: IT^C GF.: CSC

Th. (GNP): NOT (20) Th. (IR): NOT

Sect. *Sesamei*

Astragalus asterias Hohen., Bull. Soc. Imp. Naturalistes Moscou 11: 343 (1838). Syn.: *A. cruciatus* Link var. *asterias* (Hohen.) Širj.

Mat.: A-10488; Ma-47546, 47573	
Hab.: Waste places and <i>Artemisia-Stipa</i> steppe and probably <i>Paliurus</i> scrub	
Dist.: Map 371	Alt.: 1100-1300
Ch.: IT-M	GF.: TCA ^{DW}
Th. (GNP): VUL (4)	Th. (IR): NOT

Astragalus filicaulis Kar. & Kir., Bull. Soc. Imp. Naturalistes Moscou 15: 336 (1841). Syn.: *A. rutilobus* Bunge; *A. agrestis* Freyn.

Mat.: A-s.n. (fragment); TM-21.5.1976 (n.v.)	
Hab.: Reported by Gazer (1993: 95) from the southern border of the Park. The species is also known from a fragmentary collection in the <i>Artemisia-Stipa</i> steppe in N parts of the Park	
Dist.: N & S	Alt.: 1000-1160
Ch.: IT ^{C&E}	GF.: TSC ^{DW}
Th. (GNP): END (2)	Th. (IR): NOT

Astragalus persepolitianus Boiss., Diagn. Pl. Orient. Nov. sér. 1, 9: 60 (1849). Syn.: *A. ammophilus* Kar. & Kir.

Mat.: R-52900a, 52951 (fide Gazer 1993:108)	
Hab.: Most likely <i>Artemisia</i> steppe in Mirza-Baylu plain	
Dist.: E	Alt.: 1200
Ch.: IT ^{C&E}	GF.: TCA ^{DW}
Th. (GNP): END (2)	Th. (IR): NOT

Astragalus sesamoides Boiss., Diagn. Pl. Orient. Ser. 1, 9: 59 (1849).

Mat.: Ma-47557	
Hab.: Locality in our area not clear, probably from Mirza-Baylu plain in <i>Artemisia</i> steppe	
Dist.: ? E or S	Alt.: ? 1100
Ch.: IT ^{C&E}	GF.: TSC ^{DW}
Th. (GNP): END (1)	Th. (IR): VUL

Astragalus tribuloides Del., Descr. Egypte, Hist. Nat.: 70 (1813). Syn.: *A. minutus* Boiss.

Mat.: Ma-47560 (fide Maassumi 1986)	
Hab.: Locality in our area not clear, probably from Mirza-Baylu plain in <i>Artemisia</i> steppe	
Dist.: ? E or S	Alt.: ? 1100
Ch.: IT-SS	GF.: TCA ^{DW}
Th. (GNP): END (1)	Th. (IR): NOT

Sect.: **Stereothrix**

Astragalus brachypetalus Trautv., Trudy Imp. S.-Petersburgsk. Bot. Sada 9: 446 (1886).

Mat.: A-4527, 9579, 9390, 9550; R-53074; WF-12655	
Hab.: <i>Paliurus spina-christi</i> thickets, <i>Juniperus</i> woodland, mountain steppe with grasses and thorn-cushions, open shrubland (transition between steppe and montane forest)	
Dist.: Map 372	Alt.: 900-1750
Ch.: IT ^{Cauc.-Turk.}	GF.: HSC ^(basally branched)
Th. (GNP): VUL (8)	Th. (IR): SUN

Sect. **Trachycercis**

Astragalus testiculatus Pall., Sp. Astragal.: 82, t. 67 (1802).

Mat.: A-11013, 11326, 10814, 11767; R-53080; Rz-53188	
Hab.: Exposed summits with stony ground in mountain steppes dominated by <i>Festuca valesiaca</i> , <i>Stipa lessingiana</i> and thorn-cushions	
Dist.: Map 373	Alt.: 1800-2400
Ch.: IT ^(more E)	GF.: HAC
Th. (GNP): VUL (7)	Th. (IR): ? VUL

Doubtful or wrong record

Zehzad (in Hasanzadeh-Kiabi & al 1994: 97) reported *Astragalus affinis* in our area. There exists no such validly published name among the Old World *Astragalus* (Podlech, pers. comm.).

Colutea buhsei (Boiss.) Shap., Fl. URSS 11: 320 (1941). Syn.: *C. persica* var. *buhsei* Boiss., Fl. Orient. 2: 196 (1872); *C. persica* auct. non Boiss.

Mat.: A-4481, 9406, 12376; GA-4881, 4983; R-37636, 52601, 52933, 53123; Wa-178	
Hab.: Scattered in different open scrubs, but often occurs on rocky slopes associated with <i>Carpinus orientalis-Quercus castaneifolia</i> scrub and <i>Crataegus</i> and <i>Acer monspessulanum</i> thickets, rarely in closed forest and <i>Juniperus</i> woodland	
Dist.: Map 374	Alt.: 500-1900
Ch.: IT ^{KK} /ES ^{HY (east)}	GF.: PSS
Th. (GNP): NOT (62)	Th. (IR): NOT

Very interesting is that the species produces flowers as late as November, so one may find both flowers and fruit during a long time of the vegetation period.

Colutea porphyrogramma Rech. f., Anz. Österr. Akad. Wiss. Math.-Naturwiss. Kl. 101: 400 (1964).
Fig. 21, A.

Mat.: A-6214, 10278, AS-5994; R-52791, 53001, 53001; WF-12823	
Hab.: <i>Artemisia-Stipa</i> steppe, gravelly dry stream bed with <i>Haloxylon</i> shrubs, rocky slopes in <i>Juniperus</i> woodland, <i>Paliurus spina-christi</i> thickets	
Dist.: Map 375	Alt.: 1000-1500
Ch.: IT ^{KK}	GF.: PSS
Th. (GNP): RAR (9)	Th. (IR): END

Coronilla (see *Securigera*)

Glycyrrhiza glabra L., Sp. Pl.: 1: 742 (1753).
Syn.: *G. violacea* Boiss.

Mat.: A-12220; W&C-14261; WF-12750; Z-84/17, 82/210	
Hab.: Waste places, saline soils (associated with <i>Salsola dendroides</i> and <i>Phragmites australis</i>), <i>Paliurus spina-christi</i> scrub, river valley with <i>Salix aegyptiaca</i>	
Dist.: Map 376	Alt.: 650-1750
Ch.: IT-M-ES	GF.: GRH
Th. (GNP): RAR (10)	Th. (IR): NOT

Hedysarum kopetdaghi Boriss., Bot. Mater. Gerb. Glavn. Bot. Sada SSSR 10: 82 (1947).

Mat.: A-4319, 10730; AS-5995; F-1122; R-53070; WF-12744	
Hab.: <i>Juniperus</i> woodland, <i>Stipa</i> steppe, mountain steppe with grasses and thorn-cushions, <i>Acer monspessulanum</i> scrub, transition between <i>Artemisia</i> steppe and <i>Paliurus spina-christi</i> scrub	
Dist.: Map 377	Alt.: 1200-2020
Ch.: IT ^{KK}	GF.: HSC (basally branched)
Th. (GNP): NOT (16)	Th. (IR): VUL

Hedysarum micropterum Bunge ex Boiss. Fl. Orient. 2: 523 (1872).

Mat.: A-10272, 10500, 10846; R-52824*, 52932; WF-12772*	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa-Festuca</i> steppes, <i>Juniperus</i> woodland; ? <i>Paliurus spina-christi</i> scrub	
Dist.: Map 378	Alt.: 1000-1450
Ch.: IT ^C	GF.: HSC
Th. (GNP): RAR (10)	Th. (IR): SUN

* Det.: L. I. Vassiljeva

Some of the above cited specimens were reported by Rechinger (Fl. Iranica 157: 384, 1984) under *H. wrightianum* Aitch. & Baker. These have afterwards been revised by Vassiljeva as *H. micropterum*. The author has accepted this latter name, not only it has priority, but because it has been described from localities nearer our area.

Hedysarum spec. I

Mat.: A-11140	
Hab.: <i>Juniperus excelsa</i> woodland, on steep limestone rocks	
Dist.: N	Alt.: 1300
Ch.: IT ^{KK} (? Endemic)	GF.: HSC
Th. (GNP): END (1)	Th. (IR): ?

Superficially very similar to *H. kopetdaghi*, but with spreading and greyish subtomentose indumentum and longer hairs (0.5-1 mm on stem). In *H. kopetdaghi*, nearly all hairs are strongly appressed and clearly shorter (0.2-0.5 mm on stem). The specimen is in fruiting condition, without flowers. Therefore I hesitate to provide a formal name before further specimens are available.

Hedysarum spec. II

Mat.: A-4315	
Hab.: Mountain steppe	
Dist.: NE	Alt.: 1550
Ch.: IT ^{KK} (? Endemic)	GF.: HSC
Th. (GNP): END (1)	Th. (IR): ?

Above cited specimen is an immature plant, with only one young fruit and a few flowers. It is similar to *H. kopetdaghi*, but differs by the shorter corolla, broadly ovate leaves and rather dense indumentum in the upper leaf surface.

Lathyrus annus L., Demonstr. Pl. 24 (1753).

Mat.: A-10376; Z&al-86/2927; TM-34833	
Hab.: Lowland forest and forest margin in Tangerang and Tangegol	
Dist.: W, C	Alt.: 450-700
Ch.: IT-M	GF.: TST
Th. (GNP): VUL (4)	Th. (IR): IND

Lathyrus aphaca L., Sp. Pl.: 729 (1753).

Mat.: AS-6010, A-10373; TM-34836

Hab.: Lowland forest margin, rocky openings; <i>Acer monspessulanum</i> thickets	
Dist.: Map 379	Alt.: 450-1120
Ch.: ES-IT-M	GF.: TST
Th. (GNP): RAR (10)	Th. (IR): NOT

Lathyrus cicera L. Sp. Pl.: 730 (1753).

Mat.: A-10436	
Hab.: Stony and gravelly dry stream bed near Dasht (surrounded by <i>Artemisia</i> steppe)	
Dist.: S	Alt.: 1100
Ch.: IT-M	GF.: TST
Th. (GNP): END (1)	Th. (IR): NOT

Lathyrus hirsutus L., Sp. Pl.: 732 (1753).

Mat.: R-52616, 52440	
Hab.: Forest margin and scrubs in Tangegol and Tangerang	
Dist.: W, C	Alt.: 450-750
Ch.: ES-IT-M	GF.: TST (biennial)
Th. (GNP): END (2)	Th. (IR): VUL

Lathyrus inconspicuus L., Sp. Pl.: 730 (1753).
Syn.: *L. erectus* Lag.

Mat.: A-10437; U-16028 (n.v.)	
Hab.: Forest margin and scrubs in Tangegol and stony gravelly dry stream bed near Dasht (surrounded by <i>Artemisia</i> steppe)	
Dist.: C, S	Alt.: 600-1100
Ch.: IT-M	GF.: TST
Th. (GNP): VUL (4)	Th. (IR): NOT

Lathyrus laxiflorus (Desf.) Kuntze, Trudy Glavn. Bot. Sada 10: 185 (1887). Syn.: *Orobis laxiflorus* Desf., Ann. Mus. Natl. Hist. Nat. 12: 57, tab. 8 (1808).

Mat.: A-4422, 10377; AS-6038; R-52618; W&al-11025	
Hab.: Closed lowland and montane forest	
Dist.: Map 380	Alt.: 500-2000
Ch.: ES ^{EH} [ES ^E]	GF.: GRH
Th. (GNP): NOT (64)	Th. (IR): NOT

Lathyrus pratensis L., Sp. Pl.: 733 (1753).

Mat.: A-4355, 9773, 11794, 11209; F-1117, 1120	
Hab.: Montane forest clearings, particularly steep slopes with <i>Pteridium aquilinum</i> and <i>Calamagrostis epigejos</i> ; <i>Quercus macranthera</i> forest	
Dist.: Map 381	Alt.: 900-2230

Ch.: ES-IT-M	GF.: GRH/GSC
Th. (GNP): RAR (12)	Th. (IR): NOT

Lathyrus sphaericus Retz., Obs. Bot. 3: 39 (1783).

Mat.: A-10380; W&al-10963	
Hab.: Lowland forest (<i>Quercus castaneifolia-Carpinus betulus</i>) in Tangerang and one locality 6 km E Tangegol (without details)	
Dist.: W, C	Alt.: 450-820
Ch.: IT-M-ES	GF.: TSC/TST
Th. (GNP): END (2)	Th. (IR): VUL

Lens cyanea (Boiss. & Hohen.) Alef., Bonplandia 9: 129 (1861). Syn.: *Ervum cyaneum* Boiss. & Hohen., Diagn. Pl. Orient. Nov. sér. 1, 9: 115 (1849).

Mat.: A-10406; U-16079 (n.v.)	
Hab.: Forest margin and scrubs in Tangegol and gravelly dry stream bed near Dasht (surrounded by <i>Artemisia</i> steppe)	
Dist.: C, S	Alt.: 1000-1100
Ch.: IT ^W	GF.: TSC
Th. (GNP): END (2)	Th. (IR): RAR

Lens orientalis (Boiss.) Hand.-Mazz., Ann. Naturhist. Mus. Wien 27: 80 (1913).
Syn.: *Ervum orientale* Boiss., Diagn. Pl. Orient. Nov. sér. 1, 9: 115 (1849); *Lens pygmaea* Grossh.

Mat.: A-11452 (over-ripe material with uncertain determination)	
Hab.: Steep rocky outcrops in Adam-Chaqran rocks	
Dist.: C	Alt.: 760-780
Ch.: IT	GF.: HSC
Th. (GNP): END (1)	Th. (IR): NOT

Lotus corniculatus L., Sp. Pl.: 775 (1753).

Mat.: A-11317, 11379; R-52517 (n.v); Z-85/164	
Hab.: River and streamside, alpine meadow, <i>Acer monspessulanum</i> thicket	
Dist.: Map 382*	Alt.: 450-2060
Ch.: PL	GF.: HSC
Th. (GNP): VUL (6)	Th. (IR): NOT

* R-52517 has been recorded between Tangerang and Tangegol not shown in the map.

Lotus glaber Mill., Gard. Dict. ed. 8: Lotus n° 3 (1768). Syn.: *L. corniculatus* L. var. *tenuifolius* L.; *L. tenuis* Willd.

Mat.: A-9860	
Hab.: Streamside in Qez-Qaleh-e Dasht	
Dist.: S	Alt.: 1100
Ch.: IT-ES-M	GF.: HSC
Th. (GNP): END (1)	Th. (IR): RAR

Medicago

The genus *Medicago* is accepted here as delimited by Small & al (1987). Therefore the three early known species of *Trigonella*, i.e. *T. arcuata*, *T. monantha* and *T. monspeliaca* are included in *Medicago*.

Medicago lupulina L., Sp. Pl.: 779 (1753).

Mat.: A-9733, 9734, 9778, 9810, 9811, 11099, 11505; R-52443	
Hab.: Open scrub on rocky outcrops, closed lowland and montane forest, riverside, grazed open <i>Crataegus</i> scrub	
Dist.: Map 383	Alt.: 450-2050
Ch.: PL ^(Old World)	GF.: HCR/TCR
Th. (GNP): NOT (18)	Th. (IR): NOT

Medicago medicaginoides (Retz.) E. Small, in Willdenowia 16: 434 (1987). Syn.: *Lotus medicaginoides* Retz., Observ. Bot. 2: 23 (1781); *Trigonella arcuata* C. A. Mey.; *T. cancellata* Pers.; *T. tenuis* M, Bieb.

Mat.: R-52838 (under <i>Trigonella arcuata</i>)	
Hab.: <i>Artemisia</i> steppe in Mirza-Baylu flats	
Dist.: E	Alt.: 1200
Ch.: IT-M ^E	GF.: TCA/TCR ^{DW}
Th. (GNP): END (1)	Th. (IR): NOT

Medicago minima (L.) L. Fl. Angl.: 21 (1754). Syn.: *M. polymorpha* L. var. *minima* L., Sp. Pl.: 780 (1753).

Mat.: A-10374, 10433; R-52442; TM-34881	
Hab.: Rocky outcrops, <i>Artemisia</i> steppe, forest margin, <i>Paliurus spina-christi</i> thicket	
Dist.: Map 384	Alt.: 450-1100
Ch.: PL ^(Old World)	GF.: TSC/TCR
Th. (GNP): RAR (11)	Th. (IR): NOT

Medicago monantha (C. A. Mey.) Trautv. in Bull. Sci. Acad. Imp. Sci. Sain-Pétersbourg 8: 272 (1841). Syn.: *Trigonella monantha* C. A. Mey. Verz. Pfl. Cauc.: 137 (1831); *T. noëana* Boiss.; *T. monantha* subsp. *noëana* (Boiss.) Huber-Morath.

Mat.: A-10561, 10431; TM-34824	
Hab.: <i>Paliurus spina-christi</i> thickets, <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppe, transition between <i>Artemisia</i> steppe and open shrubland, rarely rocky outcrops and forest margin	
Dist.: Map 385	Alt.: 600-1250
Ch.: IT ^{omni}	GF.: TCA/TCR ^{DW}
Th. (GNP): VUL (7)	Th. (IR): NOT

For details on the variation and distribution map of the *M. monantha* see Small & Fawzy (1992).

Medicago monspeliaca (L.) Trautv., Bull. Sci. Acad. Imp. Sci. Sain-Pétersbourg 8: 272 (1841). Syn.: *Trigonella monspeliaca* L., Sp. Pl.: 777 (1753).

Mat.: So-7887 (n. v.); TM-34832-E (n.v.): both under <i>Trigonella monspeliaca</i>	
Hab.: <i>Paliurus spina-christi</i> scrub, steep rocky outcrops, <i>Stipa</i> steppe	
Dist.: Map 386	Alt.: 580-1240
Ch.: IT-M	GF.: TCA/TCR ^{DW}
Th. (GNP): VUL (8)	Th. (IR): NOT

Although the species has been recorded several times during the field studies, I have not collected herbarium specimens.

Medicago orbicularis (L.) Bartal., Cat. Piante Siena 61 (1776). Syn.: *M. polymorpha* L. var. *orbicularis* L., Sp. Pl.: 779 (1753). *M. orbicularis* (L.) All.

Mat.: A-10645; R-52437; TM-34876	
Hab.: Mountain meadow surrounded by forest, rocky outcrops, ? garden weed	
Dist.: Map 387	Alt.: 450-1550
Ch.: IT-M	GF.: TSC
Th. (GNP): VUL (5)	Th. (IR): NOT

Medicago polymorpha L., Spec. Pl. 779 (1753). Syn.: *M. persica* Steven ex Ledeb.; *M. denticulata* Willd.

Mat.: TM-34877 (n.v.)	
Hab.: Found once in Tangerang (without further details)	
Dist.: W	Alt.: 580
Ch.: M-IT ^(alien elsewhere)	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Medicago rigiduloides E. Small, Can. J. Bot. 68: 2614 (1990). Syn.: *M. rigidula* (L.) All. var. *submitis* Boiss.; *M. rigidula* auct. Flora Iranica non (L.) All.

Mat.: A-10432, 10646; R-52447 (n.v.); So-7823, (n.v.) (both latter under <i>M. rigidula</i>)	
Hab.: <i>Paliurus spina-christi</i> scrub, mountain meadow in forest clearing, <i>Artemisia</i> steppe and probably at forest margin and garden weed	
Dist.: Map 388	Alt.: 450-1480
Ch.: IT	GF.: TSC ^{DW}
Th. (GNP): VUL (5)	Th. (IR): NOT

Small & al (1990) & Small (1990) have shown that the Asian plants of already known *M. rigidula* s. l. differ from European ones by the presence of 4-pored pollen (not mostly 3-pored as in *M. rigidula* s. str.), and by fruits with more coils and straighter spine tips.

Medicago sativa L., Sp. Pl.: 778 (1753).

Mat.: A-11551	
Hab.: Common in various types of vegetation, in mountain steppes, lowland and montane scrubs, particularly those dominated by grasses	
Dist.: Map 389	Alt.: 450-2200
Ch.: IT ^(alien and cultivated elsewhere)	GF.: HSC
Th. (GNP): NOT (90)	Th. (IR): NOT

Melilotus albus Medicus, Vorles. Churpf. Phys. Ges. 2: 382 (1787). Syn.: *M. kotschyi* O. E. Schulz

Mat.: A-9771, 11726; GA-4998; ZA-18021	
Hab.: Stream and riverside, moist soils at forest margin	
Dist.: Map 390	Alt.: 850-1700
Ch.: PL	GF.: HSC ^(biennial)
Th. (GNP): VUL (6)	Th. (IR): NOT

Melilotus dentatus (Waldst. & Kit) Pers., Syn. Pl. 2: 348 (1807). Syn.: *Trifolium dentatum* Waldst. & Kit., Pl. Rar. Hung. 1: 41 (1802).

Mat.: A-9850	
Hab.: Streamside	
Dist.: Map 391	Alt.: 1100
Ch.: ES-IT ^E	GF.: HSC ^(biennial)
Th. (GNP): END (1)	Th. (IR): END

Melilotus dentatus has recently been recorded as a new record for Iran (Akhani 1996: 103).

Melilotus officinalis (L.) Pall., Riese Prov. Russ. Reiches 3: 537 (1776). Syn.: *Trifolium officinallis* L., Sp. Pl.: 765 (1753); *M. bungeanus* Boiss.

Mat.: A-9365; F-1097; R-52518	
Hab.: Forest margin and garden weed in Tangelog and Tangerang	
Dist.: W, C	Alt.: 450-650
Ch.: IT-ES-M	GF.: HSC ^(biennial)
Th. (GNP): END (3)	Th. (IR): NOT

Meristotropis xanthioides Vassilcz., Not. Syst. Herb. Inst. Bot. Nom. Komarov Acad. Scien. URSS 11: 120 (1949).

Mat.: A-4450, 9498; R-52758	
Hab.: Disturbed places margin of the road and around protection station	
Dist.: Map 392	Alt.: 900-1200
Ch.: IT ^C	GF.: ? GRH
Th. (GNP): VUL (4)	Th. (IR): NOT

Onobrychis aucheri Boiss., Diagn. Pl. Orient. Nov. sér. 1, 2: 94 (1843).

subsp. *teheranica* (Bornm.) Rech. f., Fl. Iranica, 157: 445 (1984). Syn.: *O. teheranica* Bornm., Bull. Herb. Boissier, sér. 2, 5: 846 (1905); *O. spinescens* Bornm.

Mat.: A-10862; R-52876	
Hab.: <i>Artemisia</i> steppe in Mirza-Baylu plain and along Derazi valley	
Dist.: S, E	Alt.: 1100-1250
Ch.: IT ^C	GF.: TCA/TCR ^{DW}
Th. (GNP): VUL (4)	Th. (IR): NOT

Onobrychis cornuta (L.) Desv., J. Bot. Agric.: 81 (1814). Syn.: *Hedysarum cornutum* L., Sp. Pl.: ed. 2: 1060 (1763).

Only subsp. *cornuta* occurs in Iran.

Mat.: A-4410, 9383; AS-6053; GA-4876; F-1150; R-53094, 53095	
Hab.: Common in most of mountain steppes, with or without shrubs, particularly in Almeh plain, and also associated with <i>Juniperus</i> woodland and <i>Acer monspessulanum</i> scrubs	
Dist.: Map 393	Alt.: 1300-2200
Ch.: IT ^{omni}	GF.: CSC TH
Th. (GNP): NOT (62)	Th. (IR): NOT

Onobrychis sintenisii Bornm., Bull. Herb. Boissier, sér. 2, 5: 849 (1909).

Mat.: A-4472, 4529, 4887, 9375, 9580, 10729; F-1129; R-53072* Rz-53974*; WF-12692*; TM-35090**	
Hab.: Mountain steppe with grasses and thorn-cushions, grassy steppes (<i>Stipa</i> , <i>Poa</i> , <i>Festuca</i>), <i>Acer monspessulanum</i> scrub valley, <i>Paliurus spinachristi</i> thickets, <i>Crataegus</i> scrub, rarely <i>Juniperus</i> woodland	
Dist.: Map 394	Alt.: 900-2000
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): NOT (51)	Th. (IR): ? RAR

* Under *O. chorassanica* (det. by Rechinger)

** Under *O. amoena* Popov & Vved. (det. by Rechinger)

The reports of *Onobrychis chorassanica* Bunge (R-53974, 53072, WF-12692) and *O. amoena* Popov & Vved. (TM-35090) by Rechinger (Fl. Iranica 157: 451-452, 1984) from the Park are a misidentification of *O. sintenisii*. This species is extremely polymorphic with regard to indumentum, and leaflets shape and size. But the legume shape is constant and cannot be confused with two other species. During my field studies in nearly all parts of the Park, only *O. sintenisii* was found.

Onobrychis transcaspica V. Nikitin, Fl. URSS 13: 555 (1948).

Mat.: A-10588, 11107; R-52435, 52606	
Hab.: Lowland rocky outcrops often with <i>Carpinus orientalis</i> , <i>Quercus castaneifolia</i> and <i>Paliurus spina-christi</i>	
Dist.: Map 395	Alt.: 450-1550
Ch.: IT ^{KK}	GF.: HCR
Th. (GNP): NOT (22)	Th. (IR): VUL

Ononis spinosa L., Sp. Pl.: 716 (1753).
subsp. **antiquorum** (L.) Arcang., Comp. Fl. Ital.: 157 (1882). Syn.: *Ononis antiquorum* L., Sp. Pl.: ed. 2: 1006 (1763).

Mat.: A-4343; Z-85/154	
Hab.: Moist and waste places around Soolegerd station with <i>Phragmites australis</i>	
Dist.: Map 396	Alt.: 1200
Ch.: IT-M	GF.: CSE TH
Th. (GNP): END (2)	Th. (IR): END

Ononis spinosa subsp. **antiquorum** became recently known for Iran, based on above cited specimens (Akhani 1996: 104).

Ononis pusilla L., Syst. Nat. ed. 10., 2: 1159 (1759). Fig. 21, B.

Mat.: A-11471, 11491, 11686, 11919	
Hab.: Rocky outcrops (grows usually on soils, not stony ground) often in <i>Carpinus orientalis</i> ; <i>Acer monspessulanum</i> - <i>Crataegus</i> thickets, forest margin	
Dist.: Map 397	Alt.: 840-1660
Ch.: M-ES ^{EH}	GF.: HSC
Th. (GNP): RAR (9)	Th. (IR): END

Ononis pusilla, a widely distributed species in the Mediterranean area, was known by Rechinger (Fl. Iranica 157: 193, 1984) from a few localities in N and W parts of Iran. Only one of these have been marked by exclamation mark (usually means that it has been seen by the author of Flora Iranica).

Oxytropis kopetdaghensis Gontsch., Fl. URSS 13: 544 (1948).

Mat.: A-6210, 10779, 10974; R-53076, 53078; T-41447, 41451, 41420	
Hab.: Mountain steppes with or without thorn-cushions, <i>Acer monspessulanum</i> - <i>Crataegus</i> thicket, scrub valley with <i>Haloxylon</i> , transition zone between montane broad-leaved forest and <i>Juniperus excelsa</i> woodland	
Dist.: Map 398	Alt.: 1350-2180
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): RAR (13)	Th. (IR): VUL

Oxytropis suavis Boriss., Bot. Mater. Gerb. Glavn. Bot. Sada SSSR 10: 80 (1947).

Mat.: A-10721, 10538, 11340, 11922, 10245, 11628; AS-6100; R-52862*, 53020 (type of <i>O. bicornis</i> Vassilcz.); Rz-53980**	
Hab.: Road margin, <i>Juniperus</i> woodland, steep limestone cliff, <i>Acer monspessulanum</i> - <i>Crataegus</i> thicket, mountain meadow and exposed mountain summits	
Dist.: Map 399	Alt.: 1200-2400
Ch.: IT ^{?KK}	GF.: HSC
Th. (GNP): RAR (12)	Th. (IR): SUN

* Under *O. kuchanensis* (det. Vassilczenko)

** Under *O. bicornis* (det. Vassilczenko)

Vassilczenko (Fl. Iranica 157, 1984) reported *O. kuchanensis* Vassilcz. (R-52862) and *O. bicornis* Vassilcz. (R-53020) from the Park. The latter has originally been described from the Park and the former from a locality about 200 km E of the Park: Khorasan: Inter Quchan et Bajgiran, 1100-1600 m, Schmid 6312 (Iso: W). After studying the types of both species, I cannot see any reliable differences with those named under *O. suavis* by Vassilczenko. However, I doubt that *O. suavis* is the oldest name for the plants that occur in the Park. The account of *Oxytropis* in Flora Iranica needs a critical review. The true number of the species in the Flora Iranica area is surely much smaller than in Vassilczenko's account.

Pisum sativum L., Sp. Pl.: 727 (1753).

Mat.: TM-34834; W&A-11024	
Hab.: Forest margin or weed garden in Tangerang and Tangegol	
Dist.: W, C	Alt.: 450-650
Ch.: IT-M	GF.: TST
Th. (GNP): END (2)	Th. (IR): NOT

Securigera

The two species of *Securigera*, namely, *S. parviflora* and *S. varia* were included in the older literature, as in Rechinger, Flora Iranica, 157: 357-361, 1984, in the genus *Coronilla*. Recently, Lassen (1989) proposed a new delimitation of the genera *Securigera*, *Coronilla* and *Hippocrepis*. According to his delimitation, supported by morphological characters and chromosome numbers, *Coronilla parviflora* and *C. varia* were transferred to *Securigera*.

Securigera securidaca (L.) Degen & Dörfel. Akad. Wiss. Wien, Math.-Naturwiss. Kl., Denkschr. 64: 718 (1897). Syn.: *Coronilla securidaca* L., Sp. Pl.: 743 (1753); *Securigera coronilla* DC.

Mat.: A-10362; T-34839; R-52513, 33150, 62631; Z&al-86/2935	
Hab.: Rocky outcrops, forest margin (<i>Quercus castaneifolia</i> - <i>Carpinus betulus</i>)	
Dist.: Map 400	Alt.: 450-1200
Ch.: M-ES ^{EH}	GF.: HSC
Th. (GNP): VUL (7)	Th. (IR): NOT

Securigera parviflora (Desv.) Lassen, Willdenowia 19: 60 (1989). Syn.: *Artrolobium parviflorum* Desv., Mém. Soc. Linn. Paris 4: 304 (1826); *Coronilla parviflora* Willd., Sp. Pl.: 3: 1155 (1802), nom. illeg., non Moench, Meth. 121 (1794).

Mat.: D-38623; F-1113; W&al-11039	
Hab.: Known from Tangerang and Tangegol	
Dist.: W, C	Alt.: 450-650
Ch.: M-ES ^{EH}	GF.: TSC
Th. (GNP): END (3)	Th. (IR): END

Securigera varia (L.) Lassen, Svensk Bot. Tidskr. 83: 84 (1989). Syn.: *Coronilla varia* L., Sp. Pl.: 743 (1753).

Mat.: A-9475, 9710; E-716; Fu-7298; IZ-15214; R-52432	
Hab.: Steep rocky outcrops and vertical cliffs, lowland forest, <i>Acer monspessulanum</i> scrub valley, <i>Quercus macranthera</i> forest, <i>Salix aegyptiaca</i> scrub valley, open woodland (transition between montane forest and steppe)	
Dist.: Map 401	Alt.: 450-2000
Ch.: ES-IT-M	GF.: GTU
Th. (GNP): NOT (29)	Th. (IR): NOT

Rechinger (Fl. Iranica 157: 359-361, 1984) classified this very polymorphic species into two geographic races as: subsp. *varia* and subsp. *hirta* (Bunge ex Boiss.) Rech. f. This view is not followed here, not only because of the overlapping of both taxa, but also due to the absence of a valid combination of these taxa under *Securigera*.

Sophora pachycarpa C. A. Mey., Index Sem. Hort. Petrop. 9: 89 (1843). Syn.: *Goebelia pachycarpa* (C. A. Mey.) Bunge ex Boiss., *Ammothamnus intermedius* Kuntze .

Mat.: A-10873	
Hab.: Moderately saline and disturbed soils, margin of the road north Armadlu	
Dist.: S	Alt.: 1200
Ch.: IT ^{C&E}	GF.: HSC
Th. (GNP): END (1)	Th. (IR): NOT

Trifolium

I have found very few *Trifolium* (and *Vicia*) species in the Park. However, a remarkable number of species was collected during 1970-1978 (cf. Flora

Iranica 157: 275-325, 1984), most of them between Tangerang and Tangegol. Many species of *Trifolium* and *Vicia* are incorporated into man made habitats and agricultural lands. Apparently, the development of a natural vegetation after more than three decades of protection, eliminates much of those species with synanthropic origins.

Trifolium angustifolium L., Sp. Pl.: 769 (1753).

Only var. *angustifolium* occurs in Iran.

Mat.: A-11479; R-52441	
Hab.: Pioneer forest (<i>Crataegus pentagyna-Prunus divaricata</i>), forest openings (with <i>Pteridium aquilinum</i>) and open lowland forest (<i>Quercus castaneifolia</i> , <i>Carpinus orientalis</i> , <i>Parrotia persica</i>)	
Dist.: Map 402	Alt.: 450-1000
Ch.: M-ES ^{EH}	GF.: TSC
Th. (GNP): VUL (5)	Th. (IR): VUL

Trifolium arvense L., Sp. Pl.: 769 (1753). Syn.: *T. eriocephalum* Ledeb.; *T. longisetum* Boiss. & Bal.

Only var. *arvense* occurs in our area.

Mat.: A-9740, 11480; R-52427	
Hab.: Forest openings with or without <i>Pteridium aquilinum</i>	
Dist.: Map 403	Alt.: 450-1100
Ch.: ES-M	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Trifolium campestre Schreb. in Sturm, Deutschl. Flora 1, 4, 16: tab. 253 (1804). Syn.: *T. glaucescens* Hausskn.

Mat.: A-11574; F-1038; R-52430; TM-34880	
Hab.: <i>Acer monspessulanum-Lonicera floribunda</i> thickets, open scrub of <i>Crataegus pentagyna-Prunus divaricata</i> , steep rocky outcrops	
Dist.: Map 404	Alt.: 450-1120
Ch.: ES-IT-M ^(alien elsewhere)	GF.: TSC
Th. (GNP): VUL (8)	Th. (IR): NOT

Trifolium canescens Willd., Sp. Pl.: 3: 1369 (1802). Syn.: *T. hohenackeri* Jaub. & Spach.

Mat.: WF-12810 (n.v.)	
Hab.: Reported only from one locality in Tangegol (no more details are available)	
Dist.: C	Alt.: 700-1000
Ch.: ES ^{EH}	GF.: GRH/HST
Th. (GNP): END (1)	Th. (IR): NOT

Trifolium fragiferum L., Sp. Pl.: 772 (1753).

Only var. *pulchellum* Lange was found in the area.

Mat.: Z-82/174	
Hab.: Known from one collection in Sharleq	
Dist.: S	Alt.: 900
Ch.: ES-IT-M ^(alien elsewhere)	GF.: GRH/HST
Th. (GNP): END (1)	Th. (IR): NOT

Trifolium lappaceum L., Sp. Pl.: 768 (1753).

Mat.: A-11566; R-52459	
Hab.: With <i>Crataegus pentagyna-Prunus divaricata</i> scrub in Tangerang and Khandoushan	
Dist.: W	Alt.: 400-460
Ch.: M [IT-ES ^{EH}]	GF.: TSC
Th. (GNP): END (3)	Th. (IR): VUL

Trifolium ochroleucum Huds., Fl. Angl. 283 (1762). Syn.: *T. roseum* J. & C. Presl.

Mat.: A-4382, 11481, 11482	
Hab.: Forest opening with <i>Pteridium aquilinum</i> and more or less open lowland forest with <i>Quercus castaneifolia</i> and <i>Parrotia persica</i>	
Dist.: Map 405	Alt.: 500-1500
Ch.: ES-M	GF.: GSC
Th. (GNP): VUL (4)	Th. (IR): END

Heller (Fl. Iranica 157: 307-308, 1984) reported *T. caucasicum* Tausch from Iran, only from one locality within the National Park: Inter Tang-e Rah et Tang-e Gol, 400-600 m, Rech. 52519 (n. v.). The very variable and widespread *T. ochroleucum* has also been known by Heller (l. c.: 314), only from one locality in Gilan: 12 km W Astara, 900 m, Cowan & Darlington 2503 (n.v.). No authentic material of *T. caucasicum* has been seen by the author. I compared my plants with several specimens from Europe in M. But I could not find reliable differences between the Iranian and the European plants. The presence of a mucro in the leaflets of *T. caucasicum* and obtuse leaflets in *T. ochroleucum* - as have been used by Heller in the key of Flora Iranica (page 278) to distinguish these species- are inconstant characters. A-4382 has mucronate, obtuse and emarginate leaflets on the same plant. The other characters, like colour of corolla and flowers and the length of calyx teeth need to be examined with more material and field studies.

Trifolium pratense L., Sp. Pl.: 768 (1753).

Mat.: A-11870; Z-85/182	
Hab.: <i>Crataegus</i> shrubland, lowland forest margin	
Dist.: Map 406	Alt.: ? 1000-1500
Ch.: ES-IT-M	GF.: HSC
Th. (GNP): END (3)	Th. (IR): NOT

Trifolium radicosum Boiss. & Hohen. in Boiss., Diagn. Pl. Orient. Nov. sér. 1, 9: 27 (1849).

Mat.: TM-34828	
Hab.: Only known in Tangerang	
Dist.: W	Alt.: ? 1580
Ch.: ES ^{HY}	GF.: GRH
Th. (GNP): END (1)	Th. (IR): NOT

Trifolium repens L., Sp. Pl.: 767 (1753).

Mat.: A-10370; R-52514	
Hab.: Moist soils, margin of road and forest between Tangerang and Tangegol	
Dist.: W	Alt.: 450-600
Ch.: ES-IT-M ^(alien and cult. elsewhere)	GF.: HST/GRH
Th. (GNP): END (2)	Th. (IR): NOT

Trifolium resupinatum L., Sp. Pl.: 771 (1753).

Only var. *majus* Boiss. has been recorded from our area (Heller in Fl. Iranica, 157: 301, 1984).

Mat.: R-52486; TM-34827 (both n. v.)	
Hab.: Known from Tangerang	
Dist.: W	Alt.: 400-580
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

Trifolium scabrum L., Sp. Pl.: 770 (1753).

Mat.: R-52419; TM-34882	
Hab.: Known from Tangerang	
Dist.: W	Alt.: 450
Ch.: ES-M [IT]	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

Trifolium tumens Steven ex M. Bieb., Fl. Taur.-Caucas. 2: 217 (1808).

Only var. *tumens* was known in our area.

Mat.: A-11080-b; F-1110; R-52480; W&A1-11032	
Hab.: Forest margin, wet and waste places	
Dist.: Map 407	Alt.: 450-1550
Ch.: ES ^{EH}	GF.: GSC
Th. (GNP): VUL (5)	Th. (IR): NOT

Trigonella

See notes under *Medicago* regarding the delimitation of the genus.

Trigonella foenum-graceum L., Sp. Pl.: 777 (1753).

Mat.: A-11862	
Hab.: <i>Acer monspessulanum</i> - <i>Lonicera floribunda</i> and <i>Paliurus spina-christi</i> thickets	
Dist.: Map 408	Alt.: 700-1120
Ch.: PL	GF.: TSC
Th. (GNP): END (3)	Th. (IR): RAR

Vicia

See also notes under *Trifolium*.

Vicia cassubica L., Sp. Pl.: 735 (1753).

Mat.: A-21.8.1995 (fragment); Z-85/184	
Hab.: Forest margin with <i>Pteridium aquilinum</i>	
Dist.: Map 409	Alt.: 1000-1700
Ch.: ES	GF.: HCR
Th. (GNP): END (2)	Th. (IR): END

Known as new record for Iran (Akhani 1999).

Vicia crocea (Desf.) B. Fedtsch., Fl. URSS, 13: 425 (1948). Syn.: *Orobis croceus* Desf., Choix Pl. Coroll. Tournef. 85, tab. 63 (1808); *Vicia aurantia* (Steven) Boiss.

Mat.: A-4380, 9974, 10595; AS-6131; WF-12781	
Hab.: Montane forest	
Dist.: Map 410	Alt.: 1000-2000
Ch.: ES ^{EH}	GF.: HSC
Th. (GNP): NOT (66)	Th. (IR): NOT

Vicia grandiflora Scop., Fl. Carn. ed. 2, 2: 65 (1772).

Mat.: A-10648, 11540; So-11240	
Hab.: In meadow or with <i>Pteridium aquilinum</i> in forest clearings	
Dist.: Map 411	Alt.: 1000-1500
Ch.: ES	GF.: TST
Th. (GNP): END (3)	Th. (IR): END

Vicia hirsuta (L.) S. F. Gray, Nat. Arr. Brit. Pl. 614 (1821). Syn.: *Ervum hirsutum* L., Sp. Pl.: 738 (1753).

Mat.: A-10391, 10641; K-5756 (n.v.); R-52438; TM-34841	
Hab.: Lowland and montane forest	
Dist.: Map 412	Alt.: 450-1500
Ch.: PL	GF.: TSC
Th. (GNP): VUL (7)	Th. (IR): NOT

Vicia lutea L., Sp. Pl.: 736 (1753). s. l. Incl. *V. hirta* Balbis ex DC., Syn. Fl. Gall. 360, (1806).

Mat.: A-11541**; F-1111*; R-52434*; TM-34837**	
Hab.: <i>Paliurus spina-christi</i> scrub, forest openings with <i>Pteridium aquilinum</i> , lowland forest with <i>Quercus castaneifolia</i>	
Dist.: Map 413	Alt.: 450-1060
Ch.: M-ES ^{EH}	GF.: TST
Th. (GNP): VUL (6)	Th. (IR): VUL

* var *lutea*

** var. *hirta* (Balbis) Loisel.

Vicia michauxii Spreng., Fl. Halens. Mant. 48 (1807). Syn.: *V. perspolitana* Boiss.

Only var. *stenophylla* Boiss. was reported from our area.

Mat.: U-16079 (n.v. fide Chrtková-Žertová in Fl. Iranica 140: 45, 1979).	
Hab.: It has been recorded from Tangegol	
Dist.: C	Alt.: 1050
Ch.: IT ^{W&C}	GF.: TST
Th. (GNP): END (1)	Th. (IR): NOT

Vicia monantha Retz., Obs. Bot. 3: 39 (1783). Syn.: *V. calcarata* Boiss.

Mat.: A-10435; TM-34829, 34831 (n.v.)	
Hab.: <i>Artemisia</i> steppe NW of Dasht and Tangerang (without details)	
Dist.: W, S	Alt.: 450-1100
Ch.: IT-M	GF.: TST/TSC
Th. (GNP): END (2)	Th. (IR): NOT

Vicia narbonensis L., Sp. Pl.: 737 (1753).

Only var. *narbonensis* is known in Iran.

Mat.: AS-6008; R-52487; TM-34825	
Hab.: Known from some localities in Tangerang, Tangegol and in <i>Paliurus spina-christi</i> scrub between Golzar and Sharleq	
Dist.: W, C, S	Alt.: 450-1000
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Vicia pannonica Crantz, Strip. Austr. ed. 2, 2: 393 (1769).

Mat.: A-10625, 10651; R-52761-b	
Hab.: Closed montane forest, <i>Paliurus spina-christi</i> scrub	
Dist.: Map 414	Alt.: 650-1550
Ch.: ES-M	GF.: TST
Th. (GNP): VUL (4)	Th. (IR): END

V. pannonica was known by Chrtková-Žertová (Fl. Iranica, 140: 42, 1979) only from one locality in the Park (R-52761-b). I have not seen the material and therefore cannot be certain on their identity. The European specimens with which I have compared my specimens are characterized by longer flowers and a denser indumentum.

Vicia peregrina L., Sp. Pl.: 737 (1753).

Mat.: A-10360; R-52761 (n.v.)	
Hab.: <i>Paliurus spina-christi</i> thickets from Tunnel to Sharleq	
Dist.: S	Alt.: 900-1140
Ch.: ES-IT-M	GF.: TSC/TCR
Th. (GNP): END (2)	Th. (IR): NOT

Vicia sativa L., Sp. Pl.: 1: 736 (1753). s. l.

Mat.: A-10390; So- s. n. (material not seen: U-16109, K-5755, 5757; TM-34823, 34834, 34840, fide Fl. Iranica 140, 51, 1979)	
Hab.: Margin of lowland forest in Tangegol and Tangerang	
Dist.: W, S	Alt.: 450-1000
Ch.: ES-IT-M	GF.: TST
Th. (GNP): RAR (9)	Th. (IR): NOT

V. amphicarpa Lam. belongs to the *V. sativa* complex and is regarded by some authors as a subspecies of *V. sativa*. Chrtková-Žertová (Fl. Iranica 140, 54, 1979) reported this taxon from the Park: Tang-e Rah, 400 m, Rech. 52433 (n.v.).

Vicia subvillosa (Ledeb.) Trautv., Trudy Glavn. Bot. Sada 3: 42 (1872) non Boiss. Syn.: *Orobis subvillosus* Ledeb.; *Lathyrus subvillosus* (Ledeb.) Aitch. & Hemsl.

Mat.: A-6155, 10212, 10474; R-53077; W&A-10979	
Hab.: Mountain steppe with grasses and thorn-cushions, <i>Artemisia-Festuca-Stipa</i> steppe,	

<i>Juniperus</i> woodland, dry valley with <i>Haloxylon</i> shrubs	
Dist.: Map 415	Alt.: 1000-1850
Ch.: IT ^E	GF.: GRH
Th. (GNP): NOT (16)	Th. (IR): NOT

Vicia tetrasperma (L.) Schreb., Spic. Fl. Lips. 26 (1771). Syn.: *Ervum tetraspermum* L.

Mat.: A-10379; R-52515	
Hab.: Forest margin in Tangerang and Tangegol	
Dist.: W, C	Alt.: 450-600
Ch.: ES-IT-M	GF.: TST
Th. (GNP): VUL (4)	Th. (IR): VUL

Vicia variabilis Freyn & Sint., Österr. Bot. Z. 42: 82 (1892). Fig. 9, D.

Mat.: A-4353, 9701, 11088, 11793; F-1128; So-11236, 11237, 11238, 11243	
Hab.: Transition between montane forest and steppe with scattered trees and shrubs and forest openings with <i>Pteridium aquilinum</i>	
Dist.: Map 416	Alt.: 1000-2230
Ch.: IT	GF.: HSC/HST
Th. (GNP): NOT (21)	Th. (IR): NOT

The taxonomic status of various taxa in the *V. cracca* group (incl. *V. variabilis*, *V. tenuifolia*) in SW Asia is not well known. I provisionally followed Flora Iranica by using the name *V. variabilis* for the populations that occur in our area. This species is the most common *Vicia* in open forests in the northwestern parts of the Park. In some areas it forms pure impenetrable patches which are harvested annually by the local people and by Park staff (see Fig. 9, D.).

Vicia venulosa Boiss. & Hohen., Diagn. Pl. Orient. Nov. sér. 1, 9: 123 (1849).

Mat.: A-11037	
Hab.: Dry stony and gravelly brooklet bed at the beginning of Darreh Palang (in the middle of Alme valley) surrounded by <i>Juniperus excelsa</i> woodland	
Dist.: E	Alt.: 1500
Ch.: IT ^{KK}	GF.: HSC/HST
Th. (GNP): END (1)	Th. (IR): END

The above cited plant was compared with the type specimen: Monte Elborz prope Darband, Kotschy 233 (M).

Vicia villosa Roth, Tent. Fl. Germ. 2, 2: 182 (1793).

Mat.: R-52596 (n.v.); Z-82/233	
Hab.: Known along Madrasu river in Sharleq and between Tangerang and Tangegol	
Dist.: C, S	Alt.: 500-900
Ch.: IT-ES-M	GF.: TSC/HSC
Th. (GNP): END (2)	Th. (IR): NOT

Fagaceae

Quercus castaneifolia C. A. Mey., Verz. Pfl. Cauc. 44 (1831). Fig. 21, C-D.

Mat.: A-4373, 4395, 4533, 9245, 9300, 9329, 9808, 9946, 9947; GA-4937, 4980; R-37632	
Hab.: One of the most important tree and shrub elements in lowland and montane closed and open forests and scrubs. In closed forest as tree associated usually with <i>Carpinus betulus</i> and in open forest on rocky outcrops as shrub associated with <i>Carpinus orientalis</i>	
Dist.: Map 417	Alt.: 450-2000
Ch.: ES ^{HV}	GF.: PTS/PSS
Th. (GNP): NOT (162)	Th. (IR): NOT

Quercus macranthera Fisch. & C. A. Mey., in Bull. Soc. Imp. Naturalites Moscou 11: 260 (1838). Fig. 7, G-H.

Mat.: A-9987, 11300, 11611, 11867, 11989; GA-4965; W&C-14373	
Hab.: The most important forest element in the montane forest, particularly over 2000 m	
Dist.: Map 418	Alt.: 900-2300
Ch.: ES ^{EH}	GF.: PTS (rarely PSS)
Th. (GNP): NOT (50)	Th. (IR): NOT

Frankeniaceae

Frankenia hirsuta L., Sp. Pl.: 331 (1753). Syn.: *F. aucheri* Jaub. & Spach; *F. hirsuta* L. subsp. *aucheri* (Jaub. & Spach) Bornm.

Mat.: A-10845, 12226	
Hab.: Saline soils associated with <i>Salsola dendroides</i> and other halophytes	
Dist.: Map 419	Alt.: 1200
Ch.: ES-IT-M	GF.: HSC
Th. (GNP): END (2)	Th. (IR): NOT

Fumariaceae

Corydalis angustifolia (M. Bieb.) DC., Reg. Veg. Syst. Nat. 2: 120 (1821). Syn.: *Fumaria angustifolia* M. Bieb., Fl. Taur.-Caucas. 2: 146 (1808).

Mat.: A-10307; AS-6108, I-8148	
Hab.: Mountain meadow, mixed of grasses and open woodland	
Dist.: Map 420	Alt.: 1450-2000
Ch.: ES ^{EH}	GF.: GTU
Th. (GNP): END (3)	Th. (IR): END

Corydalis chionophila Czerniak., Izv. Glavn. Bot. Sada SSSR 29: 138 (1930).

Mat.: A-10203, AS-6101; Fu-5120, I-12295	
Hab.: Mountain meadows with scattered shrubs	
Dist.: Map 421	Alt.: 1700-2000
Ch.: IT ^{KK}	GF.: GTU
Th. (GNP): VUL (4)	Th. (IR): END

Corydalis marschalliana (Pall.) Pers., Syn. Pl. 2: 269 (1807). Syn.: *Fumaria marschalliana* Pall., Nov. Act. Petrop. 10: 315 (1797). *Corydalis bulbosa* (L.) DC. subsp. *marschalliana* (Pall.) Chater.

Mat.: A-10590; I-12294	
Hab.: Rather sunny montane forest	
Dist.: SW & ?	Alt.: 1500
Ch.: ES ^{EH}	GF.: GTU
Th. (GNP): END (2)	Th. (IR): RAR

Fumaria densiflora DC., Cat. Pl. Hort. Mosnp. 113 (1813). Syn.: *F. micrantha* Lag.

Mat.: AS-6140; W&A-11042; U -14903, 16147, 16026 (Uotila's specimens not seen)	
Hab.: Rocky outcrops above Tangerang	
Dist.: C	Alt.: 500-1000
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): VUL (5)	Th. (IR): SUN

Fumaria vaillantii Loisel. in Desv., J. Bot. 2: 358 (1809).

Mat.: A-6176; F-1004; R-53167, 52799, 52658; U-16277 (n.v.)	
Hab.: Forest margin, <i>Paliurus spina-christi</i> scrub valley	
Dist.: Map 422	Alt.: 750-1500
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): VUL (6)	Th. (IR): NOT

F. parviflora is very similar to *F. vaillantii* and has been recorded from various localities around the Park. Its occurrence in the Park or on cultivated land at the margin of the Park is very probable. The bracts of *F. parviflora* are as long as or longer than the pedicel, but those of *F. vaillantii* are shorter than the pedicel.

Gentianaceae

Centaureum erythraea Rafn, Danm. Holst. Fl. 2: 75 (1800). subsp. *erythraea*. Fig. 21, E.

Mat.: A-9721, 9669	
Hab.: Forest openings on steep slopes	
Dist.: Map 423	Alt.: 800-1000
Ch.: ES-M [IT]	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

Centaureum erythraea Rafn subsp. *turcicum* (Velen.) Melderis in J. Linn. Soc., Bot. 65:232 (1972). Syn.: *Erythraea turcica* Velen. in Abh. Königl. Böhm. Ges. Wiss. ser. 7, 1: 31 (1886).

Mat.: A-4496 (doubtful), 11735	
Hab.: Margin of river valley	
Dist.: Map 424	Alt.: 1350-1700
Ch.: IT-M	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

Geraniaceae

Biebersteinia multifida DC., Prodr. 1: 708 (1824).

Mat.: R-53040; W&A-10991	
Hab.: Vernal species in steppe and mountain steppe (<i>Artemisia-Stipa</i> steppe, mixed of grasses and thorn-cushions)	
Dist.: Map 425	Alt.: 1200-1900
Ch.: IT ^{omni}	GF.: GTU
Th. (GNP): VUL (5)	Th. (IR): NOT

Erodium ciconium (Jusl.) L'Hér. in Aiton, Hort. Kew. 2: 414 (1789). Syn.: *Geranium ciconium* L., Sp. Pl.: ed. 2: 952 (1763).

Mat.: A-10559 a, 10429	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppe in Dasht and Nekarbandi (7-8 km NW Soolegerd)	
Dist.: NE, S	Alt.: 1000-1100
Ch.: M-IT	GF.: TCA/TCR
Th. (GNP): END (2)	Th. (IR): NOT

Erodium cicutarium (L.) L'Hér. in Aiton, Hort. Kew 2: 414 (1789). Syn.: *Geranium cicutarium* L., Sp. Pl.: 650 (1753).

Mat.: A-5969, 6164, 10269, 10559-b, 10572, 10430; F-1057; R-52754, 33172	
Hab.: <i>Paliurus spina-christi</i> scrub, <i>Artemisia</i> steppe, scrub valley, waste places around the stations	
Dist.: Map 426	Alt.: 900-1500
Ch.: ES-IT-M [SS] ^{alien} elsewhere	GF.: TSR (or biennial)
Th. (GNP): RAR (9)	Th. (IR): NOT

Erodium oxycorymbum M. Bieb., Fl. Taur.-Caucas. 2: 133 (1808).

Mat.: A-10925	
Hab.: On sand dune above the hill at the beginning of the Almeh valley	
Dist.: E	Alt.: 1500
Ch.: IT-SS	GF.: TSR (or biennial)
Th. (GNP): END (1)	Th. (IR): NOT

Geranium divaricatum Ehrh., Beitr. Naturk. 7: 164 (1792).

Mat.: A-9615; AS-6016	
Hab.: <i>Stipa</i> steppe between Sharleq and Almeh and <i>Zelkova carpinifolia</i> - <i>Carpinus betulus</i> forest in Golzar	
Dist.: C, S	Alt.: 850-1400
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): END (2)	Th. (IR): RAR

Geranium kotschyi Boiss., Diagn. Pl. Orient. Nov. sér. 1, 6: 30 (1845).

Mat.: A-10204, 10251, 10445; AS-5933; F-1187, 1119; W&al-10970	
Hab.: <i>Artemisia</i> and <i>Artemisia-Festuca-Stipa</i> steppes, mountain steppe with grasses and thorn-cushions, <i>Juniperus</i> woodland	
Dist.: Map 427	Alt.: 1000-1880
Ch.: IT ^c	GF.: GBT
Th. (GNP): NOT (16)	Th. (IR): NOT

Geranium lucidum L., Sp. Pl.: 682 (1753).

Mat.: W&al-10938	
Hab.: Limestone cliffs with ledges of deep soil, 6 km E of Tangeqol	
Dist.: C	Alt.: 820
Ch.: ES-M-IT	GF.: TSC
Th. (GNP): END (1)	Th. (IR): RAR

Geranium purpureum Vill. FL. Delph. in L., Syst. Pl. Eur. vol. 1, 72 (1785).

Mat.: A-9981, 11910, 11488	
Hab.: Closed lowland and montane forest often on moist soils and streamside	
Dist.: Map 428	Alt.: 500-2100
Ch.: ES-M	GF.: TSC
Th. (GNP): RAR (12)	Th. (IR): NOT

Geranium pusillum L., Syst. Nat. ed. 10: 1144 (1759).

Mat.: A-10582; R-52617	
Hab.: <i>Paliurus spina-christi</i> scrub in Sharleq, <i>Quercus castaneifolia</i> lowland forest E of Tangeqol	
Dist.: C, S	Alt.: 750-1000
Ch.: ES-IT-M	GF.: TCR
Th. (GNP): END (2)	Th. (IR): END

Geranium pyrenaicum Burm. f., Spec. Bot. German. 27 (1759). Syn.: *G. elbursense* Gilli.

Mat.: A-11911, 12007	
Hab.: Mountain meadow, montane forest bottom of an alpine karstic gully surrounded by montane forest	
Dist.: Map 429	Alt.: 1880-2140
Ch.: ES-M	GF.: GRH
Th. (GNP): END (3)	Th. (IR): NOT

Geranium robertianum L., Sp. Pl.: 681 (1753).

Mat.: A-11269	
Hab.: Montane forest in Besh-Jakhdan	
Dist.: NW	Alt.: 1900-1960
Ch.: PL	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Geranium rotundifolium L., Sp. Pl.: 683 (1753).

Mat.: A-10414, 10548; AS-6042	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppe, vertical rock cliffs with <i>Carpinus orientalis</i> and <i>Stipa bromoides</i>	
Dist.: Map 430	Alt.: 1000-1440
Ch.: ES-IT-M	GF.: TCR/TSC
Th. (GNP): END (3)	Th. (IR): NOT

Grossulariaceae

Ribes melananthum Boiss. & Hohen., in Boiss. Diagn. Pl. Orient. Nov. sér. 2, 10: 19 (1849).

Mat.: A-11908	
Hab.: Irregularly rocky substrate top of Alu-Baq Mountain with <i>Acer monspessulanum</i>	
Dist.: Map 431	Alt.: 2080-2140
Ch.: IT ^{KK} or Alborz	GF.: PSS
Th. (GNP): END (1)	Th. (IR): END

Ribes spec.

Mat.: A-12062	
Hab.: Flat summit top of Gerieh-Sar mountain with carpet-like scrub of <i>Juniperus sabina</i> and <i>J. communis</i>	
Dist.: Map 431	Alt.: 2080-2140
Ch.: IT ^{KK} or Alborz	GF.: PSS
Th. (GNP): END (1)	Th. (IR): END

Provisionally I kept two above cited *Ribes* as separate species. Both specimens are very late collections (7 & 23 August, respectively), without complete inflorescence. A comparison with the type specimen of *R. melanathum* (In saxosis jugi Naserou in m. Damawend, 21.6.1843, Th. Kotschy 349, W), showed that the divaricate branching, the brown colour of the last years branches and the yellowish leaves in A-11908 match well with the type. A-12062 differs by the intricate branching, concolourous branches (both old and last years branches are grey) and by having grey-green leaves.

Hamamelidaceae

Parrotia persica (DC.) C. A. Mey., Verz. Pfl. Cauc.: 46 (1831). Syn.: *Hamamelias persica* DC., Prodr. 4: 268 (1830). Fig. 7, A.

Mat.: A-9371; E-712; GA-4955, 4999; K-7685 R-52458	
Hab.: Lowland forest, alluvial and riparian forest, often with <i>Diospyrus lotus</i> , <i>Acer velutinum</i> with <i>Quercus castaneifolia</i> and <i>Carpinus betulus</i> , rarely closed rocky outcrops	
Dist.: Map 432	Alt.: 450-1440
Ch.: ES ^{HY}	GF.: PTS
Th. (GNP): NOT (41)	Th. (IR): NOT

Hypericaceae

Hypericum androsaemum L., Sp. Pl.: 784 (1753).
Syn.: *Androsaemum officinale* All.

Mat.: A-9230, 9252	
Hab.: Closed lowland and submontane forest, stream and springside	
Dist.: Map 433	Alt.: 450-1700
Ch.: ES-M	GF.: CHE/CSE
Th. (GNP): NOT (29)	Th. (IR): NOT

Hypericum elongatum Ledeb., Fl. Altaica 3: 367 (1831).

subsp. *elongatum*. Syn.: *H. hyssopifolium* (Ledeb.) Woronow

Mat.: A-4462, 11314, 9586-b, 10606; F-1149; W&C-14281; WF-12682	
Hab.: Mountain steppe and mountain meadows (often dominated by <i>Stipa</i> and thorn-cushions), shrubby vegetation with <i>Acer monspessulanum</i> , <i>Crataegus</i> , <i>Paliurus</i> , and <i>Lonicera floribunda</i> ; <i>Juniperus excelsa</i> woodland; mountain summits in <i>J. sabina</i> - <i>J. communis</i> scrub; <i>Quercus macranthera</i> forest	
Dist.: Map 434	Alt.: 800-2180
Ch.: IT ^{W & Cauc. Turk.}	GF.: HSC
Th. (GNP): NOT (65)	Th. (IR): NOT

Hypericum aff. elongatum

A-9480

Here cited material differs from *H. elongatum* subsp. *elongatum* by the thinner leaf texture and the hairy lower surface of the leaves and young shoots, respectively (these differences have been confirmed by Dr N. Robson, pers. comm.). Future studies may show that this specimen belongs to another taxon than *H. elongatum* subsp. *elongatum*.

Hypericum linarioides Bosse, Allg. Gartenzeit. 3: 99 (1835)

Mat.: A-11346, 11312	
Hab.: Moist subalpine meadows, margin of <i>Quercus macranthera</i> forest	
Dist.: Map 435	Alt.: 1900-2200
Ch.: ES ^{EH}	GF.: HSC/HCR
Th. (GNP): VUL (4)	Th. (IR): VUL

A typically small plant, 15-25 cm tall, characterized by the radicate stems, the distinct red-venose petals, the 2-7 (-8) cm subspicate inflorescence, 4-8 mm wide flat elliptic leaves, and 1-1.7

cm long and ± eglandulose calyx. The nearest known locality of this species to our area is according to Robson (Fl. Iranica, 49: 15, 1968) in Mazandaran: Nur. It is interesting that all reports of this species in Flora Iranica are based on old collections by Aucher and Buhse. A recent record of the species is from Arasbaran Protected Area in N. Azerbaijan (Assadi 1987: 169).

Hypericum perforatum L., Sp. Pl.: 785 (1753).

Mat.: A-4369, 4418, 9708, 9713, 9775, 9979, 11192; F-1059; WF-12777, 12753; ZK-82/105	
Hab.: Steep and gentle rocky outcrops in forested zone, various types of scrubs and open woodland, forest opening with <i>Pteridium aquilinum</i> , rarely closed forests	
Dist.: Map 436	Alt.: 700-2200
Ch.: PL (mainly ES-M)	GF.: HSC
Th. (GNP): NOT (80)	Th. (IR): NOT

Hypericum scabrum L., Cent. Plant. 1: 25 (1755).

Mat.: A-6213, 10720, 11313, 9384, 9586-a; F-1154; WF-12688	
Hab.: Grassy mountain steppes with thorn-cushions, <i>Stipa</i> steppe, <i>Acer monspessulanum</i> and <i>Paliurus</i> and <i>Crataegus</i> scrubs, juniper woodland, dry valley with <i>Haloxylon</i> shrubs, subalpine meadow, margin of brooklets and springs	
Dist.: Map 437	Alt.: (650-) 1200-2170
Ch.: IT ^{W&C}	GF.: HSC
Th. (GNP): NOT (62)	Th. (IR): NOT

Hypericum tetrapterum Fries, Nov. Fl. Suec. 94 (1823).

Mat.: A-9904; GA-5002; Z-85/258	
Hab.: Streamside in lowland forest	
Dist.: Map 438	Alt.: 650-850
Ch.: ES [M]	GF.: HSC/HCR
Th. (GNP): END (2)	Th. (IR): VUL

Juglandaceae

Juglans regia L., Sp. Pl.: 997 (1753).

Mat.: A-9767; W&C-14317	
Hab.: Usually in valleys, in some places it may be cultivation remnant of human settlements	
Dist.: Map 439*	Alt.: 500-1500 ?
Ch.: ? IT-ES ^{EH}	GF.: PTS
Th. (GNP): IND	Th. (IR): NOT

* The map is incomplete.

Lamiaceae (Labiatae)

Acinos rotundifolius Pers., Syn. Plant. 2: 131 (1806). Syn.: *A. graveolens* (M. Bieb.) Link; *Thymus graveolens* M. Bieb.

Mat.: A-6193, 10527	
Hab.: Mountain steppe (<i>Festuca valesiaca-Stipa lessingiana</i>); <i>Juniperus</i> woodland, dry valley with <i>Haloxylon</i> shrubs, montane scrub (<i>Quercus castaneifolia, Carpinus orientalis-Acer-monspessulanum</i>)	
Dist.: Map 440	Alt.: 1400-1950
Ch.: IT-M	GF.: TCA ^{DW}
Th. (GNP): VUL (6)	Th. (IR): NOT

I follow Davis & Leblebici (Flora of Turkey, 7: 334, 1982) and Nikitin & Geldykhov (1988: 518), regarding the synonymy of *A. graveolens* and *C. rotundifolius*.

Ajuga commata Stapf, Akad. Wiss. Wien, Math.-Naturwiss. Kl., Denkschr. 50: 50 (1885). Syn.: *A. pseudochia* Schost.; *A. chia* Benth.

Mat.: A-9908, 9725; 12267, AS-6076; R-52800; W&C-14392	
Hab.: Steep rocky outcrops with various scrub vegetation, moist soils, margin of a river valley, mountain steppe (<i>Festuca valesiaca, Thymus kotschyanus</i>), forest openings	
Dist.: Map 441	Alt.: 700-1960
Ch.: IT ^{W-ES} ^{EH}	GF.: HSC ^{DW}
Th. (GNP): NOT (19)	Th. (IR): NOT

Ajuga chamaecistus Ging. ex Benth. has been recorded by Zehzad (in Hasanzadeh-Kiabi & al. 1994: 92). I have not seen any material.

Calamintha grandiflora (L.) Moench, Meth. 408 (1794). Syn.: *Melissa grandiflora* L., Sp. Pl.: 532 (1753); *Satureja grandiflora* (L.) Scheele; *Thymus grandiflora* (L.) Scop.; *Clinopodium grandiflorum* (L.) Kuntze.

Mat.: Abai 12353	
Hab.: Na'leyn forest	
Dist.: ?	Alt.: ?
Ch.: ES	GF.: HSC
Th. (GNP): ? EXT	Th. (IR): RAR

The only specimen collected in 1967, cannot be localized. My intensive efforts to trace the

occurrence of this species in the Park, was unsuccessful. Probably, the cited material is from a locality outside the Park.

Calamintha nepeta (L.) Savi, Fl. Pis. 2: 63 (1798). Syn.: *Melissa nepeta* L., Spec. Plant: 593 (1953); *Satureja nepeta* (L.) Scheele; *C. officinalis* auct Fl. Iranica non Moench. Fig. 21, F.

Mat.: A-12231, 9649, 9901, 12193, 12186, 12211, 12212, 11998; GA-4992; TM-35089 (n.v.)	
Hab.: Lowland forest (often with <i>Quercus castaneifolia</i> , <i>Parrotia persica</i> and <i>Carpinus betulus</i>), steep rocky forest, streamside	
Dist.: Map 442	Alt.: 450-1400 (-1820)
Ch.: ES	GF.: HSC
Th. (GNP): NOT (21)	Th. (IR): NOT

C. nepeta usually grows in lowland forests under 1000 m altitude. However, it occurs in Beili-Kuh in an elevation up to 1400 m and on northern slopes of Alu Baq in 1820 m.

I follow here Ball (1972: 346) and Davis & Leblebici (Flora of Turkey, 7: 327, 1982), regarding the nomenclature of this species. The 4.5-6 mm calyx length and 1-2.5 mm long lower calyx teeth correspond to *C. nepeta*. Rechinger (Fl. Iranica 150: 511, 1982) used the name *C. officinalis* Moench for the Iranian plants. This species has been known as a synonym of *C. nepeta* subsp. *glandulosa* (Req.) P. W. Ball, because of taxonomic and nomenclatural reasons elucidated by Ball (l.c.).

Clinopodium umbrosum (M. Bieb.) K. Koch, Linnaea 21: 673 (1848). Syn.: *Melissa umbrosa* M. Bieb., Fl. Taur.-Caucas. 2: 63 (1808); *Calamintha umbrosa* (M. Bieb.) Fisch. & C. A. Mey.; *Satureja umbrosa* (M. Bieb.) Scheele.

Mat.: A-9302, 9902, 9237-a, 9794, 9735, 9807, 11504, 11461, 11654; GA-4963; R-52543	
Hab.: Closed lowland and montane forest, river and streamside, rarely rocky outcrops (with closed vegetation)	
Dist.: Map 443	Alt.: 500-2000
Ch.: ES ^{EH} -Himalaya, Assam, Burma	GF.: HSC
Th. (GNP): NOT (82)	Th. (IR): NOT

Clinopodium vulgare L., Sp. Pl., 587 (1753). Syn.: *C. integerrima* Boriss.

Mat.: A-4375, 9812, 9723, 9677, 11309, 11503, 11564, 11097, 11614; GA-4968	
Hab.: Steep rocky outcrops in forested zones often with <i>Carpinus orientalis</i> , <i>Crataegus</i> scrub, forest opening with <i>Pteridium aquilinum</i> , lowland and montane forest, <i>Quercus macranthera</i> forest	
Dist.: Map 444	Alt.: (550-)1000-2050
Ch.: PL ^(N Temperate)	GF.: HSC
Th. (GNP): NOT (48)	Th. (IR): NOT

Dracocephalum kotschyi Boiss., Diagn. Pl. Orient. Nov. sér. 1, 7: 53 (1846).

Mat.: A-11356	
Hab.: Found once on limestone ground in open <i>Juniperus</i> woodland, N slopes of Divar Kaji Mountain	
Dist.: C	Alt.: 1900
Ch.: IT ^C (mostly Alborz)	GF.: CSC
Th. (GNP): END (1)	Th. (IR): NOT

Eremostachys boissieriana Regel, Trudy Glavn. Bot. Sada 9: 559 (1886).

Mat.: AS-5934; R-52927	
Hab.: <i>Artemisia</i> steppe in Mirza-Baylu plain	
Dist.: E	Alt.: 1200
Ch.: IT ^E	GF.: GTU
Th. (GNP): END (2)	Th. (IR): END

Eremostachys labiosiformis (Popov) Knorring, Fl. URSS 21: 26 (1954). Syn.: *E. laciniata* (L.) Bunge var. *labiosiformis* Popov, Nouv. Mém. Soc. Imp. Naturalistes Moscou, 19: 96 (1940). Fig. 21, H.

Mat.: A-10336, 10974; AS-5986; Z&al-86/2621; R-53143 (n.v.); Sabeti-5469 (n.v.)	
Hab.: <i>Artemisia-Stipa</i> steppe, mountain steppe with grasses and thorn-cushions, <i>Paliurus spina-christi</i> , <i>Acer monspessulanum</i> scrub, dry scrub valley with scattered <i>Juniperus</i> trees, transition between <i>Artemisia</i> steppe and montane scrub	
Dist.: Map 445	Alt.: 1000-1800
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): RAR (9)	Th. (IR): NOT

Eremostachys aff. labiosifomis. Fig. 21, I.

Mat.: A-10656; AS-6122, W&al-11036	
Hab.: Lowland and montane forest openings	
Dist.: W	Alt.: 550-1500
Ch.: ? ES ^{HY}	GF.: HSC
Th. (GNP): VUL (4)	Th. (IR): ?

Above cited plants differs evidently from *E. labiosiformis* by a number of characters and by their habitats: The most distinguishing features are the white flowers and less lobed leaves versus yellow and deeply pinnatisect leaves in *E. labiosiformis*. (see Fig. 21, H & I). Furthermore, the habitat of *E. labiosiformis* is in mountain steppes with drier conditions, typical of the Irano-Turanian climate. Rechinger (Fl. Iranica, 150: 265, 1982) gave some evidence of two different groups within this complex on the basis of leaf shape. He marked many plants from Afghanistan and Khorasan which have finely leaf dissection with an asterisk. However, he described the colour of the flowers as ochre-yellow "ochroleuca". The yellow and white colour of both groups changes after desiccation into yellowish brown. A revision of this complex including *E. laciniata* (L.) Bunge, *E. laevigata* Bunge, *E. tournefortii* Jaub. & Spach and *E. azerbaijanica* Rech. f. is necessary to study the range of variability of each species and the status of above cited plants.

Eremostachys moluccelleoides Bunge in Ledeb., Fl. Altaica, 2: 415 (1830). Syn.: *E. macrophylla* Montbr. & Auch.; *E. pyramidalis* Jaub. & Spach.

Mat.: T-35652; W&al-11068	
Hab.: <i>Artemisia-Stipa</i> steppe	
Dist.: Map 446	Alt.: 1000-1250
Ch.: IT	GF.: GTU
Th. (GNP): VUL (6)	Th. (IR): NOT

T-35652 (Almeh, 1200-1300 m) cannot be localized. It is more likely from Mirza-Baylu plain. During my field studies I found only juvenile basal leaves of this geophytic species, clearly because of unsuitable climatic conditions.

Hymenocrater calycinus (Boiss.) Benth. in DC., Prodr. 12: 406 (1848). Syn.: *Sentinia calycina* Boiss., Diagn. Pl. Orient. Nov. sér. 1, 5: 41 (1844); *Hymenocrater macrophyllus* Bunge. Fig. 21, G.

Mat.: AS-5988; F-1148; R-52966; T-35660; TM-34806; Z&al-86/2588	
Hab.: <i>Juniperus</i> woodland, <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> scrubs, <i>Artemisia-Stipa</i> steppe	
Dist.: Map 447	Alt.: (?580-) 970-2020
Ch.: IT ^C	GF.: CSC
Th. (GNP): NOT (21)	Th. (IR): NOT

It is questionable whether T-35660 was really collected from Tangerang. It is not included in the map.

Lagochilus aucheri Boiss., Diagn. Pl. Orient. Nov. sér. 1, 5: 38 (1844).

Mat.: A-4318, 11243, 11155	
Hab.: Mountain steppe with grasses and thorn-cushions, <i>Artemisia-Stipa</i> and <i>Stipa</i> steppe, <i>Juniperus excelsa</i> woodland	
Dist.: Map 448	Alt.: 1200-1800
Ch.: IT ^C	GF.: CSC
Th. (GNP): RAR (15)	Th. (IR): NOT

L. aucheri and *L. cabulicum* can be distinguished from each other as follows:

- Calyx 21-25 (-30)mm long, lobes (10-) 13-16 mm long *L. aucheri*
- Calyx 16-18 (-20) mm long, lobes 9-11 mm long *L. cabulicum*

However, these differences are not applicable for the population outside the Park, as in Turkmenistan. Some determined specimens from Kopetdagh (i. e. Sintenis 807 and Linczevski, Mali & Vvedensky 6433; cf. Rechinger in Fl. Iranica 150, 341, 1982) are characterized by a 23-26 mm long calyx length. Therefore these may be misidentifications of *L. aucheri*.

The calyx of A-11155 is characterized by having mainly 4 lobes. However, calyces with lobes reduced into a spine or even with 5 lobes were observed on the same plants. In all other characters, it is the same as other collected *L. aucheri* plants in the area. Therefore, it is probable that *L. quadridentatus* Jamzad, Iranian J. Bot. 4, 1:100. 1988, was described on the basis of a similar form. I have not seen the type: Mazandaran: 85 km from Kandavan to Haraz road, Mazid village, 1900-2000 m, 23.6.1979, Assadi & Mozaffarian 33030 (TARI). Furthermore Jamzad (1988) placed the representatives of *L. aucheri* from our area (i. e. Wendelbo & Foroughi 12721 n. v.) under subsp. *aucheri* var. *elegans* Jamzad. She has characterized her variety by the 30 mm long calyx length and the presence of long patent hairs on throat. None of the above cited plants have calyces to 30 mm long. But all - except A-4318, which is glabrous - bear long hairs on calyx throat.

Lagochilus cabulicus Benth. in DC., Prodr. 12: 515 (1848).

Mat.: A-11418, 11419, 11154; DRD unit leader 1287	
Hab.: <i>Stipa</i> steppe in Jakhtikalan Pass and before Koilar	
Dist.: NE, N	Alt.: 1200-1600
Ch.: IT ^C	GF.: CSC
Th. (GNP): VUL (5)	Th. (IR): RAR

See notes under *L. aucheri*.

Lallemantia iberica (Steven) Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 6: 53 (1839). Syn.: *Dracocephalum ibericum* Steven in M. Bieb., Fl. Taur.-Cauc. 2: 64 (1808); *Lallemantia sulphurea* K. Koch; *L. kopetdaghensis* Boriss.

Mat.: A-6165, 10346; F-1076; R-52880	
Hab.: <i>Paliurus-Acer monspessulanum</i> scrub, mountain steppe with grasses and thorn-cushions, scrub valley (road margin), <i>Artemisia</i> steppe	
Dist.: Map 449	Alt.: 1000-1750
Ch.: IT ^{W&C}	GF.: TSC ^{DW}
Th. (GNP): VUL (5)	Th. (IR): NOT

Lallemantia royleana (Benth.) Benth. in DC., Prodr. 12: 404 (1848). Syn.: *Dracocephalum royleanum* Benth. in Wall., Pl. Asiat. Rar. 1: 65 (1830); *D. inderiense* Less. ex Kar. & Kir.; *Nepeta erodifolia* Boiss.

Mat.: A-10867-b, 10411; R-52880	
Hab.: <i>Artemisia-Stipa</i> steppe, sandy-gravelly soils, <i>Artemisia</i> steppe	
Dist.: Map 450	Alt.: 1000-1250
Ch.: IT ^{omni}	GF.: TSC ^{DW}
Th. (GNP): VUL (8)	Th. (IR): NOT

Lamium album L., Sp. Pl.: 579 (1753). s. l.

Mat.: A-9309, 9249, 9327, 9780, 9782, 10293 a, 11600, 11788, 10665.; Z-83/1353; Z&al-86/2944; R-52471; W&al-10933 (more material cited in Fl. Iranica, 150: 323-324, 1982)	
Hab.: Closed lowland and montane forest, moist soils along river and stream margin in forested zone, rarely on rocky outcrops	
Dist.: Map 451	Alt.: 450-2230
Ch.: PL ^{Temperate Eurasia}	GF.: HSC
Th. (GNP): NOT (90)	Th. (IR): NOT

Only the subsp. *crinitum* (Montbr. & Auch. ex Benth.) Mennema has been known from the Park

by Mennema (Fl. Iranica, 150: 323-324, 1982). A-10293 and Z-83/1353 differ from other material by clearly shorter, c. 2-4 cm long leaves. These look superficially similar to some European material of subsp. *album*, but the calyx teeth are evidently longer than the tube.

Lamium amplexicaule L., Sp. Pl.: 579 (1753).

Only var. *amplexicaule* occurs in our area.

Mat.: A-6197; W&al-10996	
Hab.: <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> scrubs, <i>Stipa</i> steppe	
Dist.: Map 452	Alt.: 1000-1820
Ch.: SCO ^(alien in many places)	GF.: TSC ^{DW}
Th. (GNP): VUL (5)	Th. (IR): NOT

Lamium purpureum L., Sp. Pl.: 579 (1753).

Mat.: A-10293-b	
Hab.: In open montane woodland with grassy patches (grows in grassy openings as spring therophyte)	
Dist.: Map 453	Alt.: 1450
Ch.: ES-M	GF.: TSC ^{DW}
Th. (GNP): END (1)	Th. (IR): END

Only one locality is mentioned in Flora Iranica, 150: 327, 1982, for *L. purpureum* viz. Mazandaran: forest between Sardab and Deylaman, Abai 35482-E (W, n.v.). The species may probably have a wide distribution in the hyrcanian forest, but apparently is rare.

Lycopus europaeus L., Sp. Pl.: 21 (1753).

Mat.: A-9903; GA-5011; TM-35086	
Hab.: Waterside	
Dist.: Map 454	Alt.: 500-1380
Ch.: ES-M [IT and elsewhere]	GF.: HSC/HCR
Th. (GNP): VUL (6)	Th. (IR): NOT

Marrubium anisodon K. Koch, Linnaea 21: 696 (1848). Syn.: *M. laricum* Parsa; *M. alternidens* Rech. f.

Mat.: A-9762, 11058	
Hab.: Open rocky outcrops in Adam-Chaqran cliffs and moist clay disturbed soils, margin of road, 2 km N Mirza-Baylu station	
Dist.: C, E	Alt.: 900-1350
Ch.: IT	GF.: HSC
Th. (GNP): END (2)	Th. (IR): NOT

Marrubium astracanicum Jacq., Icon. Pl. Rar. 1: 11 (1781-86). Syn.: *M. kotschyi* Boiss. & Hohen.; *M. brachyodon* Boiss.; *M. purpureum* Bunge; *M. goktschaicum* N. Popov. Fig. 21, J.

Mat.: A-11335, 11383; WF-12652 (n.v.)	
Hab.: Mountain meadows and mountain steppe of mixed grasses and thorn-cushions	
Dist.: Map 455	Alt.: 1620-2300
Ch.: IT ^{w&c}	GF.: HSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Marrubium parviflorum Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 33 (1835). Syn.: *M. aellenii* Rech. f.

Mat.: A-9522, 10966, 10841, 11051; R-53163	
Hab.: <i>Artemisia</i> , <i>Artemisia-Stipa</i> and <i>Stipa</i> steppes, moderately saline soils, over-grazed open <i>Crataegus</i> shrubland, <i>Juniperus excelsa</i> woodland, mountain meadow and mountain steppe with grasses and thorn-cushions	
Dist.: Map 456	Alt.: 1200-2020
Ch.: IT ^{w&c}	GF.: HSC
Th. (GNP): RAR (13)	Th. (IR): NOT

Marrubium vulgare L., Sp. Pl.: 583 (1753).

Mat.: TM-34807 (n.v.)	
Hab.: Over-grazed <i>Crataegus</i> shrubland in Ilanli and probably garden weed in Tangerang	
Dist.: W, SW	Alt.: 580-1440
Ch.: PL	GF.: HSC
Th. (GNP): END (3)	Th. (IR): NOT

Melissa officinalis L., Sp. Pl.: 592 (1753).

Mat.: A-9667, 9973, 9237-b, 11549; W&C-14313; Z-82/206	
Hab.: Lowland forest and forest margin	
Dist.: Map 457	Alt.: 600-1120
Ch.: ES-IT-M	GF.: HSC
Th. (GNP): RAR (11)	Th. (IR): VUL

Mentha aquatica L., Sp. Pl.: 576 (1753).

Mat.: A-9915, 11990; GA-4947; TM-35087	
Hab.: Waterside and moist soils in forested zone	
Dist.: Map 458	Alt.: 500-1380
Ch.: ES	GF.: HSC
Th. (GNP): VUL (7)	Th. (IR): NOT

Mentha longifolia (L.) Huds., Fl. Angl. 221 (1762). Syn.: *M. spicata* L. var. *longifolia* L., Sp. Pl.: 576 (1753); *M. sylvestris* L. s. l.

Mat.: A-9490, 9858; U-19106 (under var. <i>chlorodictya</i> Rech. f.); W&C-14210 (under var. <i>asiatica</i> (Boriss.) Rech. f.); ZK-82-115	
Hab.: Waterside and waste place on moist soils	
Dist.: Map 459	Alt.: 500-1980
Ch.: PL	GF.: HSC
Th. (GNP): RAR (11)	Th. (IR): NOT

Rechinger (Fl. Iranica 150: 557-565) has divided the Flora Iranica representatives of *M. longifolia* complex into 8 varieties, two of them, namely var. *asiatica* (Boriss.) Rech. f. and var. *chlorodictya* Rech. f., grow in our area.

Nepeta cataria L., Sp. Pl.: 570 (1753).

Mat.: A-11951, 11977	
Hab.: Moist places: limestone ground at margin of a dry stream in Pich-e Soleyman Koshteh, around Sulukli Lake and in Khandoushan	
Dist.: W, NW, C	Alt.: 650-1380
Ch.: ES-IT-M ^(alien elsewhere)	GF.: HSC
Th. (GNP): END (3)	Th. (IR): NOT

Nepeta pungens (Bunge) Benth., Lab. Gen. Sp. 487 (1839). Syn.: *Ziziphora pungens* Bunge in Ledeb., Fl. Altaica 1: 23 (1829); *Nepeta chenopodifolia* Stapf.

Mat.: A-6233	
Hab.: Mountain steppe with grasses and thorn-cushions, dry soils along Almev valley with scattered <i>Haloxylon ammodendron</i> shrubs	
Dist.: Map 460	Alt.: 1400-1850
Ch.: IT ^c	GF.: TSC
Th. (GNP): END (3)	Th. (IR): NOT

Nepeta saccharata Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, sér. 7, 21: 56 (1873).

Mat.: A-6172, 6173, 11069; R-52901, 52967, 53156, 53213	
Hab.: <i>Artemisia</i> steppe in Mirza-Baylu plain and dry gravelly soils along Almev valley	
Dist.: E, CE	Alt.: 1200-1500
Ch.: IT ^c	GF.: TSC
Th. (GNP): VUL (7)	Th. (IR): NOT

Determination of A-6173, with rather long calyx (\pm 8 mm), is uncertain. Other specimens are characterized by distinctly shorter calyces (\pm 6 mm).

Nepeta sintensisii Bornm., Feddes Repert. 10: 421 (1912).

Mat.: A-4413, 11650; WF-12657	
Hab.: Moist mountain meadows; mountain steppe with grasses and thorn-cushions, <i>Crataegus</i> scrub, scrub valley dominated by <i>Acer monspessulanum</i>	
Dist.: Map 461	Alt.: 1450-1900
Ch.: IT ^{KK} or Alborz	GF.: HSC
Th. (GNP): RAR (12)	Th. (IR): RAR

Nepeta ukrainica L., Sp. Pl.: 570 (1753).
subsp. *kopetdaghensis* (Pojark.) Rech. f., Fl. Iranica 150: 189 (1982). Syn.: *N. kopetdaghensis* Pojark, Flora URSS 20: 522 (1954).

Mat.: A-10690	
Hab.: <i>Artemisia</i> steppe in Derazi	
Dist.: S	Alt.: 1200
Ch.: IT ^{KK} as subspecies	GF.: HSC
Th. (GNP): END (1)	Th. (IR): VUL

Origanum vulgare L., Sp. Pl.: 590 (1753). Syn.: *O. strobilaceum* Mobayen & Ghahraman (for more synonyms see Ietswaart, in Fl. Iranica, 150: 529-530, 1982).

Mat.: A-9648, 9702; GA-4964; ZK-82/156; IZ-35536; W&C-14328 (the two latter specimens reported under subsp. <i>viride</i> (Boiss.) Hayek	
Hab.: Steep rocky outcrops and vertical cliffs, various types of scrubs, forest margin, weed in waste places and gardens and cutted forest, forest openings	
Dist.: Map 462	Alt.: 500-1800
Ch.: PL	GF.: HSC
Th. (GNP): NOT (44)	Th. (IR): NOT

According to Ietswaart in Fl. Iranica, 150: 531, 1982, the plants of the eastern Caspian forest belong to subsp. *viridis* (Boiss.) Hayek, which is characterized by green bracts (sometime tinged purple), often puberulent, and corollas often white, rarely pinkish-white.

Perovskia abrotanoides Karel., Bull. Soc. Nat. Mosc. 14: 15 (1841).

Mat.: A-4514; GA-4872; Foroughi-7326; ZK-82/313	
Hab.: Stony and gravelly dry stream bed, sandy	

soils, *Artemisia-Stipa* and *Stipa* steppes, vertical cliffs in steppe zone, waste-places and subsaline soils along the road and around the stations, *Acer monspessulanum* and *Crataegus* scrubs

Dist.: Map 463	Alt.: 1050-1800
Ch.: IT ^E	GF.: CHE
Th. (GNP): NOT (20)	Th. (IR): NOT

Phlomis cancellata Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, sér. 7, 21: 76 (1873).

Mat.: A-11040, 10929, 10343, 9535 (incomplete specimen); F-1156; R-52846; WF-12684	
Hab.: <i>Juniperus</i> woodland, <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> scrubs, grassy mountain steppes with thorn-cushions, <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes, sandy soils	
Dist.: Map 464	Alt.: 970-2020
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): NOT (56)	Th. (IR): NOT

Phlomis herba-venti L., Sp. Pl.: 586 (1753).
According to Rechinger Fl. Iranica 150: 309 (1982), populations occurring in our area (NE Iran and Turkmenistan) belong to subsp. *kopetdaghensis* (Knorring) Rech. f.

Mat.: A-9394, 4359; GA-4891; Z-82/294; R-52747	
Hab.: <i>Acer monspessulanum</i> , <i>Crataegus</i> and <i>Paliurus</i> scrubs, mountain meadows and steppes (<i>Stipa</i> steppe and mix of grasses and thorn-cushions)	
Dist.: Map 465	Alt.: 1000-2170
Ch.: M-IT ^(as species) IT ^{KK} (as subspecies)	GF.: HSC
Th. (GNP): NOT (53)	Th. (IR): NOT

Prunella vulgaris L., Sp. Pl.: 600 (1753). Syn.: *Brunella vulgaris* Moench, Meth. 414 (1794).

Mat.: A-9283, 9722, 11492, 11661; R-52463	
Hab.: Lowland forest, rarely montane forest, streamside	
Dist.: Map 466	Alt.: 450-1300 (-1550)
Ch.: PL	GF.: HCR/HSC
Th. (GNP): NOT (20)	Th. (IR): NOT

Salvia aethiopsis L., Sp. Pl.: 27 (1753).

Mat.: A-4515, 11398	
Hab.: Clay soils, margin of the road in Jakhtikalan Pass and scrub valley 6 km W of Soolegerd	
Dist.: NE	Alt.: 1350-1600
Ch.: \pm ES ^{EH} -IT	GF.: HSR
Th. (GNP): END (3)	Th. (IR): RAR



Fig. 21: A, *Colutea porphyrogramma*; B, *Ononis pusilla*; C-D, *Quercus castaneifolia*; E, *Centaurium erythraea*; F, *Calamintha nepeta*; G, *Hymenocrater calycinus*; H, *Eremostachys labiosiformis*; I, *Eremostachys* aff. *labiosiformis*; J, *Marrubium astracanicum*.

Salvia atropatana Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, sér. 7: 47 (1873). Syn.: *S. bachtiarica* Bunge; *S. kopetdaghensis* Kudr.; *S. kourossia* Parsa; *S. linguifolia* Hedge & Hub.-Mor.

Mat.: A-9419, 11002; R-53142; WF-12630, 12690	
Hab.: Mountain steppes: mixed of grasses and thorn-cushions, <i>Stipa</i> steppe, mountain meadow; montane forest of open <i>Quercus castaneifolia</i> and <i>Q. macranthera</i> ; <i>Acer monspessulanum</i> and <i>Crataegus</i> thickets	
Dist.: Map 467	Alt.: 1400-2200
Ch.: IT ^{W&C}	GF.: HSR
Th. (GNP): NOT (27)	Th. (IR): NOT

Salvia chloroleuca Rech. f. & Aellen, Österr. Bot. Z. 99: 59 (1952). Fig. 22, A.

Mat.: A-9424, 9533, 11027, 10854; R-52923; WF-12691 (under <i>S. limbata</i>); Z&A-86/2628	
Hab.: Dry gentle slopes with scattered <i>Acer monspessulanum</i> and <i>Juniperus excelsa</i> trees; probably <i>Artemisia</i> steppe (?)	
Dist.: Map 468	Alt.: ? 1200-2020
Ch.: IT ^{Alborz}	GF.: HSC
Th. (GNP): RAR (9)	Th. (IR): NOT

WF-12691 was wrongly cited under *S. limbata* (Hedge in Fl. Iranica, 150: 462, 1982). Apparently, it was not seen by the author of the account of *Salvia* in Flora Iranica. The limb of the corolla is not villose at the tip and the pedicels are 1-2 mm long compared to *S. limbata* with distinctly villose corolla limbs and a 4-16 mm long pedicel. As the occurrence of *S. limbata* in the NE of Iran was based only on this specimen, its occurrence in Khorasan may not be expected.

Salvia glutinosa L., Sp. Pl.: 26 (1753). Fig. 22, B.

Mat.: A-9882, 11933, 11655; W&C-14390	
Hab.: Closed montane forest, particularly in altitudes between 1700-2000	
Dist.: Map 469	Alt.: 1500-2000
Ch.: ES	GF.: HSC
Th. (GNP): RAR (15)	Th. (IR): NOT

Salvia aff. rhytidea Benth. Fig. 22, D.

Mat.: A-9455, 11016, 11028; R-53141 (n.v.); WF-12614	
Hab.: gentle slopes with open <i>Juniperus excelsa</i> and <i>Acer monspessulanum</i> shrubs	
Dist.: Map 470	Alt.: 1600-1880
Ch.: ? IT ^{KK}	GF.: HSC
Th. (GNP): RAR (9)	Th. (IR): ? END

Salvia sclarea L., Sp. Pl.: 27 (1753). Syn.: *S. pamirica* Gand., Bull. Soc. Bot. France 60: 26 (1913); *S. altilabrosa* Pau. Fig. 21, C.

Mat.: A-9962, 11436, 11280, 11679; R-52755	
Hab.: Open scrub on steep and gentle rocky outcrops (on soil) (dominated by <i>Carpinus orientalis</i> and <i>Quercus castaneifolia</i>), clay, disturbed soils, margin of road or at the base of rocky slopes	
Dist.: Map 471	Alt.: 670-2000
Ch.: IT-M	GF.: HSC
Th. (GNP): VUL (8)	Th. (IR): NOT

Hedge (Fl. Iranica 150, 1982) cited R-53141 under *S. sclarea* (page 450) and under *S. aff. rhytidea* (page 455). We have requested a loan of this material from W herbarium (under the latter name), but it was not found. As only *S. aff. rhytidea* was found in Almehr, it is more likely that R-53141 belongs to this taxon.

Salvia virgata Jacq., Hort. Vindob. 1: 14, tab. 37 (1770). *S. campestris* M. Bieb.; *S. similata* Hausskn.

Mat.: A-9769, 4358, 11119, 11688; ZK-82/102; W&C-14255	
Hab.: Often in open scrub with patches of grasses, rarely in grassy mountain steppes with thorn-cushions and <i>Stipa</i> steppe	
Dist.: Map 472	Alt.: 700-1900
Ch.: M-IT	GF.: HSC
Th. (GNP): NOT (18)	Th. (IR): NOT

Salvia viridis L., Sp. Pl.: 24 (1753). Syn.: *S. horminum* L., Sp. Pl.: 24 (1753); *S. intercedens* Pobeb.

Mat.: TM-34811	
Hab.: Found once in Tangerang	
Dist.: W	Alt.: 580
Ch.: M-IT ^{W&C}	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Satureja mutica Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 2: 49 (1835).

Mat.: A-9726, 12065, 12098; TM-35088; ZA-15863	
Hab.: Characteristic of rock crevices on steep slopes and vertical cliffs	
Dist.: Map 473	Alt.: 650-2030
Ch.: ES ^{HY}	GF.: HSC
Th. (GNP): NOT (29)	Th. (IR): RAR

Scutellaria litwinowii Bormm. & Sint. ex Bormm., Russk. Bot. Zhurn. 1: 8 (1914).

Mat.: A-11043	
Hab.: In gorge on limestone ground surrounded by <i>Juniperus excelsa</i> woodland beginning of Palang valley (N side of Almeh valley)	
Dist.: E	Alt.: 1500
Ch.: IT ^{KK}	GF.: CHE
Th. (GNP): END (1)	Th. (IR): NOT

It seems that *Sc. litwinowii* and *Sc. luteo-coerulea* Bormm. & Sint. ex Bormm., Hourn. Russe Bot. 1: 7 (1914); Syntype: Regio transcaspica: Aschabad; Suluklü (Saratowka); ad fines Persiae, in declivibus montium, 28.7.1900, P. Sintenis 948 (M), are conspecific. The differences given by Rechinger in Fl. Iranica, 150: 46, 62 & 63, 1982, are minute. Long petioles as typical for *Sc. luteo-coerulea* have also been seen in material determined as *Sc. litwinowii*. The length of the corolla shows overlapping in some of the material cited in Flora Iranica. The shorter calyx length of *Sc. luteo-coerulea* may be due to the young state of the collected plants. Apparently plants from dry and stony ground habitats (like the above cited material) were described under *Sc. litwinowii* and those of shady places with rich substrates as *Sc. luteo-coerulea*, respectively. Rechinger (l.c.) stated that *Sc. choras-sanica* Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, sér. 7, 21: 65 (1873) may be the oldest name of this group.

Scutellaria pinnatifida A. Hamilt., Esq. Monogr. Scutellaria 16 (Lyon 1832). Fig. 22, E-F.

Mat.: A-9543, 11072; R-53145; WF-12631	
Hab.: Montane open scrubs, often with grass patches, mountain steppe with grasses and thorn-cushions, <i>Juniperus</i> woodland	
Dist.: Map 474	Alt.: 1400-1840
Ch.: IT	GF.: CHU
Th. (GNP): RAR (10)	Th. (IR): NOT

Plants from our area correspond to subsp. *alpina* (Bormm.) Rech. f., with ± prostrate habit, indumentum loosely canescens, deeply pinnatifid leaf lamina, from half-way to the midrib and a 30-35 mm long corolla (Rechinger, Fl. Iranica, 150: 78, 1982).

Scutellaria tournefortii Benth., Bot. Reg. 18: ad calycem No. 1493 (1832).

Mat.: A-9278, 9229, 9608, 9653, 9736; F-1080; R-52473, 52673	
Hab.: Closed lowland and montane forest (does not penetrate into the <i>Quercus macranthera</i> forest); stream and riverside, rarely on rocky outcrops (in these cases in shady parts)	
Dist.: Map 475	Alt.: 450-2130
Ch.: ES ^{HY}	GF.: HSC/CHE
Th. (GNP): NOT (86)	Th. (IR): NOT

Sideritis montana L. Sp. Pl.: 575 (1753).

Mat.: A-9718, 11632	
Hab.: Steep rocky outcrops, <i>Juniperus</i> woodland, <i>Stipa</i> steppe	
Dist.: Map 476	Alt.: 580-1460
Ch.: IT-M	GF.: TSC
Th. (GNP): NOT (16)	Th. (IR): NOT

Stachys annua (L.) L., Sp. Pl.: ed. 2: 813 (1762). Syn.: *Betonia annua* L., Sp. Pl.: 573 (1753); *St. pubescens* Ten., Fl. Nap. 34 (1811).

Mat.: A-10616, 9963, 12204; Z-82/1192 (R-37640, IZ-15153 and Wa-182 were reported under <i>St. pubescens</i> , Fl. Iranica, 150: 377-379, 1982)	
Hab.: Disturbed clay soils, margin of road, steep rocky outcrops (on soils)	
Dist.: Map 477	Alt.: 500-1920
Ch.: IT-ES-M	GF.: TSC/HSC
Th. (GNP): NOT (16)	Th. (IR): NOT

Based on my field observations, the plants in our area are often annual and biennial. Therefore, the synonymy of *St. annua* and *St. pubescens*, as proposed by Bhattacharjeii (1974: 288-290) and in Flora of Turkey, 7: 248, 1982, is accepted here. Rechinger (Flora Iranica, 150: 377-379, 1982) believed that these are two separate species and the Iranian plants belong to *St. pubescens*.

Stachys byzantina K. Koch, Linnaea 21: 686 (1849). Syn.: *St. lanata* Jacq. Fig. 21, G.

Mat.: GA-4974; E-702	
Hab.: <i>Crataegus-Prunus divaricata</i> and <i>Acer monspessulanum</i> scrubs, forest openings, pioneer forest (with or without <i>Pteridium aquilinum</i>) and margin of lowland and montane forest, rocky outcrops in <i>Carpinus orientalis-Quercus castaneifolia</i> open scrub	
Dist.: Map 478	Alt.: 450-2000
Ch.: ES ^{EH}	GF.: HSC
Th. (GNP): NOT (23)	Th. (IR): NOT

Stachys inflata Benth., Lab. Gen. Sp. 562 (1834).

Mat.: A-10644, F-1121	
Hab.: Forest openings in South slopes of Shakha (above Dast-e Shah station)	
Dist.: SW	Alt.: 1500
Ch.: IT ^{C&W}	GF.: HSC
Th. (GNP): END (2)	Th. (IR): NOT

St. inflata, *St. laxa*, *St. turcomanica* and *St. subaphylla* are closely related species with sympatric distribution in the Park. They are, however, more or less easily distinguishable from each other and often occupy different habitats. The distinction of *St. inflata* centers in Central Iran. The finding of this species in the Park extends its distribution more northwards and may probably be the northernmost range of the species. In the southern parts of the Park, some of the material is intermediate between *St. turcomanica* and *St. inflata* (A-10344). Rechinger described them as a new hybrid: *St. inflata* x *turcomanica*; *St. x paraplesia* Rech. f., in Fl. Iranica 150: 395 (1982). TM-34810 was cited by Rechinger from our area.

Stachys laxa Boiss. & Buhse, Nouv. Mém. Soc. Imp. Naturalistes Moscou, 12: 179 (1860). Syn.: *St. demavendica* Bornm.; *St. laxa* Boiss. & Buhse var. *demavendica* (Bornm.) Bornm. Fig. 22, H-I.

Mat.: A-9849, 10752, 10735, 11935, 12326	
Hab.: On rock crevices with <i>Juniperus excelsa</i> woodland in S parts of the Park and vertical cliffs with scattered <i>Celtis caucasica</i> and <i>Rhmanus pallasii</i> shrubs and C ₄ grasses <i>Bothriochloa ischaemum</i> and <i>Heteropogon contortus</i> in Zav	
Dist.: Map 479	Alt.: 700-1600
Ch.: IT ^{Alborz}	GF.: CHU
Th. (GNP): VUL (5)	Th. (IR): NOT

St. laxa was found fully flowering in November 1996, on cliffs above Zav village, located NW of the area just off the Park (see Fig. 22, H-I).

Stachys persica Gmel., Jun. ex C. A. Mey., Verz. Pfl. Cauc. 94 (1831). Syn.: *St. masanderana* Bornm. & Gauba.

Mat.: A-9877, 11871	
Hab.: Found in open <i>Crataegus</i> scrub 2 km NE of Dast-e Shah station, and in montane forest in Loveh (outside the Park)	
Dist.: W, SW	Alt.: 1400-1500
Ch.: ES ^{HY}	GF.: HSC
Th. (GNP): END (2)	Th. (IR): NOT

Assadi (1987: 174) placed *St. persica* auct. Flora Iranica 150, 360 (1982) non Gmel., Jun. ex C. A. Mey. as a synonym of *St. macrophylla* Albov. He gave no reasons for his opinion.

Stachys subaphylla Rech. f., Pl. Syst. Evol. 134: 288 (1980).

Mat.: A-9509, 11714	
Hab.: Rock crevices in open <i>Juniperus excelsa</i> woodland with <i>Artemisia</i> patches and <i>Artemisia-Stipa</i> steppe, serpentine cliffs with <i>Ficus carica</i> , <i>Rhamnus pallasii</i>	
Dist.: Map 480	Alt.: 1200-1350
Ch.: IT ^{KK}	GF.: CHU
Th. (GNP): VUL (5)	Th. (IR): END

St. subaphylla is a very interesting endemic species, and was previously known only from two localities near the Park: 14 km E of Chaman Bid [ca. 40 km E of the area], 1100 m, Wendelbo & Cobham 14355, W) and Kotal-e yek Chenar, Koelz 16739, W) (cf. Rechinger, l.c. and Flora Iranica, 150: 391, 1982).

Stachys trinervia Aitch. & Hemsl., Trans. Linn. Soc. London, Bot., Ser. 2, 3: 97 (1888).

Mat.: A-6212; R-52984, 52914; W&al-11067	
Hab.: <i>Artemisia</i> or <i>Artemisia-Stipa</i> steppe	
Dist.: Map 481	Alt.: 1200-1350
Ch.: IT ^C	GF.: CSC
Th. (GNP): RAR (10)	Th. (IR): NOT

Stachys turcomanica Trautv., Trudy Glavn. Bot. Sada 9: 463 (1886).

Mat.: A-4327, 9576, 10734, 11067; AS-5993; R-52877, 52752; Z-82/237	
Hab.: Frequent on rocky slopes in <i>Juniperus</i> woodland, <i>Acer monspessulanum</i> and <i>Paliurus spina-christi</i> scrubs, mountain steppes with grasses and thorn-cushions, <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes, mountain meadows and exposed mountain summits	
Dist.: Map 482	Alt.: 750-2400
Ch.: IT ^{KK}	GF.: CHU
Th. (GNP): NOT (75)	Th. (IR): NOT

Teucrium chamaedrys L., Sp. Pl.: 565 (1753). s. l.

Mat.: A-4368, 9420, 9486, 9572, 9707, 9965; R-52422; 53005	
--	--

Hab.: Steep rocky outcrops with open scrub, mountain meadows, <i>Crataegus</i> , and <i>Acer monspessulanum</i> and <i>Paliurus spina-christi</i> scrubs, <i>Juniperus excelsa</i> woodland, mountain steppes with grasses and thorn-cushions, scrub valley with <i>Salix aegyptiaca</i> , <i>Quercus macranthera</i> forest	
Dist.: Map 483	Alt.: 450-2200
Ch.: ES-M [IT]	GF.: CHU/HSC
Th. (GNP): NOT (87)	Th. (IR): NOT

T. chamaedrys is an extremely variable species; two subsp. *sinuatum* (Čelak.) Rech. f. and subsp. *sympirensis* (C. Loch) Rech. f. have been recorded from our area (Rechinger in Fl. Iranica 150: 30-32, 1982).

Teucrium hyrcanicum L., Syst. Veg. ed. 10: 1096 (1759). Syn.: *Scorodonia spicata* Moench. Fig. 22, J.

Mat.: A-4425, 9360, 11960, 11553; R-52469	
Hab.: Often in <i>Crataegus</i> scrub, moist meadow around Sulukli Lake	
Dist.: Map 484	Alt.: 450-1560
Ch.: ES ^{HY}	GF.: HSC
Th. (GNP): RAR (9)	Th. (IR): NOT

Teucrium polium L., Sp. Pl.: 566 (1753).

Mat.: A-4499; GA-4978 b; R-52415	
Hab.: Associated with a wide range of open scrubs and mountain steppes, absent in closed forest and <i>Artemisia</i> steppe in S and E	
Dist.: Map 485	Alt.: 450-2070
Ch.: IT ^{W&C} -M	GF.: CHU
Th. (GNP): NOT (75)	Th. (IR): NOT

Thymus kotschyanus Boiss. & Hohen. in Boiss., Diagn. Pl. Orient. Nov. sér. 5: 16 (1844). s. l.

Mat.: A-9553, 10699, 11073, 11387, 11386, 11607; R-53150	
Hab.: <i>Juniperus excelsa</i> woodland and <i>J. communis</i> - <i>J. sabina</i> scrubs, mountain steppes with grasses and thorn-cushions, mountain meadows, <i>Carpinus orientalis</i> - <i>Juniperus communis</i> mountain scrub, steep cliffs, open woodland with grass patches	
Dist.: Map 486	Alt.: 1350-2400
Ch.: IT ^C	GF.: CHU
Th. (GNP): NOT (22)	Th. (IR): NOT
LN: Qara-Qash (قره قاش)	

Thymus is a mountain steppe genus and extremely difficult with poor taxonomic characters; comparable with *Helichrysum* and *Tragopogon*. The colour of calyx and bracts - as has been used by Jalas in his identification key of Flora Iranica, 150: 534, 1982 - seems to be unsatisfactory. A-10699 has a distinctly purplish calyx and is keyed out as *Th. pubescens* Boiss. & Kotschy ex Čelak. The calyces of all other specimens are either green or indistinctly purplish tinged which indicate *Th. transcaspicus* or *Th. kotschyanus* (*sensu* Jallas). R-53150 (named by Jallas as *Th. transcaucasicus*) has both green and purplish inflorescences. The leaf size seems to have minor taxonomic importance and is perhaps influenced by habitat and altitude. Both glabrous leaf forms (A-11387, 9553, R-53150) and velutinous-puberulent leaf forms (the remaining material) have been found in our area side by side (as A-11386 and A-11387). Nearly none of the above cited plants from the Park are really similar and cannot be confidently determined by the treatment in Flora Iranica. I prefer, therefore, to follow Rechinger (1954) and use *Th. kotschyanus* s. l., as the oldest name of this complex.

Ziziphora capitata L., Sp. Pl.: 21 (1753).

subsp. *orientalis* Samuelsson ex Rech. f., Ark. Bot. ser. 2, 1: 535 (1951).

Mat.: A-11152	
Hab.: Found once in <i>Juniperus</i> woodland along Qortoy valley (10 km SW Lohondor)	
Dist.: N	Alt.: 1400
Ch.: IT ^{W&C}	GF.: TSC ^{DW}
Th. (GNP): END (1)	Th. (IR): NOT

Subsp. *orientalis* is distinguished from the typical subspecies by suborbicular to broadly ovate subtending leaves which are shorter or as long as the inflorescence. Subtending leaves of the typical subspecies are lanceolate to oblong and about twice longer than the inflorescence.

Ziziphora clinopodioides Lam., Illustr. Gen. 1: 63 (1791).

Mat.: A-4547, 11403, 9429	
Hab.: Mountain steppes with or without shrubs	
Dist.: Map 487	Alt.: 1400-2000
Ch.: IT ^{omni}	GF.: CHU
Th. (GNP): RAR (10)	Th. (IR): NOT
LN: An'noch (آن نوح)	

Rechinger (Fl. Iranica, 150, 482, 1982) recognized 9 subspecies within this extremely polymorphic species. A-9429 falls within subsp. *bungeana* (Juz.) Rech. f. and A-4547, 11403 within subsp. *rigida* (Boiss.) Rech. f., respectively.

Ziziphora tenuior L., Sp. Pl.: 21 (1753).

Mat.: A- 10701, 10867a; R-52894	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes, <i>Juniperus</i> woodland, dry valley with <i>Haloxylon</i> shrubs; rarely in <i>Stipa</i> steppe and <i>Juniperus</i> woodland	
Dist.: Map 488	Alt.: 1100-1530
Ch.: IT ^{omni}	GF.: TSC ^{DW}
Th. (GNP): NOT (22)	Th. (IR): NOT

Linaceae

Linum austriacum L., Sp. Pl.: 278 (1753). s.l. (Incl. *L. glaucum* Boiss. & Noë).

Mat.: A-10541	
Hab.: <i>Juniperus excelsa</i> woodland, 7 km W Soolegerd and N slopes of Divar Kaji	
Dist.: NE, C	Alt.: 1500-1840
Ch.: ES-IT-M	GF.: CHE
Th. (GNP): END (2)	Th. (IR): NOT

The above cited material shows intermediate characters between *L. austriacum* and *L. glaucum*. The calyx length is 6-7 mm long, but the corolla 10-12 mm long. This seems to be the easternmost range of the species which needs further studies.

Linum corymbulosum Rchb., Fl. Germ. Excurs. 834 (1832).

Mat.: A-10552, 11168; R-52425	
Hab.: <i>Artemisia-Stipa</i> and <i>Stipa</i> steppes, S-facing rocky outcrops	
Dist.: Map 489	Alt.: 450-1300
Ch.: PL ^(IT-M & tr. E Africa)	GF.: TSC
Th. (GNP): END (3)	Th. (IR): NOT

A-10552 is characteristically branched from the base. A-11168 and other material seen by me are usually unbranched at the base.

Linum nervosum Waldst. & Kit., Pl. Rar. Hung. 2: 109 (1805).

Mat.: A-4372, 10587, 11670	
Hab.: Mountain steppes, montane scrubs (often between <i>Carpinus orientalis</i> , <i>Quercus castaneifolia</i> , <i>Crataegus</i> spp., <i>Acer monspessulanum</i> , <i>Juniperus communis</i> , <i>J. sabina</i> shrubs)	
Dist.: Map 490	Alt.: 1450-2080
Ch.: ES ^{EH}	GF.: HSC
Th. (GNP): RAR (12)	Th. (IR): RAR

The cited plants are in a poor state, so that the identification needs confirmation.

Linum nodiflorum L., Sp. Pl.: ed. 2, 401 (1762).

Syn.: *L. luteolum* M. Bieb.

Mat.: A-11439	
Hab.: Steep slopes above Tangelol station on deep clay soils accumulated between rock clefts	
Dist.: C	Alt.: 700
Ch.: M-IT ^{W&C}	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Loranthaceae

Viscum album L., Sp. Pl.: 1023 (1753).

Mat.: A-9598, 9816; GA-4938, 4950; IZ-15245; K-7665; R-33142	
Hab.: Epiphyte on several forest trees particularly on <i>Carpinus</i> , <i>Crataegus</i> , <i>Parrotia</i> and <i>Ulmus</i>	
Dist.: Map 491	Alt.: 450-1850
Ch.: PL ^(Temperate Eurasia)	GF.: PEP
Th. (GNP): NOT (28)	Th. (IR): NOT

Lythraceae

Lythrum salicaria L., Sp. Pl.: 446 (1753).

Mat.: A-9361, 9861; GA-4934; R-52481; U-19041	
Hab.: Waterside, with different vegetation, both in steppe and forest zones	
Dist.: Map 492	Alt.: 450-1700
Ch.: PL	GF.: HSC
Th. (GNP): RAR (9)	Th. (IR): NOT

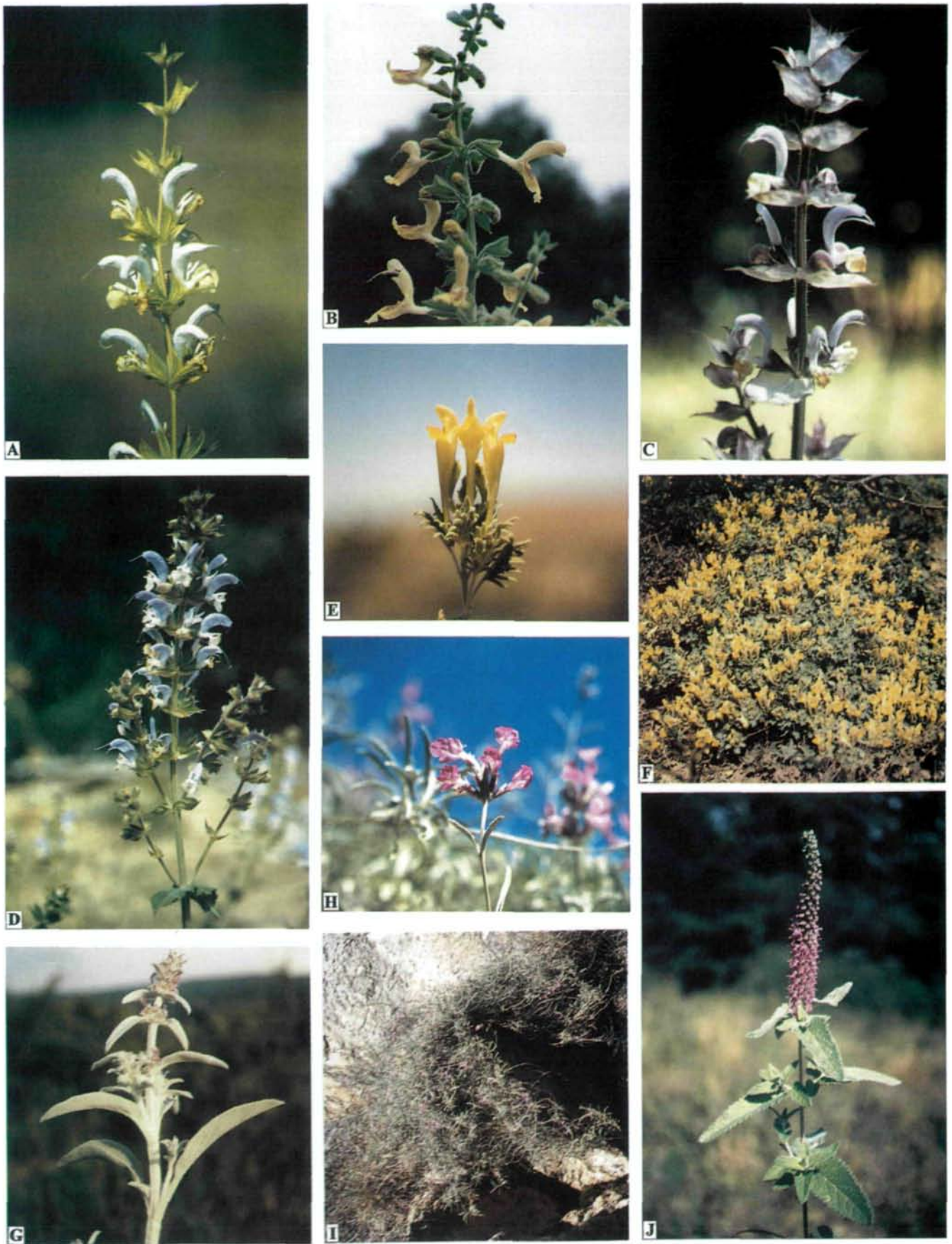


Fig. 22: A, *Salvia chloroleuca*; B, *Salvia glutinosa*; C, *Salvia sclarea*; D, *Salvia* aff. *rhytidea*; E-F, *Scutellaria pinnatifida*; G, *Stachys byzantina*; H-I, *Stachys laxa*; J, *Teucrium hyrcanicum*.

Malvaceae

Alcea gorganica (Rech. f., Aellen & Esfand.) Zohary, Bull. Res. Council. Israel 11 D 4: 227 (1963). Syn.: *Althaea gorganica* Rech. f., Aellen & Esfand., Anz. Österr. Akad. Wiss. Math.-Naturwiss. Kl. 87: 299 (1950).

Holotype: Gorgan: In silvarum apertis regionis litoral inter Bandar Gaz & Sari, 18.6.1948, Rech., Aellen & Esfand. 5547 (W).

Mat.: A-9674, 9545, 9675, 9417, 11819, 11820, 11821, 12037, 11543, 11197; IZ-15247, 16271 (under *A. popovii* & *A. sycophylla*); R-37628, 52465 (under *A. popovii*), 53774; W&C-14256; WF-12848; Z-83/1367

Hab.: Garden weed, forest margin and forest openings, particularly with *Pteridium aquilinum*, *Crataegus* and *Acer monspessulanum* thickets

Dist.: Map 493	Alt.: 450-2050
Ch.: ? IT ^{KK} -ES ^{HY}	GF.: HSC
Th. (GNP): NOT (37)	Th. (IR): NOT

I. Riedl (Fl. Iranica 120, 1976) reported *A. gorganica*, *A. popovii* Iljin and *A. sycophylla* Iljin & Nikitin from several localities within and near the Park. After studying many of these plants in the herbarium and tracing them in the field, I concluded that it is very difficult to separate these plants. In one of the studied populations in the westernmost area of the Park (Tangerah), both forms with deeply lobed leaves (*gorganica*-form) and forms with shallowly lobed leaves (*popovii*-form) are growing together with many intermediates, possibly due to hybridization. I have collected these different forms (A-1119, 11820, 11821), but am unable to correlate leaf dissection with other characters. This seems to be true also for *A. sycophylla* and *A. gorganica*. Riedl (Fl. Iranica 122: 46, 1978) used the numbers of carpels as one of the distinguishing characters between these species: 32-38 for *A. sycophylla* and ± 28 in *A. gorganica*. One of the specimens treated by Riedl in Flora Iranica under *A. sycophylla* (Inter Bojnurd et Tappehye Moraveh, 25.7.1965, Rechinger 32566 M) has 27-29 carpels! Further-more, one specimen i.e. Inter Gol Loveh et Zaleyn Iranshahr & Zargani 16271, has been cited in Flora Iranica both under *A. popovii* (p. 72) and *A. sycophylla* (p. 77), respectively! For the time being I prefer to use tentatively the name *A. gorganica* for the plants

occurring in our area. Firstly because it has been described from our area and secondly because I have seen the type. A revision of this genus would be a very rewarding research project.

Althaea armeniaca Ten., Index Sem. Hort. Neap. 1 (1837).

Mat.: A-4335, 9492	
Hab.: Moist soils in association with <i>Phragmites australis</i> and river margin in association with <i>Salix aegyptiaca</i>	
Dist.: Map 494	Alt.: 1200-1420
Ch.: IT ^{Cauc.-Turk.}	GF.: HSC
Th. (GNP): END (2)	Th. (IR): END

Althaea cannabina L., Sp. Pl.: 686 (1753). Syn.: *A. kotschyi* Boiss., Diagn. Pl. Orient. Nov. sér. 2, 1: 102 (1854).

Mat.: A-11813; Wa-173	
Hab.: Steep slopes with <i>Pteridium aquilinum</i> in Qameshli and road margin among grasses	
Dist.: W	Alt.: 1000-1160
Ch.: IT-M	GF.: HSC
Th. (GNP): END (2)	Th. (IR): RAR

Althaea hirsuta L., Sp. Pl.: 687 (1753). Fig. 23, A.

Mat.: A-10553, 10679, 11437; AS-6132; W&al-11035	
Hab.: Often on limestone, rocky outcrops with various kinds of scrub vegetation	
Dist.: Map 495	Alt.: 550-1880
Ch.: M [IT]	GF.: TSC
Th. (GNP): NOT (16)	Th. (IR): NOT

W&al-11035 collected from forest South of Tangerah, 550 m, is not shown in Map 495.

Malva neglecta Wallr., Syll. Ratisb. 1: 140 (1824).

Mat.: A-11696	
Hab.: Found once on sandy soils at the bottom of a dry stream, N Mirza-Baylu station and in over-grazed open <i>Crataegus</i> shrubland, 2 km E of Daste Shah station	
Dist.: E, S	Alt.: 1250-1440
Ch.: ES-IT-M	GF.: HCR
Th. (GNP): END (2)	Th. (IR): NOT

Monotropaceae**Monotropa hypopithys** L., Sp. Pl.: 1: 387 (1753)

Mat.: WF-12811 (n.v.); W&C-14372 (n.v.)	
Hab.: Forest S of Tangeol	
Dist.: C	Alt.: 900-1100
Ch.: PL	GF.: GRP
Th. (GNP): END (2)	Th. (IR): END

Although I have seen no material from the Park, there is no reason to doubt the above cited records by Assadi & Wendelbo (1977: 104).

Moraceae**Ficus carica** L., Sp. Pl.: 1059 (1753). Syn.: *F. kopetdagensis* Pachom.; *F. colchica* Grossh.; *F. hyrcana* Grossh.

Only subsp. *carica* occurs in our area.

Mat.: A-9897; GA-4929; K-7681	
Hab.: Often vertical cliffs in dry and mesic zones of the Park	
Dist.: Map 496	Alt.: 500-1320
Ch.: ? IT-M	GF.: PSS
Th. (GNP): NOT (16)	Th. (IR): NOT

Morus alba L., Sp. Pl.: 986 (1753).

Mat.: A-9231	
Hab.: Cultivated relict in Tangerang and Tangeol	
Dist.: W, C	Alt.: 450-650
Ch.: IT	GF.: PTS
Th. (GNP): END (2)	Th. (IR): NOT

Oleaceae**Fraxinus excelsior** L., Sp. Pl.: 1057 (1753).

Mat.: A-9623, 9899, 9977, 11164, 11223, 11878, 11904 (?), 11905, 11999	
Hab.: Closed montane forest	
Dist.: Map 497	Alt.: 800-2130
Ch.: ES	GF.: PTS
Th. (GNP): NOT (51)	Th. (IR): NOT

A-11904 was collected at the top of Alu-Baq mountain. It has evidently larger leaves than other cited material, even that collected from the same locality (like 11905).

Fraxinus syriaca Boiss., Diagn. Ser. 1, 11: 77 (1849). Syn.: *F. rotundifolia* (non Mill.) sensu E. Murray in Flora Iranica 52:7 (1968).

Mat.: A-4494, 4495 (?)	
Hab.: Scrub valley surrounded by <i>Juniperus excelsa</i> woodland towards the sloping ground, in 6 km W of Soolegerd	
Dist.: NE	Alt.: 1350
Ch.: IT	GF.: PTS
Th. (GNP): END (2)	Th. (IR): NOT

The nomenclature of *F. angustifolia* Vahl and *F. rotundifolia* Mill. is a matter of controversy. Green (1985) argued that the latter name is correct, because the description given by Miller apply to a species of Sect. *Fraxinus* and not to Sect. *Ornus* as has been claimed in Flora Europaea (3: 35, 1972). A second problem is the correct name of the plants occurring in our area. As the treatment of *Oleaceae* in Flora Iranica (52, 1968) is out-dated and no new investigation is available for the species in SW Asia, following Cristopoulos (Flora of Iraq, 4: 509, 1980), I use provisionally *F. syriaca* for the species occurring in our area, firstly to avoid from the nomenclatural problem caused by using the names *F. rotundifolia* and *F. angustifolia*, and secondly because the type of *F. syriaca* was originated from SW Asia.

A-4495 has been collected from the same locality as A-4494 and lacks fruits. The rachis are reddish and the leaves are elliptic-ovate and biserrate at the margin. As it has no fruit, its status is uncertain.

Jasminum fruticans L., Sp. Pl.: 7 (1953).

Mat.: A-9483, 9577, 9625; GA-4984; R-52600; 52797	
Hab.: Rocky slopes, often in thickets of <i>Acer monspessulanum</i> , <i>Paliurus spina-christi</i> , <i>Lonicera floribunda</i> , <i>Carpinus orientalis</i> , rarely in <i>Juniperus excelsa</i> woodland	
Dist.: Map 498	Alt.: 650-1980
Ch.: M-ES ^{EH}	GF.: PSS/PSB
Th. (GNP): NOT (30)	Th. (IR): NOT

Jasminum officinale L., Sp. Pl.: 7 (1753).

Mat.: A-11847	
Hab.: Found once near Golestan Tourist Center along the Madrasu River, tendril on <i>Euonymus velutina</i>	
Dist.: W-C	Alt.: 500
Ch.: ES ^{EH} -Himalaya	GF.: PLI
Th. (GNP): END (1)	Th. (IR): SUN

Onagraceae

Circaea lutetiana L., Sp. Pl.: 9 (1753).

Mat.: A-9244, 9323, 9244, 9975, 11239; R- 52526; WF-12802	
Hab.: Closed lowland and montane forest	
Dist.: Map 499	Alt.: 500-2130
Ch.: PL	GF.: GRH
Th. (GNP): NOT (50)	Th. (IR): NOT

Epilobium hirsutum L., Sp. Pl.: 347 (1753). Syn.: *E. nassirelmuicii* Stapf.

Mat.: A-9857; GA-4884	
Hab.: stream and riverside	
Dist.: Map 500	Alt.: 1100-1700
Ch.: PL	GF.: GRH
Th. (GNP): END (3)	Th. (IR): NOT

Epilobium montanum L., Sp. Pl.: 1: 348 (1753).

Mat.: A-9774, 11217; E-726	
Hab.: Margin of spring, bottom of karstic gully with <i>Dryopteris caucasica</i>	
Dist.: Map 501	Alt.: 1000-2000
Ch.: ES-M	GF.: GRH
Th. (GNP): END (3)	Th. (IR): ? END

Epilobium parviflorum Schreb., Spic. Fl. Lips. 146, 155 (1771). Syn.: *E. menthoides* Boiss. & Heldr.

Mat.: A-9912	
Hab.: Found once at margin of river in forest valley E of Kondeskuh	
Dist.: W	Alt.: 800-850
Ch.: ES-IT-M	GF.: GRH
Th. (GNP): END (1)	Th. (IR): VUL

Epilobium rechingeri P. H. Raven, Arbok Univ. Bergen, Mat. Naturv. Ser. 1962, No. 1: 26 (1962).

Mat.: A-11879, 11884, 11602	
Hab.: Closed montane forest	
Dist.: Map 502	Alt.: 1800-2130
Ch.: ES ^{HY}	GF.: GRH
Th. (GNP): VUL (7)	Th. (IR): END

E. rechingeri is a little known species and was described from N. Iran: Mazandaran: In declivibus borealis jugi Kandavan, ca. 2600-3000 m, 25. 8.1948 Rechinger 6752 (Iso. M). It is also known

from a few localities in Alborz and Iraqi Kurdistan (Raven in Fl. Iranica 7: 15, 1964). The species is closely related to *E. minutiflorum* Hausskn., and may not be much different from that species. Above cited plants have been collected from Alu-Baq and Shakha Mountains, in moist and high altitude forests between 1800-2130 m. They are in many characters very similar with the type material of *E. rechingeri*, except the very short flowers (ca. 4 mm long), somewhat broader seeds and broader leaf lamina to 2.5 cm (more similar to *E. minutiflorum*). The isotype specimen in M lacks any flower, but Raven (Fl. Iranica 7: 15, 1964) described the flowers to be 6-7 mm long. Raven (l. c.) quoted that one of the plants studied by him (Gorgan: M. Shahvar prope Hajilang, 2400-2600 m, Rech. 6123, n.v.) is entirely glabrous. This is true more or less for A-11879, 11884. Furthermore he cited specimens which are intermediate between *E. minutiflorum* and *E. rechingeri*, with possible hybrid origin.

Orobanchaceae

Orobanche is a difficult genus and not well investigated in SW Asia. The account in Flora Iranica (5, 1964) is outdated and lacks a description. Gilli (1979) provided a revised identification key for the Flora Iranica species, still without description and illustration. The latter author identified the collection of Rechinger from the Park (incl. *O. amoena*, *O. minor* and *O. coelestis*). The other species were determined by the author, some with uncertain status. As the author usually avoided to collect broomrape species, it is likely that more species will be found in the Park with further studies.

Orobanche alba Stephan in Willd., Sp. Pl.: 3: 350 (1800).

Mat.: A-11354, 11399; F-1069	
Hab.: Transition zone between <i>Quercus macranthera</i> and <i>Juniperus excelsa</i> woodland, <i>Acer monspessulanum</i> scrub, disturbed places	
Dist.: Map 503	Alt.: 1200-2100
Ch.: ES-IT-M	GF.: GRP
Th. (GNP): SUN	Th. (IR): NOT

Orobanche amoena C. A. Mey. in Ledeb., Fl. Altaica 2: 457 (1830).

Mat.: R-52924 (Det.: A. Gilli)	
Hab.: Probably <i>Artemisia</i> steppe in Mirza-Baylu plain	
Dist.: E	Alt.: 1200
Ch.: IT ^{C&E}	GF.: GRP
Th. (GNP): SUN	Th. (IR): NOT

Orobanche coelestis (Reuter) G. Beck, Monogr. Orob. 114, tab. 2, fig. 21 (1890). Syn.: *Phelipaea coelestis* Reuter in DC., Prodr. 11: 5 (1890).

Mat.: A-11750, 11792; R-53140 (Det.: A. Gilli)	
Hab.: Margin of <i>Quercus macranthera</i> forest, mountain steppe	
Dist.: Map 504	Alt.: 1800-2300
Ch.: M-IT	GF.: GRP
Th. (GNP): IND	Th. (IR): NOT

Orobanche minor Sm., Engl. Bot. 6: 422 (1797). Syn.: *euglossa* Rchb. f.

Mat.: A-11667; R-52628 (Det.: A. Gilli)	
Hab.: Forest margin in Shakha Mountain and scrub E of Tangejol	
Dist.: C	Alt.: 750-1500
Ch.: PL	GF.: GRP
Th. (GNP): END (2)	Th. (IR): IND

Orobanche mutellii F. Schultz in Mutel, Fl. Fr. 2: 353 (1835).

Mat.: A- 6178, 10637, 11578	
Hab.: Forest and scrub margin	
Dist.: Map 505	Alt.: 840-1600
Ch.: IT-M	GF.: GRP
Th. (GNP): SUN	Th. (IR): NOT

Orobanche orientalis G. Beck; Monogr. Orob. 110 (1890).

Mat.: A-9671	
Hab.: Lowland forest	
Dist.: Map 506	Alt.: 800-850
Ch.: ES ^{EH} -Himalaya	GF.: GRP
Th. (GNP): END (1)	Th. (IR): END

Above cited material was compared with the type specimen: In regione temperata Himalayae boreali-occidentalis prope Yannu et Banahal, 1700-2300 m, Hook. f. & Thompson (W). Schiman-Czeika (F. Iranica 5: 9, 1964) cited only one specimen of this species in Iran: Azerbaijan: M. Karnaru prope Shahpur, Knapp. Gilli (1979: 303) added a second

one in Gilan: ad lacum Bashm 7 km NW Bandar-e Pahlavi (now Anzali), -25 m, Lamond 2922.

Orobanche spec. I
A-9918, 9367

Orobanche spec. II
A-11111

Orobache spp.
A-10331, 9876

Oxalidaceae

Oxalis corniculata L., Sp. Pl.: 435 (1753).

Mat.: A-12327, 11817; R-52520	
Hab.: Riverside in forest, garden weed, rocky outcrops	
Dist.: Map 507	Alt.: 450-700
Ch.: SCO	GF.: TCR
Th. (GNP): VUL (6)	Th. (IR): NOT

Paeoniaceae

Paeonia wittmanniana Hartwiss ex Lindl., Bot. Reg. 32, tab. 9 (1846). Fig. 23, B.

Mat.: A-4381, 6110, 6129, 10310; F-1178	
Hab.: Closed montane forest	
Dist.: Map 508	Alt.: 1000-2000
Ch.: ES ^{EH}	GF.: GTU
Th. (GNP): NOT (26)	Th. (IR): VUL

Papaveraceae

Chelidonium majus L., Sp. Pl.: 505 (1753).

Mat.: A-11846; Noll-1228; R-52664; U-16194	
Hab.: Waste and moist places in forests between Tangerang and Tangejol	
Dist.: C, W	Alt.: 450-600
Ch.: PL ^(North Temperate)	GF.: HSC
Th. (GNP): VUL (5)	Th. (IR): SUN

Glaucium elegans Fisch. & C. A. Mey., Index Sem. Hort. Petrop., 1: 29 (1835). Syn.: *G. pumilum* Boiss.

Mat.: A-10412, 10456, 10818; AS-5981; R-52819, 52845; U-16074	
Hab.: Sandy-gravelly, lime-gypsum and disturbed soils in <i>Artemisia</i> steppe, <i>Juniperus</i> woodland and <i>Paliurus spina-christi</i> scrub	
Dist.: Map 509	Alt.: 500-1700
Ch.: IT	GF.: TSC ^{SU}
Th. (GNP): VUL (7)	Th. (IR): NOT

Glaucium oxylobum Boiss. & Buhse, Nouv. Mém. Soc. Imp. Naturalistes Moscou, 7: 12 (1860). Fig. 23, E.

Mat.: A-4559**, 9476*, 10247, 11057**; F-1045; R-53219**; WF-12708**	
Hab.: Clay and disturbed soils, margin of the road, often basal parts of gentle slopes	
Dist.: Map 510	Alt.: 1200-1550
Ch.: IT ^{Alborz}	GF.: HSC/HCR
Th. (GNP): VUL (7)	Th. (IR): NOT

* subsp. *oxylobum*

** subsp. *rechingeri* Mory in Feddes Repert. 89: 566 (1979)

Unmarked specimens lack mature fruits; their subspecies therefore cannot be determined. R-53219 and WF-12708 from "below Almech, 1400-1500" cannot be localized to be shown in the map.

Hypocoum pendulum L., Sp. Pl.: ed. 1: 124 (1753).

Mat.: A-12057; AS-5931; F-1042; R-52942; W&al-10974	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes, moderately saline soils in <i>Anabasis-Artemisia</i> steppe, disturbed habitats at road margin and around protection stations	
Dist.: Map 511	Alt.: 1000-1350
Ch.: IT-M	GF.: TSC
Th. (GNP): RAR (10)	Th. (IR): NOT

Almost all above cited material belongs to var. *trilobum* (Trautv.) Cullen (Syn.: *H. trilobum* Trautv.), except AS-5931 which lacks flowers, and therefore its subspecies cannot be identified.

Papaver dubium L., Sp. Pl.: Appendix: 1196 (1753).

subsp. *erosum* (Litv.) Kadereit, Notes Roy. Bot.

Gard. Edinburgh 45 (2): 246 (1989). Syn.: *P. laevigatum* M. Bieb. var. *erosum* Litv., Trav. Mus. Bot. Acad. Imp. Sci. St. Pétersbourg 1: 29 (1902). Fig. 23, C & F.

Mat.: A-10695, 10542, 10980; F-1003; R-53030	
Hab.: <i>Juniperus</i> woodland, <i>Artemisia-Stipa</i> steppe, dry valley with scattered <i>Haloxylon</i> shrubs, mountain steppe with grasses and thorn-cushions	
Dist.: Map 512	Alt.: 1000-1840
Ch.: IT ^{C&W}	GF.: TSC
Th. (GNP): RAR (12)	Th. (IR): NOT

Papaver pavonicum Fisch. & C. A. Mey., Ind. Sem. Hort. Petrop. 9: 82 (1843).

Mat.: A-10880, 10424, 10321	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes, ruderal places and road margin	
Dist.: Map 513	Alt.: 1000-1250
Ch.: IT ^E	GF.: TSC
Th. (GNP): VUL (6)	Th. (IR): NOT

Above cited materials belong to the typical subspecies (cf. Kadereit 1986: 27).

Roemeria hybrida (L.) DC., Syst. Nat. 2: 92 (1821). Syn.: *Chelidonium hybridum* L., Sp. Pl.: 506 (1753).

subsp. *dodecandra* (Forssk.) Maire, Cat. Pl. Maroc 2: 257 (1932). Syn.: *Chelidonium dodecandrum* Forssk., Fl. Aegypt.-Arab.: 100 (1775).

Mat.: A-10417; F-s.n.; R-52840, 53214	
Hab.: <i>Artemisia</i> , <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes, ruderal places and road margin	
Dist.: Map 514	Alt.: 1000-1400
Ch.: IT-M-SS	GF.: TSC
Th. (GNP): RAR (9)	Th. (IR): NOT

Roemeria refracta DC., Syst. Nat. 2: 93 (1821).

Mat.: A-10823**; F-1043*; R-52488*; Coll. Unknown (1230-MMTT)**	
Hab.: Weed in ruderal places, road margin and garden	
Dist.: Map 515	Alt.: 450-1700
Ch.: IT	GF.: TSC
Th. (GNP): VUL (5)	Th. (IR): NOT

* subsp. *refracta*

** subsp. *occidentalis* Kadereit, Flora 179: 139 (1987).

Plantaginaceae

Plantago lanceolata L., Sp. Pl.: 113 (1753). Syn.: *P. orientalis* Stapf.

Mat.: A-4500, 11373, 12235	
Hab.: Scrub valley dominated by <i>Fraxinus</i> or <i>Acer monspessulanum</i> , weed garden	
Dist.: Map 516	Alt.: 450-1580
Ch.: ES-IT-M	GF.: HRO
Th. (GNP): END (3)	Th. (IR): NOT

Plantago major L., Sp. Pl.: 112 (1753).

Mat.: A-9896, 10614, 11421, 11561, 12244	
Hab.: Garden weed, waste places, riverside, lowland and rarely montane forest (with disturbed understory)	
Dist.: Map 517	Alt.: 450-1500
Ch.: SCO	GF.: HRO
Th. (GNP): VUL (8)	Th. (IR): NOT

Plantago podlechii Akhani (in press in Edinburgh J. Bot. 56, 1, 1999).

Mat.: A-11918	
Hab.: Mountain steppe with grasses (<i>Stipa lessingiana</i> , <i>Festuca valesiaca</i> , <i>Poa bulbosa</i>) and thorn-cushions (<i>Onobrychis cornuta</i> - <i>Acantholimon raddeanum</i>)	
Dist.: Map 518	Alt.: 1600
Ch.: ± IT ^{KK} /ES ^{HY}	GF.: HRO/CHU
Th. (GNP): END (1)	Th. (IR): END

See Akhani (1999) for details on the affinity and ecology of this very interesting new species.

Platanaceae

Platanus orientalis L., Sp. Pl.: 999 (1753).

Mat.: A-11161	
Hab.: Margin of stream in gorge located in Qortoy valley (with <i>Juniperus excelsa</i> woodland in surrounding steep slopes)	
Dist.: N	Alt.: 1400
Ch.: IT-M ^E	GF.: PTS
Th. (GNP): END (1)	Th. (IR): NOT

Plumbaginaceae

Acantholimon edmondsonii Rech. f. & Schiman-Czeika, Fl. Iranica 108: 122 (1974).

Mat.: GA-4849, 4867	
Hab.: Mountain steppe	
Dist.: Map 519	Alt.: 1100-1700
Ch.: IT ^{KK}	GF.: CSC TH
Th. (GNP): END (2)	Th. (IR): END

A. edmondsonii was previously known only from the type locality, ca. 70 km East of the area in neighbouring Qorkhod Protected Area: Khorasan: Kuh-e Kurkhud, 45 km W Bojnurd, 2600 m, 22.VII.1971, Edmondson 765, holo: W). GA-4849 has been collected in an elevation of 1000 m, with bracts and leaves pilose at the base and subglabrous above. The type specimen and GA-4867 are characterized by tomentose leaves and bracts. The density of the indumentum may depend on the elevation.

Acantholimon embergeri Mobayen, Rev. Taxon. Acanth. 299 (1964). Fig. 23, H.

Mat.: A-11796, 11323	
Hab.: Mountain steppe with thorn-cushions, <i>Juniperus excelsa</i> woodland	
Dist.: Map 520	Alt.: 1500-2400
Ch.: IT ^{KK}	GF.: CSC TH
Th. (GNP): VUL (8)	Th. (IR): END

Rechinger & Schiman-Czeika (Fl. Iranica 108: 54, 1974) cited only the type and another specimen of *A. embergeri*: In Jugo Khosh Jaila [Yelaq], ca. 70 km ab oppido Shahrud orientem versus, 2200 m, Rechinger 5496 (iso: W); In declivibus borealis Montium Shahvar, in saxosis calc. supra Ostamian-dan, 3500 m, Rechinger 6002 (M). Above cited specimens match well with the type specimen. But I doubt that Rechinger 6002 really belongs to *A. embergeri*.

Acantholimon pterostegium Bunge, Mém. Acad. Imp. Sci. Saint Pétersbourg, sér. 7, 18, 2: 15 (1872). Fig. 23, D & G.

Mat.: A-10319, 10755; AS-5954	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes	
Dist.: Map 521	Alt.: 1150-1250
Ch.: IT ^{KK}	GF.: CSC TH
Th. (GNP): VUL (4)	Th. (IR): NOT

Acantholimon raddeanum Czerniak., Izv. Bot. Sada Akad. Nauk SSSR 29, 1-2: 149 (1930). Incl. *A. gorganense* Mobayen.

Mat.: A-4312, 4317, 4468, 9387, 9388, 9376, 9378, 9377, 9521, 9529, 11384, 11385; 11729, 11916; GA-4870; K-7705*; R-53000*	
Hab.: Mountain steppes with grasses and thorn-cushions (with or without shrub), <i>Juniperus</i> woodland, rarely <i>Artemisia</i> steppe	
Dist.: Map 522	Alt.: 1160-2400
Ch.: IT ^E	GF.: CSC TH
Th. (GNP): NOT (78)	Th. (IR): NOT

* Det.: H. Schiman-Czeika

A. raddeanum is a common species in most of the mountain steppes with or without shrubs. The species is extremely variable with regard to the length and shape of the leaves (10-40 mm long) and the length of the flowering stem (4-20 cm long). I was not able to find any correlation between the mentioned characters and floral characters. In my field studies, I observed various forms growing side by side. It seems these different vegetative forms indicate different ages. Usually younger plants produce shorter leaves than older ones. As the species is very common and extremely polymorphic, I rather doubt whether the above name is the oldest name of the plants occurring in our area. I use this name, because the two above cited specimens have already been identified by the author of Flora Iranica as *A. raddeanum* (Kukkonen 7705, Rechinger 53000 W). *A. gorganense* Mobayen (described from 64 km W Bojnurd, Furse & Sygne 554, K, W) belongs to this complex.

Acantholimon rudbaricum (Bornm.) Bornm., Beih. Bot. Centralbl. 33, 2: 192 (1915). Syn.: *A. truncatum* Bunge subsp. *rudbaricum* Bornm., Bull. Herb. Boissier, sér. 8: 123 (1908).

Mat.: A-10897; R-52921; T-34262*	
Hab.: Gypsum hills associated with <i>Moriera spinosa</i> , N parts of Mirza-Baylu plain	
Dist.: Map 523	Alt.: 1200-1290
Ch.: IT ^C	GF.: CSC TH
Th. (GNP): END (3)	Th. (IR): IND

* An ambiguous locality which cannot be shown in the map.

Zehzad (in Hasanzadeh-Kiabi 1994: 90) listed *A. gulistanicum* Bunge and *A. avenaceum* Bunge to occur in Golestan, apparently due to the similarity of the name "Gulistan", the type locality of these species. Bunge has collected these plants from the village Golestan [Gulistan] near Mashhad, not from

our area. His travel was from Asterabad [Gorgan] to Schahrud [Shahrud] and through Shahrud-Sabzevar road to Nischabur and Meschhed [Mashhad] (Bunge 1860).

Limonium gmelinii (Willd.) Kuntze, Rev. Gen. 2: 395 (1891). Syn.: *Statice gmelinii* Willd., Sp. Pl.: 1: 1524 (1798).

Mat.: A-10900, 12147, 12228, 12229, 11863	
Hab.: Saline soils	
Dist.: Map 524	Alt.: 670-1280
Ch.: ES-IT	GF.: HRO
Th. (GNP): VUL (5)	Th. (IR): NOT

The discovery of this species near the entrance of Tangegol (A-11863) is very unusual. Seeds and saline soils may originate from roadbuilding activities in the area.

Limonium suffruticosum (L.) Kuntze, Rev. Gen. 2: 396 (1891). Syn.: *Statice suffruticosa* L., Sp. Pl.: 276 (1753).

Mat.: A-12150, 10886	
Hab.: Saline soils and lime-gypsum hills	
Dist.: Map 525	Alt.: 1200-1280
Ch.: IT ^E	GF.: CSC
Th. (GNP): END (3)	Th. (IR): END

Plumbago europaea L., Sp. Pl.: 151 (1753).

Mat.: GA-4922, 4995; ZA-15837; ZK-82/158	
Hab.: Rocky outcrops	
Dist.: Map 526	Alt.: 800-1400
Ch.: M [IT ^{W&C} -ES ^{EH}]	GF.: HSC
Th. (GNP): RAR (11)	Th. (IR): NOT

Podophyllaceae

Bongardia chrysogonum (L.) Spach, Hist. Vég. Phan. 8: 65 (1839). Syn.: *Leontice chrysogonum* L., Sp. Pl.: 312 (1753); *Bongardia rauwolfii* C. A. Mey.; *B. olivieri* C. A. Mey.

Mat.: R-33131; Z-86/2611	
Hab.: Mountain steppes often with grasses and thorn-cushions, <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> scrubs, <i>Juniperus excelsa</i> woodland, <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes	
Dist.: Map 527	Alt.: 1000-1820
Ch.: IT ^{omni}	GF.: GBT
Th. (GNP): NOT (22)	Th. (IR): NOT

Leontice leontopetalum L., Sp. Pl.: 312 (1753).
subsp. *ewersmannii* (Bunge) Coode, Notes Roy.
Bot. Gard. Edinburgh 26, 1: 42 (1964). Syn.: *L.*
ewersmannii Bunge, Arb. Naturf. Ver. Riga 1: 47:
131 (1847); *L. tempskyana* Freyn.

Mat.: AS-5939; Z-86/2587	
Hab.: Dry <i>Artemisia</i> steppe in Mirz-Baylu plain, particularly along the road to Almehr	
Dist.: E	Alt.: 1200-1300
Ch.: IT	GF.: GBT
Th. (GNP): END (3)	Th. (IR): NOT
LN: Don-Qoz-Qotori (Turkmen name) دندوز قتورى (ترکمنی)	

Polygalaceae

Polygala anatolica Boiss. & Heldr. in Boiss.,
Diagn. Pl. Orient. Nov. sér. 2, 1: 57 (1853).

Mat.: A-9664, 11680, 10621, 11516; AS-6133; F- 1049, 1103	
Hab.: Steep slopes with soils development or on soils at base of rocks in scrub vegetation and forest margin	
Dist.: Map 528	Alt.: 800-1600
Ch.: ? IT ^W -ES ^{EH} [M ^E]	GF.: HSC
Th. (GNP): VUL (8)	Th. (IR): NOT

Polygonaceae

Atraphaxis seravschanica Pavlov, Animadvers.
Syst. Herb. Tomsk 5-6: 3 (1933).

Mat.: A-11039; R-52925	
Hab.: Sandy-gravelly dry stream bed	
Dist.: Map 529	Alt.: 1200-1500
Ch.: IT ^E	GF.: CFR
Th. (GNP): END (2)	Th. (IR): ? VUL

Recently known as new record for Iran (Akhani
1996).

Atraphaxis spinosa L., Sp. Pl.: 1: 333 (1753).

Mat.: A-9541, 9832, 11727, 11702, 11703; GA- 4899; R-52965	
Hab.: Sandy-gravelly dry stream bed, mountain steppe	
Dist.: Map 530	Alt.: 1200-1700
Ch.: IT	GF.: CFR
Th. (GNP): VUL (7)	Th. (IR): NOT

Indeterminable specimens

A-10926, 11803

A-10926 has been collected from a small sand dune
at the top of a hill, near the beginning of the Almehr
valley. It has intermediate characters between *A.*
spinosa and *seravschanica*: both lenticular and
triquetrous nuts, flowers with 2 and 3 stigmas and
with 6 or 8 stamens on the same plant. Its habit and
leaf shape are more similar to *A. spinosa*. This may
either be a hybrid between *A. spinosa* and *A.*
seravschanica or an abnormal plant. A-11803 is a
late collection and has been found at the basal parts
of a limestone cliff between Tangegol and Abshar,
a rather unusual habitat for this genus. It lacks any
flower and fruit, but the leaves are very similar to
A. seravschanica.

Polygonum

The genus *Polygonum* is treated here in a broad
sense, according to Flora Iranica (56, 1968). Some
authors and some modern floras separate the
genera *Persicaria* and *Fallopia*: Nyberg & Mill in
Flora of the Arabian Peninsula and Socotra, vol 1,
129-133, 1996; Webb in Flora Europaea, ed. 2.
vol. 1: 97-98, 1993; Wilson (1990) and Greuter &
al. (1989).

Polygonum arenastrum Boreau, Fl. Centr. Fr. ed.
3, 3: 559 (1875). Syn.: *P. aequale* Lindm.

Mat.: A-12253	
Hab.: Forest margin and open woodland of <i>Crataegus pentagyna</i> and <i>Prunus divaricata</i> in Khan Doushan	
Dist.: W	Alt.: 500
Ch.: SCO	GF.: TCR/TCA
Th. (GNP): END (1)	Th. (IR): SUN

Polygonum aviculare L., Sp. Pl.: 362 (1753).

Mat.: A-11963	
Hab.: Moist meadow around Sulukli Lake	
Dist.: NW	Alt.: 1380
Ch.: COS	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Polygonum convolvulus L., Sp. Pl.: 364 (1753).
Syn.: *Fallopia convolvulus* (L.) Á. Löve.

Mat.: A-9284, 9291; R-52510, 52767	
Hab.: Closed lowland and montane forest, open <i>Crataegus</i> woodland, <i>Paliurus spina-christi</i> thicket, forest openings with <i>Pteridium aquilinum</i> and montane meadows, rarely rocky outcrops	
Dist.: Map 531	Alt.: 450-2000
Ch.: PL	GF.: TST
Th. (GNP): NOT (50)	Th. (IR): NOT

Polygonum hyrcanicum Rech. f., Ann. Naturhist. Mus. Wien 53, 1: 352 (1942). Syn.: *P. equisetiforme* auct. fl. Persiae, nec Sibth. & Sm. (1809).

Mat.: A-9439, 9549, 9513, 12307; GA. 4894, 4853, 4921; R-52509, 52759, 37633; W&C-14235	
Hab.: Thickets of <i>Crataegus</i> and <i>Paliurus spina-christi</i> , disturbed habitats around the station and road, rarely in mountain steppes either mixed of grasses and thorn-cushions or mixed of grasses and scattered shrubs	
Dist.: Map 532	Alt.: 450-1750
Ch.: ES ^{HY}	GF.: HCR
Th. (GNP): NOT (29)	Th. (IR): NOT

Polygonum minus Huds., Fl. Angl. 148 (1762). Syn.: *Persicaria minor* (Huds.) Opiz.

Mat.: A-11975	
Hab.: Lowland forest ca. 8 km E Tangerang and moist soils around Sulukli Lake	
Dist.: NW, C	Alt.: 800-1380
Ch.: PL	GF.: TSC
Th. (GNP): END (2)	Th. (IR): END

Only two localities in Gilan were mentioned by Rechinger & Schiman-Czeika (Fl. Iranica 56: 62, 1968) for *P. minus*.

Polygonum mite Schrank, Baier. Fl. 1: 668 (1789). Syn.: *Persicaria mitis* (Schrank) Asenov.

Mat.: A-9670, 11849	
Hab.: Lowland forest on moist soils along Madrasu river near Golestan Parking	
Dist.: W-Central	Alt.: 480-500
Ch.: ES-M	GF.: TSC
Th. (GNP): END (2)	Th. (IR): END

Polygonum patulum M. Bieb., Fl. Taur.-Caucas. 1: 304 (1808).

Mat.: A-11548; Z-82/213	
Hab.: Mountain meadows in forest openings, disturbed places, margin of forest	
Dist.: Map 533	Alt.: 600-2000

Ch.: IT-M	GF.: TSC
Th. (GNP): VUL (5)	Th. (IR): NOT

Polygonum persicaria L., Sp. Pl.: 360 (1753).

Mat.: A-11826, 12248, 12245	
Hab.: Waterside along Khan Doushan river and some brooks in Tangerang	
Dist.: Map 534	Alt.: 450-500
Ch.: PL	GF.: TCR (or biennial)
Th. (GNP): END (2)	Th. (IR): NOT

Polygonum rottboellioides Jaub. & Spach, Ill. Pl. Orient. 2: 32 (1845).

Mat.: R-53159	
Hab.: Collected once in Almeh region (no further detail is available)	
Dist.: C	Alt.: ? 1500-1800
Ch.: IT ^C	GF.: TCR
Th. (GNP): END (1)	Th. (IR): NOT

Polygonum thymifolium Jaub. & Spach, Ill. Pl. Orient. 2: 22 (1844). Syn.: *P. kotyschyanum* Boiss.

Mat.: A-9438, 10970; R-52919, 53161, 53161; WF-12678	
Hab.: Mountain steppes with grasses and thorn-cushions (with or without shrub), <i>Juniperus excelsa</i> woodland	
Dist.: Map 535	Alt.: (?1200-)1500-1800
Ch.: IT ^C	GF.: CSC
Th. (GNP): RAR (10)	Th. (IR): NOT

Rheum turkestanicum Janisch., Sched. Herb. Fl. Ross. 8: 92 Nr. 2570 (1922). Fig. 23, I-J.

Mat.: A-10932; AS-5927	
Hab.: Restricted around Mirza-Baylu station and Mirza-Baylu Kohneh (demolished village) in <i>Artemisia</i> steppe and road margin	
Dist.: Map 536	Alt.: 1200
Ch.: IT ^{Aralo-Caspian}	GF.: GRH/HRO
Th. (GNP): END (2)	Th. (IR): END

The above cited material has been compared with type specimen: Transcaspia, distr. Merw, in arenosis pr. st. viae ferreae Repetek. 1913.4.5 (flower), 1913.5.1 (fruit), N. V. Androsov 2570 (Iso. M). A very beautiful plant, both in flower and in fruit (see Fig. 23, I-J.). In Fl. Iranica (56: 26-27, 1968), only two specimens were mentioned; one from Tuman Aqa and another from Torba-te Heyariyeh.

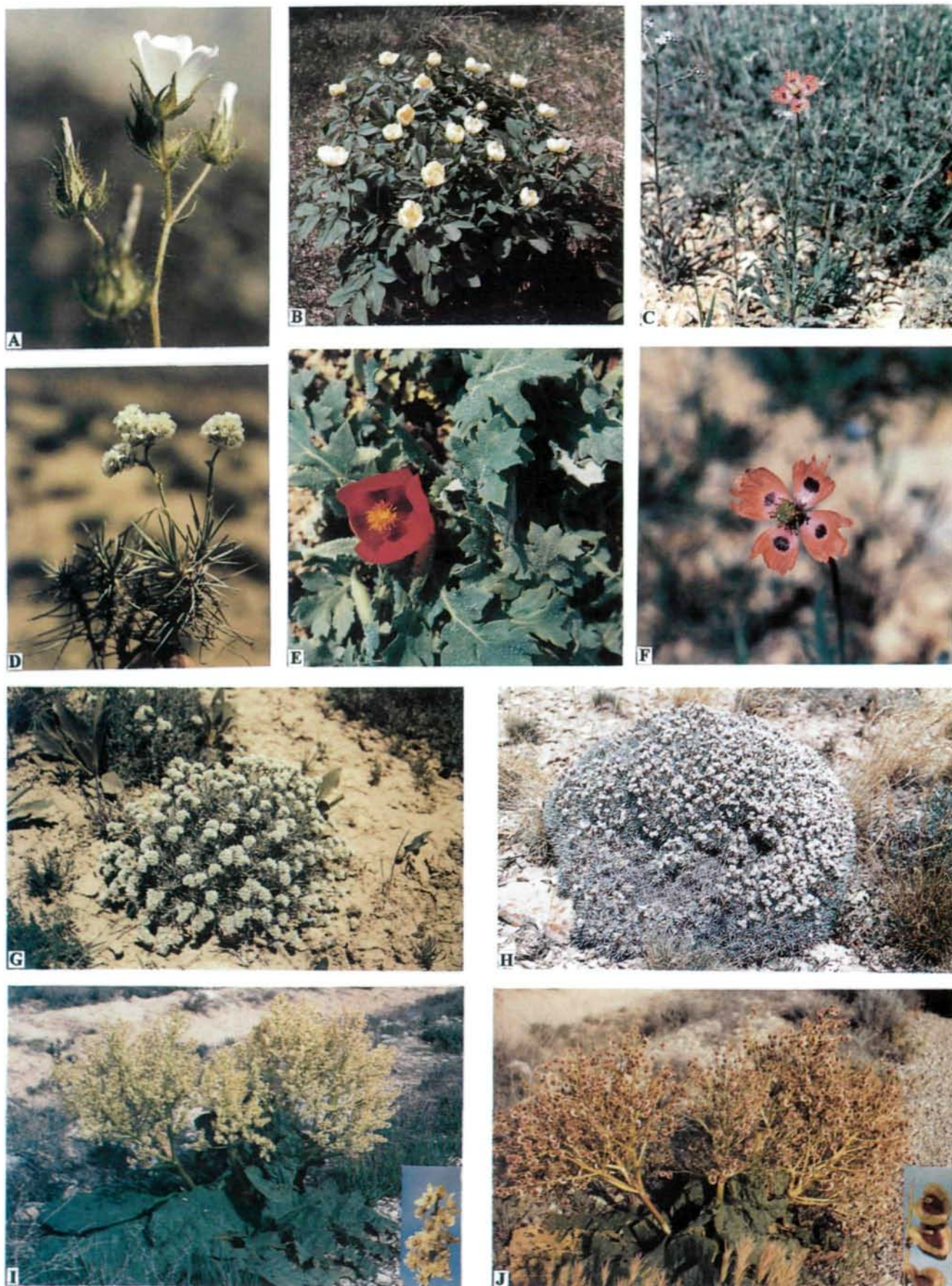


Fig. 23: A, *Althaea hirsuta*; B, *Paeonia wittmanniana*; C & F, *Papaver dubium* subsp. *erosum*; D & G, *Acantholimon pterostegium*; E, *Glaucium oxylobum*; H, *Acantholimon embergeri*; I-J, *Rheum turkestanicum*, flowering plant (I), fruiting plant (J).

Rumex

Rechinger has identified his collection of *Rumex* from the Park. These are cited here and marked by an asterisk. Furthermore, he has designated two new hybrids, with names (in sched.). As far as I know, these are not yet published. They are listed here without formal name and validation.

Rumex alveolatus Los., Fl. Turkmen. 2: 44 (1937). Syn.: *R. losinskajae* Rech. f.

Mat.: A-10957; R-52503*	
Hab.: Garden of office building in Tangerang	
Dist.: W	Alt.: 450
Ch.: IT-ES ^{HY}	GF.: HSC
Th. (GNP): END (2)	Th. (IR): NOT

Rumex caucasicus Rech. f., Feddes Repert. 31: 262 (1933).

Mat.: A-11355, 11397	
Hab.: <i>Juniperus</i> forest, road margin and thicket of <i>Acer monspessulanum</i> (with grasses)	
Dist.: Map 537	Alt.: 1580-2000
Ch.: IT ^{Cauc.-Turk.}	GF.: HSC
Th. (GNP): END (3)	Th. (IR): END

Known as new record for Iran (Akhani 1999).

Rumex chalepensis Mill., Gard. Dict. ed. 8 n° 11 (1768).

Mat.: A-10930; R-52485*	
Hab.: Waste places and garden weed in Tangerang and Mirza-Baylu	
Dist.: W, E	Alt.: 450-1200
Ch.: IT	GF.: HSC
Th. (GNP): END (2)	Th. (IR): NOT

Rumex conglomeratus Murr., Prodr. Stirp. Goetting. 52 (1770).

Mat.: A-11824; R-52512*	
Hab.: Weed around Tangerang office building	
Dist.: W	Alt.: 450
Ch.: IT-ES-M ^(alien elsewhere)	GF.: HSC
Th. (GNP): END (2)	Th. (IR): NOT

Rumex crispus L., Sp. Pl.: 335 (1753).

Mat.: A-9539, 11991; R-52504*; Z-83/1379	
Hab.: As weed in moist soils (around stations) and moist meadow around Sulukli Lake	
Dist.: Map 538	Alt.: 450-1700
Ch.: COS ^(mostly alien)	GF.: HSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Rumex dentatus L., Mantissa Alt. 226 (1771). subsp. *halácsyi* (Rech. f.) Rech. f., Beih. Bot. Centralbl. 49 /2: 16 (1932). Syn.: *R. halácsyi* (*limosus* x *pulcher*) Rech., Ver. Zool. Bot. Ges. Wien 49: 105 (1899).

Mat.: R-52548; Z-82/215	
Hab.: Two specimens along Madrasu river (near Sharleq and between Tangerang and Tangeqol)	
Dist.: S, C	Alt.: 500-900
Ch.: PL	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

Rumex obtusifolius L., Sp. Pl.: 335 (1753). subsp. *subalpinus* (Schur) Čelak, Prodr. Fl. Böhm. 159 (1873). Syn.: *R. obtusifolius* var. *subalpinus* Schur, Enum. Pl. Transs. 579 (1866).

Mat.: A-11915, 12015	
Hab.: Closed montane forest, mountain meadow surrounded by montane forest	
Dist.: Map 539	Alt.: 1950-2140
Ch.: ES	GF.: HSC
Th. (GNP): END (2)	Th. (IR): RAR

Rumex pulcher L., Sp. Pl.: 336 (1753). subsp. *anodontus* (Hausskn.) Rech. f., Beih. Bot. Centralbl. 49, 2: 34 (1932). Syn.: *R. pulcher* L. var. *anodonta* Hausskn. Mitt. Thür. Bot. Ver. N. F. 1: 34 (1891).

Mat.: A-10955; R-52505	
Hab.: In garden of office building in Tangerang	
Dist.: W	Alt.: 450
Ch.: IT-M	GF.: HSC
Th. (GNP): END (2)	Th. (IR): RAR

Rumex sanguinus L., Sp. Pl.: 334 (1753).

Mat.: A-4424, 9251, 9348, 9368, 10954, 11534; R-52501*; 52482*	
Hab.: Closed lowland forest and forest margin, rarely montane forest, forest opening with <i>Pteridium aquilinum</i> , weed in office garden	
Dist.: Map 540	Alt.: 450-1400
Ch.: ES	GF.: HSC
Th. (GNP): NOT (18)	Th. (IR): NOT

Rumex tuberosus L., Sp. Pl.: ed. 2: 481 (1762).
subsp. **tucomanicus** Rech. f., Candollea 12: 31
(1949). Syn.: *R. tuberosus* L. var. *turcomanicus*
Rech. f., Feddes Repert. 49: 1 (1940).

Mat.: A-6138, 10712; R-52644*, 33136*, 52809*	
Hab.: Rocky outcrops with various vegetation (<i>Paliurus spina-christi</i> scrub, <i>Juniperus excelsa</i> woodland, <i>Carpinus orientalis-Quercus</i> <i>castaneifolia</i> open woodland)	
Dist.: Map 541	Alt.: 700-1950
Ch.: IT-M ^(as species) , IT Cauc.-Turk. as subspecies)	GF.: GTU
Th. (GNP): NOT (26)	Th. (IR): RAR

Hybrids

Rumex alveolatus x *pulcher* subsp. *anodontus*:
R-52502*; A-10956

Rumex alveolatus x *sanguinus*:
R-52500*

Portulacaceae

Portulaca oleracea L., Sp. Pl.: 445 (1753).

Mat.: A-11850	
Hab.: Roadside weed, 3 km E of Tangerang	
Dist.: W	Alt.: 450
Ch.: IT-ES-M	GF.: TCA/TCR ^{SU}
Th. (GNP): END (1)	Th. (IR): NOT

Primulaceae

Anagallis arvensis L., Spec. Pla. 148 (1753).

Mat.: A-10563; F-1184	
Hab.: Rocky outcrops in forested zone, rarely <i>Artemisia-Stipa</i> steppe	
Dist.: Map 542	Alt.: 700-1600
Ch.: PL	GF.: TCA
Th. (GNP): VUL (7)	Th. (IR): NOT

Androsace maxima L., Sp. Pl.: 141 (1753).

Mat.: A-5918, 6199; AS-5918	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes; moderately saline soils in <i>Artemisia-Anabasis</i> <i>aphylla</i> steppe, <i>Paliurus spina-christi</i> thicket, dry valley with <i>Haloxylon</i> shrubs	
Dist.: Map 543	Alt.: 970-1400
Ch.: ES-IT-M	GF.: TRO
Th. (GNP): NOT (18)	Th. (IR): NOT

Cyclamen coum Mill., Gard. Dict. ed. 8: n° 6
(*Cyclamen*) (1768).

subsp. **caucasicum** (K. Koch) O. Schwarz, Feddes
Repert. 58: 250 (1955).

Mat.: No voucher	
Hab.: Lowland forest	
Dist.: ? W, C	Alt.: ?
Ch.: ES ^{EH}	GF.: GBT
Th. (GNP): SUN	Th. (IR): SUN

According to a personal communication by Mr. B.
Zehzad (Tehran), *C. coum* occurs in the Park.

Primula heterochroma Stapf, Akad. Wiss. Wien,
Math.-Naturwiss. Kl., Denkschr. 50: 70 (1885).

Mat.: A-10378, 10397	
Hab.: Closed lowland and montane forest	
Dist.: Map 544	Alt.: 450-2130
Ch.: ES ^{HY}	GF.: HRO
Th. (GNP): NOT (80)	Th. (IR): NOT

The colour of the flowers according to Wendelbo
(Flora Iranica, 9, 5, 1965) varies from yellow,
white, red to pink. Populations occurring in our
area are characterized by having yellow flowers,
based on field observations.

Samolus valerandi L., Sp. Pl.: 171 (1753).

Mat.: A-11018, 12137, 10831	
Hab.: Around spring and streams (brackish spring with <i>Phragmites australis</i> and <i>Trachomitum</i> <i>venetum</i> , and fresh water with <i>Salix aegyptiaca</i> and <i>Elaeagnus angustifolia</i>)	
Dist.: Map 545	Alt.: 1280-1800
Ch.: PL	GF.: HSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Punicaceae

Punica granatum L., Sp. Pl.: 472 (1753).

Mat.: A-11852	
Hab.: Forest and road margin in Tangerang and near road to Tangegol	
Dist.: W	Alt.: 450-500
Ch.: ? IT-ES ^{HY}	GF.: PSS
Th. (GNP): END (3)	Th. (IR): NOT

Ranunculaceae

Actaea spicata L., Sp. Pl.: 504 (1753).

Mat.: A-10619, 11218, 11270, 11519, 11601; W&C-14391	
Hab.: Closed montane forest	
Dist.: Map 546	Alt.: 1400-1850
Ch.: ES	GF.: GRH
Th. (GNP): VUL (6)	Th. (IR): END

Apparently a very rare species in Iran; only three localities are mentioned by Riedl (Fl. Iranica 171: 5, 1992) for Iran.

Adonis scrobiculata Boiss., Diagn. Pl. Orient. Nov. sér. 2, 1: 6 (1854).

Mat.: A-10300, 11199; F-1159; R-53149 (n.v.)	
Hab.: Open woodland with grasses (Koilar), forest opening (Dast-e Shah), steppe (Almeh) and disturbed habitats	
Dist.: N, C, SW	Alt.: 1400-1600
Ch.: IT ^C	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Adonis aestivalis L. Sp. Pl.: ed. 2: 771 (1862).

Mat.: A-10642, 10261	
Hab.: Forest openings in Shakha and ruderal places around Soolegerd station	
Dist.: NE, S	Alt.: 1200-1500
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

A-10261 is a young gathering with uncertain status. It is characterized by the small habit, 10-15 cm height, and hairy stem and sepals.

Anemone biflora DC., Reg. Veg. Syst. Nat. 1: 201 (1817). s. l.

Mat.: I-12668 (n.v., fide Fl. Iranica 171: 216, 1992); Rz-(16.4.1973) under <i>A. petiolulosa</i>	
Hab.: Mountain steppe in Almeh valley	
Dist.: C & ?	Alt.: ?-1900
Ch.: IT ^{C&E}	GF.: GRH/GTU
Th. (GNP): END (1)	Th. (IR): NOT

Renz (16.4.1973) was named by Rechinger (Fl. Iranica 171: 220, 1992) under *A. petiolulosa* Juz. Until a new collection and field data are available, I prefer to put them together.

Anemone caucasica Willd. ex Rupr., Fl. Cauc. 14 (1869). Syn.: *A. apennina* M. Bieb., *A. blanda* Boiss.

Mat.: A-10306; AS-6128	
Hab.: Grassy opening in open woodland, lowland forest	
Dist.: Map 547	Alt.: 1000-1450
Ch.: ES ^{HY}	GF.: GRH/GTU
Th. (GNP): END (2)	Th. (IR): NOT

Ceratocephala falcata (L.) Pers., Syn. Pl. 1: 341 (1805). Syn.: *Ranunculus falcatus* L., Sp. Pl.: 556 (1753).

Mat.: A-10201; F-1034	
Hab.: Mountain steppe with grasses and thorn-cushions, <i>Artemisia-Festuca-Stipa</i> steppe	
Dist.: Map 548	Alt.: 1150-1900
Ch.: ES-IT-M	GF.: TRO ^{DW}
Th. (GNP): RAR (9)	Th. (IR): NOT

Clematis isphahanica Boiss., Diagn. Pl. Orient. Nov. sér. 1, 6: 3 (1885). Syn.: *C. pseudoorientalis* Kuntze, p. p.; *C. recta* L. subsp. *isphahanica* (Boiss.) Kuntze.

Mat.: R-52935; ZA-15839	
Hab.: Scrub valley after Tunnel and Almeh valley	
Dist.: S, E	Alt.: 900-1200
Ch.: IT ^C	GF.: CSE
Th. (GNP): END (2)	Th. (IR): NOT

Clematis orientalis L., Sp. Pl.: 1: 543 (1753).

Mat.: A-4490, 11804; W&C-14241 (n.v.)	
Hab.: Along a stream E of Aq-Su, along Almeh valley and scrub valley 6 km E Soolegerd	
Dist.: C	Alt.: 800-1400
Ch.: IT	GF.: CSS
Th. (GNP): END (3)	Th. (IR): NOT

Consolida leptocarpa Nevski, Trudy Bot. Inst. Akad. Nauk SSSR, Ser. 1, 4: 296 (1937).

Mat.: A-10839; R-52944; WF-12724	
Hab.: <i>Artemisia</i> steppe in Mirza-Baylu plain from Cheshmeh Khan to Mirza-Baylu station.	
Dist.: S, E	Alt.: 1200-1300
Ch.: IT ^C (NE Iran, common in Afghanistan)	GF.: TSC
Th. (GNP): VUL (5)	Th. (IR): NOT

Consolida orientalis (Gay) Schröd., Abh. Zool.-Bot. Ges. Wien 4: 62 (1909).
Syn.: *Delphinium orientale* Gay in Des Moul., Cat. rais. pl. Dordogne 12 (1840).

Mat.: A-10759; R-52750; WF-12838	
Hab.: Waste places	
Dist.: 549	Alt.: 900-1200
Ch.: IT-M	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Consolida rugulosa (Boiss.) Schröd., Ann. K. K. Naturhist. Hofmus. 27: 43 (1913). Syn.: *Delphinium rugulosum* Boiss., Ann. Scienc. Nat. Sér. 2, 16: 361 (1841); *D. paradoxum* Bunge; *Consolida paradoxa* (Bunge) Nevski.

Mat.: A-6219* (f. <i>rugulosa</i>); AS-5912 (f. <i>paradoxa</i> (Bunge) Iranshahr)	
Hab.: <i>Artemisia</i> steppe north Armadlu (Mirza-Baylu plain) and Almeh valley	
Dist.: S, E	Alt.: 1200-1400
Ch.: IT ^C	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Consolida teheranica (Boiss.) Rech. f., Ann. Naturhist. Mus. Wien 51: 376 (1941). Syn.: *Delphinium teheranicum* Boiss., Fl. Orient. 1: 85 (1867). *Aconitopsis teheranica* (Boiss.) Kem.-Nath., *Aconitella teheranica* (Boiss.) Soják.

Mat.: A-11695, 11678; R-52751 (n.v.); Wa-174 (n.v.)	
Hab.: Open woodland with rocky outcrops, mountain meadow and disturbed habitats around Dast-e Shah station and <i>Paliurus spina-christi</i> thicket	
Dist.: Map 550	Alt.: 1000-1560
Ch.: IT ^{Alborz}	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): IND

Consolida aucheri (Boiss.) Iranshahr has been reported by Iranshahr (Flora Iranica 171: 103, 1992) from 125 km W Bojnurd, 1100 m, Anderson & Petersen 307. It is not certain whether this locality is located within the Park boundaries. I have seen neither the cited material by Iranshahr nor any other material within or around the Park.

Delphinium biternatum Huth, Bot. Jahr. Syst. 20: 422 (1895). Syn.: *D. floribundum* Freyn & Sint. ex Freyn; *D. gorganicum* Rech. f.

Mat.: A-4459, 9617, 11743	
Hab.: Sunny lowland forest and montane forest; <i>Acer monspessulanum</i> scrub valley	
Dist.: Map 551	Alt.: 850-2000
Ch.: IT ^E	GF.: GRH
Th. (GNP): END (3)	Th. (IR): END

A very beautiful plant which may be good as garden plant. It was already known in Fl. Iranica, 171: 67, 1992, but only from three collections. A-4459, 9617 were collected from lower altitudes, 900 and 1500 m, respectively. The calyx, petal and spur length of A-4459, 9617 are comparatively shorter than those of A-11743 (collected from 2000 m elevation). Further studies are necessary to check their status.

Delphinium turkmenum Lipsky, Trudy Glavn. Bot. Sada 18: 2 (1910). *D. pilosulum* B. Fedtsch.

Mat.: A-11036, 10827; F-1036; R-52878 (n.v.), 53009 (n.v.)	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes	
Dist.: Map 552	Alt.: 1200-1400
Ch.: IT ^{KK}	GF.: TSC
Th. (GNP): VUL (6)	Th. (IR): VUL

Delphinium ursinum Rech. f., Anz. Österr. Akad. Wiss. Math.-Naturwiss. Kl. 88: 224 (1951).

Mat.: A-11096, 11676; WF-12766 (n.v.)	
Hab.: Sunny montane forest and open woodland	
Dist.: Map 553	Alt.: 1000-1560
Ch.: ES ^{HY}	GF.: GTU
Th. (GNP): VUL (4)	Th. (IR): RAR

A-11096 is a young collection without flowers; but the leaves are identical with *D. ursinum*.

Delphinium aff. tuberosum Auch. ex Boiss., Ann. Scienc. Nat. Sér. 2, 16: 370 (1841).

Mat.: A-4386, 11675	
Hab.: Montane open woodland	
Dist.: SW	Alt.: 1600-1660
Ch.: ?	GF.: GTU
Th. (GNP): END (2)	Th. (IR): ?

The above cited specimens are characterized by the bluish-yellow flowers, glabrous sepals and follicles and brown (?) anthers. The bracteoles are inserted at or above the middle of the pedicel. It is closely related or possibly identical with *D. tuberosum*.

This species is distributed in NW, W, C Iran (cf. Flora Iranica, 171: 77-78, 1992)

Delphinium spec.
A-11780

The cited plant cannot confidently be identified using the treatment of *Delphinium* in Flora Iranica. It seems to be related to *D. tuberosum* and *D. ursinum*.

Ficaria kochii (Ledeb.) Iranshahr & Rech. f. in Fl. Iranica 171: 126 (1992). Syn.: *Ranunculus kochii* Ledeb., Fl. Ross. 1: 731 (1842); *R. edulis* Boiss. & Hohen.

Mat.: A-10287; AS-6098,	
Hab.: Top of mountain by melting snow, open montane woodland	
Dist.: Map 554	Alt.: 1450-2000
Ch.: IT ^{W&C}	GF.: GBT ^{SU}
Th. (GNP): END (2)	Th. (IR): NOT

Nigella integrifolia Regel, Bull. Soc. Imp. Naturalites Moscou 43, 2: 246 (1870).

Mat.: TM-34593 (n.v., fide Fl. Iranica 171: 27, 1992)	
Hab.: Only one record from Dasht-e Kalpush, probably from adjacent cultivated lands	
Dist.: S	Alt.: ± 1000
Ch.: IT ^{C&E}	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Ranunculus cicutarius Schldl., Animadvers. 25 (1819). Syn.: *R. orientale* C. A. Mey. non L.

Mat.: A-10347, 10680; AS-6149	
Hab.: Open scrubs of <i>Paliurus spina-christi</i> - <i>Acer monspessulanum</i> , margin of <i>Carpinus orientalis</i> - <i>Quercus castaneifolia</i> forest	
Dist.: Map 555	Alt.: 800-1400
Ch.: ± ES ^{HY}	GF.: GBT
Th. (GNP): VUL (6)	Th. (IR): NOT

Ranunculus lingua L., Sp. Pl.: 1: 549 (1753). Fig. 24, A.

Mat.: A-11980	
Hab.: Aquatic with <i>Lemna minor</i> and <i>Schoenoplectus lacustris</i> , confined to Sulukli lake	
Dist.: Map 290	Alt.: 1380
Ch.: ES	GF.: GRH / ARH
Th. (GNP): END (1)	Th. (IR): END

Apparently very rare in Iran; *R. lingua* was known only from one locality in Flora Iranica, 171: 169, 1992: Gilan: Rasht: Mordab-e Amir Kolayeh, Ghahreman & Agustin 9558.

Ranunculus oxyspermus Willd., Sp. Pl.: 2 (2): 1328 (1799).

Mat.: AS-5921	
Hab.: Moderately saline flats in <i>Anabasis aphylla</i> - <i>Artemisia</i> steppe near Mirza-Baylu station	
Dist.: E	Alt.: 1200
Ch.: IT ^{?W&C}	GF.: GRH/GTU
Th. (GNP): END (1)	Th. (IR): NOT

Ranunculus polyanthemus L., Sp. Pl.: 554 (1753).

Mat.: A-10382, 11316; F-1037	
Hab.: Spring and streamside in forest, moist soil in mountain meadows	
Dist.: Map 556	Alt.: 450-1900
Ch.: ES	GF.: GRH/GTU
Th. (GNP): VUL (5)	Th. (IR): NOT

Ranunculus sceleratus L., Sp. Pl.: 551 (1753).

Mat.: A-9770.	
Hab.: Margin of Adam-Chaqran forest spring, ca. 4 km W Tanggol	
Dist.: C	Alt.: 1000
Ch.: PL	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Thalictrum isopyroides C. A. Mey. in Ledeb., Fl. Altaica 2: 364 (1830).

Mat.: A-10230; W&A-11088 (n.v.)	
Hab.: <i>Juniperus</i> woodland, mountain steppes mixed of grasses and scattered shrubs or thorn-cushions, <i>Stipa</i> steppe	
Dist.: Map 557	Alt.: 1200-1900
Ch.: IT ^{omni}	GF.: GRH
Th. (GNP): VUL (7)	Th. (IR): NOT

Thalictrum minus L., Sp. Pl.: 546 (1753).

Mat.: A-4334, 9494, 11536; GA-4920, 4969; R-52668 (n.v.); W&C-14279 (n.v.)	
Hab.: Forest openings often with <i>Pteridium aquilinum</i> and <i>Calamagrostis epigejos</i> ; scrubs often with <i>Paliurus spina-christi</i> thickets, rarely with <i>Acer monspessulanum</i> and <i>Crataegus</i> thickets; steep rocky outcrops, moist habitats often with <i>Phragmites australis</i>	
Dist.: Map 558	Alt.: 500-1880

Ch.: PL ^(N Temperate Eurasia, alien elsewhere)	GF.: HSC
Th. (GNP): NOT (35)	Th. (IR): NOT

Thalictrum sultanabadense Stapf, Verh. Zool.-Bot. Ges. Wien 38: 550 (1888).

Mat.: W&al-11079 (n. v. fide Fl. Iranica 171: 119, 1992)	
Hab.: <i>Juniperus</i> woodland, transition between <i>Juniperus</i> woodland and cold-deciduous forest, <i>Quercus macranthera</i> forest	
Dist.: Map 559	Alt.: 1600-1900
Ch.: IT ^C	GF.: HSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Resedaceae

Reseda lutea L., Sp. Pl.: 1: 449 (1753).

Mat.: A-10589, 11407; R-52756-a	
Hab.: Rocky outcrops with open scrub, thicket of <i>Paliurus spina-christi</i>	
Dist.: Map 560	Alt.: 900-1880
Ch.: ES-IT-M	GF.: TSC/HSC
Th. (GNP): VUL (5)	Th. (IR): NOT

Reseda luteola L., Sp. Pl.: 1: 448 (1753).

Mat.: A-4331; Z-83/1362, 82/275	
Hab.: Waste places around Soolegerd station, between Sharleq and Cheshmeh Khan and NW border of the Park	
Dist.: S, NE, NW	Alt.: 1000-1200
Ch.: ES-IT-M	GF.: HSC (biennial)
Th. (GNP): END (3)	Th. (IR): NOT

Rhamnaceae

Paliurus spina-christi Mill., Gard. Dict. ed. 8 (1768). Syn.: *Rhamnus paliurus* L. Figs 8, G; 24, B.

Mat.: A-4340, GA-4932, 4982	
Hab.: A frequent shrub in forest openings, pioneer scrub; rocky outcrop, particularly transition between forest and steppe, and as invasive species in deforested areas	
Dist.: Map 561	Alt.: 500-1350
Ch.: M-ES ^{EH} [IT]	GF.: PSS
Th. (GNP): NOT (35)	Th. (IR): NOT

Rhamnus

Based on my collection and field observation, ca. 5 taxa of *Rhamnus* occur in the Park. Unfortunately, only 2 species can confidently be named according to the account of Flora Iranica, 125, 1977. The others may either belong to undescribed taxa or are unknown species for Iran, or are a hybrid swarm.

Rhamnus cathartica L., Sp. Pl.: 193 (1753). Syn.: *Rh. elbursensis* Gauba & Rech. f.

Mat.: A-4505, 10604, 11891, 12003, 11907, 11902, 11931, 11331, 11279	
Hab.: Montane forest and open montane scrub (usually on exposed highest summits), rarely scrub valley	
Dist.: Map 562	Alt.: 1350-2400
Ch.: ES [IT-M]	GF.: PTS/PSS
Th. (GNP): RAR (14)	Th. (IR): NOT

Most of the above plants correspond to the var. *cathartica*, except A-11279 & 12203 which may refer to var. *caucasica* Kusun.

Rhamnus pallasii Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 4: 46 (1837). s. l.

Mat.: A-4446, 9461, AS-6000; GA-4933; [Korhonen-1095; Sabeti-8039; U-16153 and Wa-176 were reported under subsp. <i>sintenisii</i> (Rech. f.) Browicz & Ziel. in Fl. Iranica 125: 20, 1977]	
Hab.: Steep rocky outcrops, often in <i>Carpinus orientalis-Quercus castaneifolia</i> scrub, steep and vertical limestone cliffs, thickets of <i>Crataegus</i> , <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> , <i>Juniperus</i> woodland, rarely <i>Stipa</i> steppe	
Dist.: Map 563	Alt.: 600-1920
Ch.: ES ^{EH} -IT ^{Cauc.-Turk. & Zagros}	GF.: PSS
Th. (GNP): NOT (78)	Th. (IR): NOT

Rhamnus spathulifolia Fisch. & C. A. Mey. Ind. Sem. Hort. Petrop. 4: 46 (1873).

Mat.: A-11369, 11415, 11659, 11721, 11930	
Hab.: Exposed mountain summit, river bed, rocky outcrops in thickets of <i>Acer monspessulanum</i> , <i>Cotoneaster</i> spp. and <i>Lonicera</i> spp.; montane forest	
Dist.: Map 564	Alt.: 1450-2050
Ch.: ES ^{EH}	GF.: PSS/PTS
Th. (GNP): VUL (6)	Th. (IR): RAR

Above cited plants are erect shrubs to small trees (up to 2.5 m tall), with \pm spiny branches. The leaves are yellowish-green in colour, narrowly elliptic-oblongate in outline and slightly recurved towards the lower surface, with prominent glands at the margins. These specimens show some intermediate characters between *R. cathartica* and *R. pallasii*. They belong more likely to *R. spathulifolia* which was supposed to be a hybrid between *R. cathartica* and *R. pallasii* by Grubov 1949: 346 and Browicz & Zielinski (Fl. Iranica 125: 25, 1977). I am rather doubtful about the hybrid nature of these plant which are not rare in our area.

Rhamnus I (aff. *prostrata*).

A-11928

An intricate and subprostrate shrub up to 0.5 m tall and 1.5 m diameter. Similar to *R. prostrata* Jacquem. ex Parker in habit and to *R. orbiculata* Bornm. in leaf shape. But differs clearly from the former in having larger leaves, 2-3 cm long, and from the latter in having alternate leaves. It may be an undescribed taxon or an abnormal hybrid swarm. No fruit and flower is available.

Rhamnus II

A-11759

A small tree, c. 3 m, grows in *Quercus macranthera* forest in an elevation of 2100 m. It differs from *R. cathartica* by the larger leaves (4-8 cm) which are deeply serrate at the margin and by a longer petiole (1-3.5 cm). Furthermore, the upper side leaf-nerves are prominent, with obscure reticulation. The leaf-nerves of *R. cathartica* are distinctly impressed in the upper surface, with distinct reticulation. No fruit and flower is available.

Rosaceae

Both woody and herbal *Rosaceae* play an important role in the vegetation of the Park. The family is well known with regard to its complex taxonomic structure. The large part of the account of the family in Flora Iranica (*Rosaceae* I, Lfg. 66, 1969) is out-dated, particularly with regard to critical genera like *Alchemilla*, *Cotoneaster* and *Potentilla*. The recent Persian revision by Khatamsaz (Flora of

Iran, No. 6. Research Institute of Forests and Rangelands) added much information on the distribution of the well known species, and some additions to the Iranian flora, but little was done on the difficult groups, as they usually demand long-term team-work. That treatment is more a translation than a critical revision which would be naturally very useful for Persian students. Except *Crataegus* which has been identified by Dr K. I. Christensen, all other genera were named by me. In spite of my journey to Prague and my attempt to meet Prof. Soják to discuss with him my problems in *Potentilla*, unfortunately, due to his illness I was neither able to meet him nor to compare my plants with the rich material at his disposal.

Agrimonia eupatoria L., Sp. Pl.: 448 (1753).

Mat.: A-9804, 9679; GA-5001	
Hab.: <i>Crataegus pentagyna-Prunus divaricata</i> thickets (pioneer forest), forest openings with <i>Pteridium aquilinum</i> , closed lowland forest, open woodland (transition between closed montane forest and steppe)	
Dist.: Map 565	Alt.: 450-1980
Ch.: ES-IT-M	GF.: HSC
Th. (GNP): NOT (25)	Th. (IR): NOT

Alchemilla sp.

Mat.: A-12004	
Hab.: Karstic gully in Besh Jakhdan area	
Dist.: N	Alt.: 2000
Ch.: ?	GF.: HRO
Th. (GNP): END (1)	Th. (IR): ?

Cerasus avium (L.) Moench, Meth. 672 (1794).

Syn.: *Prunus avium* L., Fl. Svec. ed. 2: 165 (1755).

Fig. 24, C.

Mat.: A-10601, 11208, 11855, 11882, 11484, 11887; AS-6106	
Hab.: Closed montane forest, forest margin, rarely open montane woodland or forest margin and around springs	
Dist.: Map 566	Alt.: 960-2230
Ch.: ES [M]	GF.: PTS
Th. (GNP): NOT (38)	Th. (IR): NOT

Cerasus microcarpa (C. A. Mey.) Boiss., Fl. Orient. 2: 646 (1872). Syn.: *Prunus microcarpa* C. A. Mey., Verz. Pfl. Cauc. 166 (1831); *Cerasus orientalis* Spach; *Prunus orientalis* (Spach) Walp.

Mat.: A-4324, 4479, 5999, 9555, 9594, 11022; AS-6109; ZK-82/328	
Hab.: <i>Juniperus excelsa</i> woodland; mountain steppes and mountain summits with thorn-cushion, grasses and scattered shrubs; limestone cliffs; thickets of <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i>	
Dist.: Map 567	Alt.: 670-2380
Ch.: IT ^{W&C}	GF.: PSS
Th. (GNP): NOT (47)	Th. (IR): NOT

Cerasus pseudoprostrata Pojark., Journ. Bot. URSS 24, 3: 235 (1939). Syn.: *Prunus pseudo-prostrata* (Pojark.) Rech. f.

Mat.: A-4558, 4476, 11723, 9395	
Hab.: <i>Juniperus excelsa</i> woodland, mountain steppes with grasses and thorn-cushions, <i>Acer monspessulanum</i> and <i>Crataegus</i> thickets, <i>Artemisia-Festuca</i> steppe, <i>Quercus macranthera</i> forest, mountain summits with open scrub	
Dist.: Map 568	Alt.: 1050-2380
Ch.: IT ^{KK}	GF.: CSP
Th. (GNP): NOT (58)	Th. (IR): NOT

Cotoneaster

The genus *Cotoneaster* in SW Asia needs a critical revision. Unfortunately, no certainly authenticated material has been at my disposal. 3-4 species occur in our area of which only *C. multiflorus* is confidently identified. The remaining plants belong to the *C. nummularius* complex. Two species of this complex which are easily distinguishable from each other grow abundantly in our area. However, I am not sure about their correct names. They are provisionally identified as "*C. nummularius*" and "*C. ovatus*". A further two species have been reported which are mentioned here as doubtful records.

Cotoneaster "nummularius" Fisch. & C. A. Mey.

Mat.: A-12057, 10984, 11929, 11171, 11662, 11805; WF-12626	
Hab.: Various scrub communities and mountain steppes with scattered shrubs	
Dist.: Map 569	Alt.: 740-2050
Ch.: IT	GF.: PSS
Th. (GNP): NOT	Th. (IR): NOT

Cotoneaster "ovatus" Pojark.

Mat.: A-9418, 9618, 11414, 11690, 10983, 11936, 11753; WF-12624	
Hab.: Various scrub and scrub communities, particularly in <i>Acer monspessulanum</i> and <i>Crataegus</i> thickets	
Dist.: Map 570	Alt.: 1200-2230
Ch.: ? IT ^{KK}	GF.: PSS
Th. (GNP): NOT	Th. (IR): NOT

Cotoneaster multiflorus Bunge, in Ledeb., Fl. Altaica 2: 220 (1830).

Mat.: A-12187	
Hab.: Steep rocky outcrops in montane foggy forest north slopes of Alu-Baq, just below mountain top	
Dist.: Map 571	Alt.: 1820
Ch.: ? ES ^{EH} -Central Asiatic	GF.: PSS
Th. (GNP): END (1)	Th. (IR): END

It is easily distinguished from all other species with glabrous leaves beneath.

C. discolor Pojark. was reported by Khatamsaz (Flora of Iran 6: 229-231, 1992) based on Ameh, 1720 m, Sabeti 8104 (n.v.). Z-82/300 and A-11429 may belong to this taxon.

C. hissarica Pojark. has been reported from the area by Riedl (Fl. Iranica 66: 23-24, 1969) based on Golestan, 160 km W Bojnurd, 800 m, R-37635.

Crataegus

All determined by Dr K. I. Christensen (Hørsholm).

Crataegus ambigua Meyer ex Becker, Bull. Soc. Imp. Naturalites Moscou 31: 12, 34 (1858). subsp. *ambigua*. Fig. 24, D.

Mat.: A-10686, 11687, 12180	
Hab.: <i>Crataegus</i> shrubland (transition between montane forest and steppe), open scrub of <i>Carpinus orientalis-Quercus castaneifolia</i> , mountain steppe with scattered shrubs	
Dist.: Map 572	Alt.: 1350-1720
Ch.: ? IT	GF.: PSS/PTS
Th. (GNP): IND	Th. (IR): SUN

Crataegus azarolus L., Sp. Pl.: 477 (1753). var. *pontica* (K. Koch) K. I. Chr., Syst. Bot. 35: 38 (1992). Syn.: *C. pontica* K. Koch

Mat.: A-11869, 11927, 12039	
Hab.: <i>Crataegus</i> thickets and open scrubs between cold-deciduous forest and steppe	
Dist.: Map 573	Alt.: 1420-1700
Ch.: IT-M	GF.: PTS
Th. (GNP): VUL (7)	Th. (IR): IND

Crataegus kurdestanica Hadač & Chrtek, *Candollea* 35: 317 (1980).

Mat.: A-9716, 12100, 12102, 12201, GA-4972	
Hab.: Rocky outcrops	
Dist.: Map 574	Alt.: 640-1400
Ch.: IT	GF.: PSS/PTS
Th. (GNP): IND	Th. (IR): RAR

Crataegus microphylla K. Koch, Verh. Verein. Beförd. Gartenbaues Königl. Preuss. Staaten 1: 288 (1853). Syn.: *C. orthosepala* (Hauskn. & Bornm.) Bornm. Fig. 24, E.

Mat.: A-9253, 9338, 12190	
Hab.: Usually in closed lowland and montane forest	
Dist.: Map 575*	Alt.: 450-2000
Ch.: ES ^{EH}	GF.: PSS/PTS
Th. (GNP): NOT	Th. (IR): NOT

* The map is mainly based on phytosociological relevés in which two other species with rather similar facies and habitat (v.s. *C. pseudoheterophylla* and *C. kurdestanica*) are probably mixed with *C. microphylla*.

Crataegus pentagyna Waldst. & Kit. ex Willd., Sp. Pl.: 2: 1006 (1800).

subsp. ***pentagyna***. Syn.: *C. melanocarpa* M. Bieb.; *C. elbursensis* Rech. f.; *C. melanocarpa* subsp. *elbursensis* (Rech. f.) H. Riedl. Fig. 24, F.

Mat.: A-4402, 9358, 9732, 9758, 9820, 10784, 11113, 11114, 11417, 11428, 11457, 11498, 11558, 11635, 11669, 11751, 11856, 11890, 11942, 11943, 11946, 12181, 12202, 12255, 12343, 12357, 12378; GA-4880, Z-82/339, Z-82/338, Z-85/132, Z-82/109	
Hab.: The most common <i>Crataegus</i> in our area occurs in rocky outcrops, lowland forests, forest margin and transition zone between forest and steppes (particularly in elevated plains), thickets of <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i>	
Dist.: Map 576	Alt.: 450-2120
Ch.: ES ^{EH}	GF.: PSS/PTS
Th. (GNP): NOT < 35	Th. (IR): NOT

Crataegus pseudoheterophylla Pojark. in Fl. URSS 9: 507 (1939).

subsp. ***pseudoheterophylla***

Mat.: 11416, 11649, 12342	
Hab.: <i>Acer monspessulanum</i> valley thickets, transition between montane forest and mountain steppe, lowland forest with <i>Parrotia persica</i> , <i>Carpinus betulus</i> and <i>Quercus castaneifolia</i>	
Dist.: Map 577	Alt.: 1580-1880
Ch.: ES ^{EH}	GF.: PSS/PTS
Th. (GNP): IND	Th. (IR): ?

Crataegus pseudoheterophylla Pojark. subsp. ***turkestanica*** (Pojark.) K. I. Chri., Syst. Bot. 35: 99 (1992). Syn.: *C. turkestanica* Pojark., Fl. URSS 9: 507 (1939).

Mat.: A-11098, 11945, 12038; AS- 6121	
Hab.: Transitional scrub between forest and steppe	
Dist.: Map 578	Alt.: ? 1500-1700
Ch.: IT ^{KK} or ES ^{HY} -IT ^{KK}	GF.: PSS/PTS
Th. (GNP): IND	Th. (IR): SUN

Cydonia oblonga Mill., Gard. Dict., ed. 8 (1768).

Mat.: A-9978	
Hab.: A few shrubs in Tangerang and Kondeskuh	
Dist.: W	Alt.: 450-1100
Ch.: ES ^{HY}	GF.: PSS
Th. (GNP): END (3)	Th. (IR): RAR

Fragaria vesca L., Sp. Pl.: 494 (1753). p. p.

Mat.: A-10613; F-1068	
Hab.: Foggy closed montane forest confined to mountain summits and bottom of a karstic gully	
Dist.: Map 579	Alt.: 1700-2000
Ch.: PL ^(North Temperate)	GF.: HCR
Th. (GNP): VUL (6)	Th. (IR): NOT

Geum heterocarpum Boiss., Biblioth. Universelle Genève Ser. 2, 13: 408 (1838). Syn.: *G. umbrosum* Boiss.; *G. kartavicum* Regel & Schmalh.; *Orthurus heterocarpus* (Boiss.) Juz.

Mat.: A-6154, 11328, 11351; AS-6111	
Hab.: Often under the shade of shrubs in <i>Acer monspessulanum</i> thicket, open <i>Quercus macranthera</i> forest and <i>Juniperus excelsa</i> woodland	
Dist.: Map 580	Alt.: 1600-2380
Ch.: M-IT	GF.: HSR
Th. (GNP): VUL (8)	Th. (IR): VUL

Geum urbanum L., Sp. Pl.: 501 (1753).

Mat.: A-4383, 4384, 6032, 10383, 9346, 9738 (basal leaves), 9256, 9797 (basal leaves), 9760; AS-6023	
Hab.: Closed lowland and montane forest	
Dist.: Map 581	Alt.: 450-2200
Ch.: ES	GF.: HSC
Th. (GNP): NOT (76)	Th. (IR): NOT

Malus orientalis Uglitzk., Flora URSS 8: 492 (1939). Syn.: *M. pumila* Grossh.

Mat.: A-4516, 11089; R-53217	
Hab.: Sporadically in thickets of transitional shrubland between forest and steppe (often in thickets of <i>Crataegus</i> and <i>Acer monspessulanum</i>)	
Dist.: Map 582	Alt.: 1350-1980
Ch.: ES ^{EH}	GF.: PSS/PTS
Th. (GNP): NOT (17)	Th. (IR): IND

Mespilus germanica L., Sp. Pl.: 478 (1753).

Mat.: A-9282, 9299	
Hab.: Lowland and montane forest and scrub, forest margin, rocky outcrops	
Dist.: Map 583	Alt.: 450-2230
Ch.: ES ^{EH}	GF.: PSS
Th. (GNP): NOT (111)	Th. (IR): NOT
LN.: Kondus, Azgil (کندوس - ازگیل)	

M. germanica is the most common shrub in the forested zone of the Park. The name Kondeskuh "The mountain of Kondus", a village located in the SW of the Park, has apparently been taken from this shrub. The fruits become ripe and edible in October. The fruits are collected by the local people and are offered as wild fruit in bazars of N Iran and Tehran.

Potentilla

See notes beginning of the *Rosaceae*.

Potentilla micrantha Ramond in Lam. & DC., Fl. Fr. 4: 468 (1815).

Mat.: A-10298, 10613, 11216; RE-(22.4.1974)	
Hab.: Closed montane forest	
Dist.: Map 584	Alt.: 1000-2130
Ch.: ES-M	GF.: HRO
Th. (GNP): NOT (60)	Th. (IR): NOT

Potentilla pannosa Boiss. & Hausskn. in Boiss. Fl. Orient. 2: 719 (1872).

Mat.: A-12072	
Hab.: On limestone rocks with <i>Sempervivum iranicum</i>	
Dist.: C	Alt.: 2030
Ch.: IT ^C	GF.: CHU
Th. (GNP): END (1)	Th. (IR): VUL

Potentilla recta L., Sp. Pl.: 497 (1753). s. l. Incl. *P. pedata* Nestler; *P. gilanic* (Th. Wolf). Th. Wolf; *P. transcaspica* Th. Wolf; & *P. gorganica* Soják.

Mat.: A-4326, 4463, 9404, 9628, 10976; AS-6145; WF-12696*; R-53151*	
Hab.: Scrubs of <i>Acer monspessulanum</i> , <i>Paliurus spina-christi</i> , <i>Crataegus</i> ; <i>Juniperus</i> woodland, open rocky outcrops with <i>Carpinus orientalis</i> and <i>Quercus castaneifolia</i> ; mountain steppe with grasses and thorn-cushions, <i>Stipa</i> steppe, mountain meadows	
Dist.: Map 585	Alt.: 900-2180
Ch.: ES-IT-M	GF.: HSC
Th. (GNP): NOT (60)	Th. (IR): NOT

* under *P. pedata* named by Rechinger.

A difficult group badly in need of a revision. *P. gorganica* has been described by Soják (1991: 123) from a locality within the Park: Golestan, ca 3 km ab oppido Dasht, 37°19'-56°01', 1977, Soják, s.n. (PR). Unfortunately the type specimen was not found by the staff of the herbarium in Prague during my visit.

Potentilla reptans L., Sp. Pl.: 499 (1753).

Mat.: A-11734	
Hab.: Waterside (stream, river and lake)	
Dist.: Map 586	Alt.: 1380-1980
Ch.: ES-IT-M	GF.: HCR
Th. (GNP): VUL (4)	Th. (IR): NOT

Potentilla spec. A (aff. *inclinata*)

A-11637

Potentilla spec. B (sect. *persica*).

A-12091, 12006

Prunus divaricata Ledeb., Ind. Sem. Horti Dorpat. 6 (1824). Syn.: *P. cerasifera* Ehrh. subsp. *divaricata* (Ledeb.) C. K. Schneider.; *P. caspica*

Kov. & V. Ekim.; *P. divaricata* subsp. *caspiica* (Kov. & V. Ekim.) Browicz. Fig. 24, G.

Mat.: A-9228, 9596, 9337, 9730; GA-4863; 4944; IZ-(27.7.1972)	
Hab.: Closed and open lowland and montane forest; rocky outcrops, thickets of <i>Crataegus</i> and <i>Acer monspessulanum</i> and <i>Paliurus</i> , river and streamside, along the road with <i>Rubus sanctus</i>	
Dist.: Map 587	Alt.: 450-2230
Ch.: ES ^{EH} [IT]	GF.: PSS
Th. (GNP): NOT (132)	Th. (IR): NOT
LN: Allucheh (ألوجه)	

The fruits are usually collected by the local people for production of "Lavashak" (لواشك), a special bread-like sour sweet. Browicz (1996: 16) has recently used the name of *P. cerasifolia* Ehrh. in his Chorology series and proposed that it would be appropriate to consider the wild population as *P. cerasifolia* subsp. *divaricata*.

Prunus x domestica L., Sp. Pl.: 475 (1753). A-11948

Remnant of cultivation, in *Crataegus* thicket in Yelaq plain. The shrubby vegetation of this area has been destroyed during the fire from 30. Aug. to 1. Sep. 1995. The species, consequently, may have become extinct from the area.

Pyracantha coccinea Roem., Syn. Monogr. 3: 219 (1847).

Mat.: A-12386, GA-5005	
Hab.: Around Tangegol building, probably of cultivated origin	
Dist.: C	Alt.: 670
Ch.: Euxine	GF.: PSS TH
Th. (GNP): END (1)	Th. (IR): END

Pyrus boissieriana Buhse, Nouv. Mém. Soc. Imp. Naturalistes Moscou, 12: 87 (1860).

Mat.: A-4454, 4419, 11274, 12317; GA-4864	
Hab.: Closed and open montane forest, thickets of <i>Crataegus</i> , <i>Acer monspessulanum</i> , rocky outcrops, mountain steppe with scattered shrubs	
Dist.: Map 588	Alt.: 950-2230
Ch.: ES ^{HY}	GF.: PTS
Th. (GNP): NOT (53)	Th. (IR): NOT

Khatamsaz (1988: 124) reported *Pyrus turcomanica* Maleev from the Park: Golestan forest, 770 m, May 1972, Sabeti 8110 (TARI). The material is in flowering state without fruit. *P. turcomanica* can be distinguished in fruiting condition by the persistent calyx and the absence of lenticules on the fruit. Perhaps the only character that may have been used for the identification of the above cited plant is the presence of 5 styles. More material needs to be collected.

Rosa

Most of my collections of *Rosa* are not yet identified. Here only species reported by Zielinski in Flora Iranica (152, 1982) are listed.

Rosa beggeriana Schrenk in Fisch. & C. A. Mey., Enum. Pl. Nov. Schrenk. 1: 73 (1841). Syn.: *R. anserinaefolia* Boiss.; *R. latispina* Boiss.; *R. lancerans* Boiss. & Buhse; *R. mitis* Boiss. & Buhse.

Mat.: K-7734; T-37060; TM-35092 (all not seen)	
Hab.: Scrub valley, mountain steppe	
Dist.: Map 589*	Alt.: 1200-1750
Ch.: IT ^{C&E}	GF.: PSS TH
Th. (GNP): NOT	Th. (IR): NOT

* Map incomplete

Rosa canina L., Plant. 491 (1753).

Mat.: K-7736; Wa-170; WF-12735 (all not seen)	
Hab.: Scrub valley	
Dist.: Map 590*	Alt.: ? 1500-1750
Ch.: ES-IT-M	GF.: PSS TH
Th. (GNP): NOT	Th. (IR): NOT

* Map incomplete.

Rosa persica Michx. ex Juss., Gen Plant App. 452 (1789). Syn.: *Hulthemia persica* (Michx. ex Juss.) Bornm.

Mat.: W&C-14224	
Hab.: Disturbed habitats in <i>Artemisia</i> and mountain steppes, roadside weed	
Dist.: Map 591	Alt.: 1200-1750
Ch.: IT ^{C&E}	GF.: CSE TH
Th. (GNP): VUL (8)	Th. (IR): NOT

R. persica has been recorded in several relevés, but I did not provide any herbarium voucher.

Rosa canina x iberica

W&C-14376 & W&C-14248

Above hybrid has been reported by Zielinski (Fl. Iranica 152: 28, 1982).

Rosa spec. A

Mat.: A-11965, 11532, 12090	
Hab.: Mountain meadow around Sulukli Lake and montane forest	
Dist.: NW	Alt.: 1380-2000 ?
Ch.: ?	GF.: PSS TH
Th. (GNP): IND	Th. (IR): ?

A very characteristic species of mountain forests having glaucous leaves, often spiny rachis, glabrous branches and young shoots, pedicels with a few long stipitate glands; recurved spines, and long pinnate and persistent calyx. The gall structure is peculiar and differs from other species in the area. They are densely covered by prickles up to 5 mm long and \pm recurved to uncinatate at the apex. It was found around Sulukli Lake where four new records for Iran and several other rare species were discovered.

Rosa x damascenna Mill. s. l.

A-11298.

The above cited plant is apparently one of the remnants of cultivation near Janlar spring, which has vacated a very long time ago.

Rubus

Rubus is a very complex and widely distributed genus in Iran, especially in the hyrcanian area. There is no general agreement on the species concept and its nomenclatural uniformity. Hybridization increases the taxonomic problem. Gilli (Fl. Iranica 66: 67-75, 1969) accepted 6 species and 5 hybrids from Iran, some of them from very limited material and doubtful position. Zielinski (1978) has critically discussed some complexes and keyed 6 species from Iran. Khatamsaz (in Flora of Iran 6, 1992) has raised the number of species to 8 plus 5 hybrids without any details supporting her results. In our area there are five distinct species, which I studied in the field. The specimens under *R. procerus* and *R. raddeanus* need to be checked by the specialists.

Rubus caesius L., Sp. Pl.: 1: 706 (1753).

Mat.: A-4397, 9347, 11556, 11823, 11584, 9895, 10662; Ferguson-1190	
Hab.: Closed montane and lowland forest, margin of rivers and streams, forest openings with <i>Pteridium aquilinum</i>	
Dist.: Map 592	Alt.: 450-2130
Ch.: ES-IT-M	GF.: CSP TH
Th. (GNP): NOT (57)	Th. (IR): NOT

Rubus dolichocarpus Juz., Bull. Appl. Bot. Pl. Breed. 14, 3: 159 (1925) agg. Syn.: *R. ochthodes* sensu Gilli, Fl. Iranica 66: 71 (1969) non Juz. l.c.; *R. gaubae* Rech. f.

Mat.: A-9893, 9894, 11215, 11583, 11513	
Hab.: Often closed montane forest, it particularly colonizes (often with <i>R. caesius</i>) around rotten trunks which receive some light; margin of streams and shallow valleys in forest	
Dist.: Map 593	Alt.: 500-2000
Ch.: ES ^{EH}	GF.: CFR/CSS
Th. (GNP): NOT (55)	Th. (IR): NOT

Rubus procerus P. J. Muell in Boulay, Ronces Vosg. 7 (1864) agg.

Mat.: A-11978	
Hab.: Margin of forest around Sulukli Lake	
Dist.: NW	Alt.: 1380
Ch.: ES ^{EH}	GF.: PSS TH
Th. (GNP): END (1)	Th. (IR): END

R. procerus has been reported firstly by Zielinski (1978) from Chalus valley in Iran. The discovery of this species in Golestan extends its distribution further east. Ecologically it needs probably more rainfall and acidic soils which are available around this isolated forest lake. The species is characterized by having very long prickles and the stem is glabrous, angled and brownish. This blackberry plentifully produces large black fruits which are unsuitable for eating. It causes diarrhea and stomach pain as experienced by the author!

Rubus raddeanus Focke, Abh. Nat. Ver. Bremen. 4: 182 (1874). Syn.: *R. hyrcanicus* acut. Fl. Iranica, 66: 70 (1969).

Mat.: A-11822	
Hab.: River and streamside in lowland forest	
Dist.: Map 594	Alt.: 500-930
Ch.: ES ^{HY}	GF.: PSS TH
Th. (GNP): END (3)	Th. (IR): SUN

About the complexity of *R. raddeanus* and its relation with *R. persicus* see Zielinski 1978.

Rubus sanctus Schreb., Ic. Descr. Pl.: 15 (1756).
Syn.: *R. anatolicus* (Focke) Hausskn.; *R. ulmifolius* auct. Fl. Iran non Schott. Fig. 24, H.
Holotype: Crete, Schreber 43 (M).

Mat.: A-9491, 9765, 9855; GA-4908; ZK-82/124	
Hab.: Road margin and ruderal places, garden of office buildings and stations, stream and riverside, forest openings, rocky outcrops, thickets of <i>Paliurus spina-christi</i> and <i>Crataegus-Prunus</i>	
Dist.: Map 595	Alt.: 450-1550
Ch.: IT-M ^E	GF.: PSS TH
Th. (GNP): NOT (20)	Th. (IR): NOT

R. sanctus has variously been interpreted in SW Asia. The names *R. ulmifolius* and *R. anatolicus* have frequently been used for the Iranian plants. Recently, Monasterio-Huelin & Weber (1996) have critically reviewed this group and concluded that the E Mediterranean and SW Asian species of this complex belong to *R. sanctus*. *R. ulmifolius* is a Central European and Mediterranean species. The two species meet together in Dalmatia and the Balkan Peninsula, where the intermediate occurs. The mentioned authors postulated that the intermediates in this area are probably the result of hybridization and introgression.

R. sanctus is one of the most frequent blackberries in the Park. It particularly colonizes around the road between Tangegol and Tangerang and in the garden of these stations as impenetrable hedge. The fruits are delicious and frequently used by local people and tourists.

Rubus sanctus x *caesius*; *R. karakalensis* has been reported by Khatamsaz (Flora of Iran 6: 33, 1992) from our area: between Tangerang and Tangegol, 420-470 m, Terme 36074. I have seen no material.

Sanguisorba minor Scop., Fl. Carn. ed. 2: 118 (1772).

Mat.: A-4466, 10675	
Hab.: Ruderal places, rocky outcrops, river and streamside, mountain meadows, scrubs of <i>Acer monspessulanum</i> and <i>Crataegus</i>	
Dist.: Map 596	Alt.: 600-2060
Ch.: ES-IT-M	GF.: HSR
Th. (GNP): NOT (23)	Th. (IR): NOT

Sorbus persica Hedl., Kung. Svenska Vet. Akad. Handl. 35, 1: 70 (1901).

Mat.: A-10972, 11349, 12059; Ferguson-1194	
Hab.: Scrub valley (Almeh), top of mountain with scattered shrubs, <i>Quercus macranthera</i> forest or in transition with <i>Juniperus excelsa</i> woodland	
Dist.: Map 597	Alt.: 1700-2400
Ch.: IT	GF.: PTS/PSS
Th. (GNP): VUL (8)	Th. (IR): VUL

Sorbus torminalis (L.) Crantz, Strip. Austr. 2: 45 (1763). Syn.: *Crataegus torminalis* L.; Sp. Pl.: 476 (1753); *Sorbus orientalis* Schönb.-Tem.

Mat.: A-4399, 9888, 10634; AS-6113; Z-82/302	
Hab.: Closed montane forest	
Dist.: Map 598	Alt.: 1000-2230
Ch.: ES	GF.: PTS
Th. (GNP): NOT (71)	Th. (IR): NOT
LN: Boronak, Baranak, Bourounak بارانک، برونگ، بورونک	

The locality of Z-82/299 "between Sharleq and Cheshmeh Khan" is most likely wrong.

Spiraea hypericifolia L., Sp. Pl.: 489 (1753). Fig. 24, I.

Mat.: A-11296	
Hab.: Janlar valley just near the stream	
Dist.: Map 599	Alt.: 1720
Ch.: ? IT	GF.: PSS
Th. (GNP): END (1)	Th. (IR): END

This species has previously been known only from a few localities in Arasbaran Protected Area, NW Iran (Assadi 1988: 25).

Rubiaceae

As the account of the *Rubiaceae* for Flora Iranica has not yet been published and the author has not enough authentic material at his disposal, the status of some species may be different from the coming Flora Iranica. As far as possible, I tried to confirm my identification with available published papers by F. Ehrendorfer and E. Schönbeck-Temesy.

Asperula arvensis L., Sp. Pl.: 103 (1753).

Mat.: A-6166, 6201, 6205, 10223-a; AS-6006; F-1170, 1067, 1160; R-52421	
Hab.: Rocky outcrops, <i>Juniperus</i> woodland, <i>Crataegus</i> , <i>Acer monspessulanum</i> scrubs, mountain steppes with grasses and thorn-cushions, <i>Artemisia-Stipa</i> and <i>Stipa</i> steppes	
Dist.: Map 600	Alt.: 450-1920
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): NOT (29)	Th. (IR): NOT

Asperula glomerata (M. Bieb.) Griseb., Spic. 2: 166 (1844). Syn.: *Crucianella glomerata* M. Bieb., Fl. Taur.-Caucas. 1: 107 (1808).

Mat.: A-6206, 9474, 10852	
Hab.: <i>Juniperus excelsa</i> woodland, <i>Paliurus-spinachristi</i> and <i>Acer monspessulanum</i> scrubs, dry valley with <i>Haloxylon</i> shrubs	
Dist.: Map 601	Alt.: 1000-2020
Ch.: IT ^{omni}	GF.: CHU
Th. (GNP): VUL (7)	Th. (IR): NOT

Asperula gorganica Schönb.-Tem. & Ehrend. Bot. Jahr. Syst. 107 (1-4): 80 (1985).

Mat.: A-4551, 9563, 9846, 11143, 11426, 11800; TM-35093* (n.v.); Wa-217*; ZA-15849	
Hab.: Crevices and clefts of limestone rocks on steep slopes and vertical cliffs together with various scrub vegetation types: <i>Carpinus orientalis-Quercus castaneifolia</i> scrub and <i>Juniperus</i> spp. woodlands; rarely in <i>Artemisia-Stipa</i> steppe	
Dist.: Map 602	Alt.: 600-2080
Ch.: IT ^{E Alborz/ES HY}	GF.: ± CHU
Th. (GNP): NOT (51)	Th. (IR): NOT

* Det.: Ehrendorfer and Schönbeck-Temesy [cf. Schönbeck-Temesy & Ehrendorfer (1985)].

Callipeltis cucullaris (L.) Rothm., Feddes Repert. 50: 72 (1941). Syn.: *Valantia cucullaris* L., Cent. Plant. 1: 33 (1755); *C. aperta* Boiss. & Buhse.

Mat.: A-10575	
Hab.: <i>Artemisia-Stipa</i> and <i>Stipa</i> steppes, <i>Juniperus excelsa</i> woodland	
Dist.: Map 603	Alt.: 1000-1450
Ch.: IT-M	GF.: TSC ^{DW}
Th. (GNP): VUL (5)	Th. (IR): NOT

Crucianella exasperata Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 4: 8 (1837). Syn.: *C. hispidula* Fisch. & C. A. Mey.

Mat.: Almeh, Termeh (IRAN, n.v.)	
Hab.: (no information)	
Dist.: C	Alt.: ?
Ch.: IT ^{omni}	GF.: TSC
Th. (GNP): END (1)	Th. (IR): SUN

Although no specimens of *C. exasperata* have been seen from the Park, there seems no reason to doubt its presence in the Park as mentioned by Moussavi (1989: 48).

Crucianella gilanica Trin., Mém. Acad. Imp. Sci. Saint Pétersbourg 6: 493 (1818). subsp. **transcaspica** (Ehrend.) Ehrend. & Schönb.-Tem., Pl. Syst. Evol. 165:125 (1989). Syn.: *C. glauca* A. Rich. ex DC. subsp. *transcaspica* Ehrend., Ann. Naturhist. Mus. Wien 56: 216-218 (1948).

Mat.: A-10832	
Hab.: <i>Juniperus</i> woodland, mountain steppe with grasses and thorn-cushions	
Dist.: Map 604	Alt.: 1500-1780
Ch.: Subsp.: IT ^{KK & E}	GF.: HSC
Th. (GNP): VUL (4)	Th. (IR): NOT

Crucianella platyphylla Ehrend. & Schönb.-Tem., Pl. Syst. Evol. 165: 104 (1989). Fig. 24, J.

Mat.: A-12026, 12050, 12188	
Hab.: On crevices and ledges of vertical limestone cliffs	
Dist.: Map 605	Alt.: 1820-2010
Ch.: ES ^{HY}	GF.: CHU
Th. (GNP): END (3)	Th. (IR): END

C. platyphylla is an interesting newly described species, known previously only from the type collection, ca. 100 km SW of the Park: Prov. Semnan: Shahrud, Kuh-e Abr, Kuh-e Ghatri, 2300-2500 m, 23.6.1974, Wendelbo & Foroughi 12896 holo W (n.v.) (Schönbeck-Temesy & Ehrendorfer 1989: 104-105). It is restricted to high altitude vertical limestone cliffs which are usually covered by fog during long period of the year. It was discovered in the same habitat as *Laser rechingeri* (Akhani 1996). The fruits were unknown in the original description. The mericarps are narrowly obovoid, 2-2.8 x 1-1.3 mm and tuberculate at the surface. Also, the length of the leaves should be corrected: (3-) 5-15 (-21) x (2-) 3-5 mm (9-10 x 4-5 mm in original description). Schönbeck-Temesy & Ehrendorfer (1989: 134) considered the species

to be the most "primitive" extant species of the genus, which could serve as a model for an ancestor which may have grown in rocky openings of the later Tertiary humid and warm temperate forests of SW Asia.

Crucianella sintenisii Borm., Mitt. Thür. Bot. Ver., N. F. 18: 49 (1903). Syn.: *C. khorasanica* Ehrend. Fig. 24, K.

Mat.: A-4364, 9391; F-1146; FU-7371*, 7398*; R-52998*, 52740*, 52810*; WF-12700*; Z-82/263 [Not seen materials reported by Schönbeck-Temesy & Ehrendorfer (1989: 130) are marked by an asterisk]	
Hab.: Scrubs of <i>Acer monspessulanum</i> and <i>Crataegus</i> , mountain steppes with grasses and thorn-cushions or with scattered shrubs, <i>Stipa</i> steppes, mountains meadows, margin of montane forest	
Dist.: Map 606	Alt.: 1220-2070
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): NOT (62)	Th. (IR): NOT

A rather common species in our area; with dense subglomerate inflorescence and pinkish flowers, *C. sintenisii* could be a good candidate as a garden plant.

Cruciata taurica (Pall. ex Willd.) Ehrend., Notes Roy. Bot. Gard. Edinburgh 22: 393 (1958). Syn.: *Valantia taurica* Pall. ex Willd., Sp. Pl.: ed. 4, 4 (2): 951 (1806); *Galium coronatum* Sm.; *G. humifusum* (Willd.) Stapf; *C. coronata* (Sm.) Ehrend.

Mat.: A-9422	
Hab.: Rocky mountain with <i>Acer monspessulanum</i> scrub, mountain steppe with grasses and thorn-cushions	
Dist.: Map 607	Alt.: 1750-2180
Ch.: IT ^{w&c}	GF.: ± CHU
Th. (GNP): VUL (4)	Th. (IR): NOT

Galium

Mr M. Moussavi, Tehran, provisionally provided the names for some *Galium* specimens (marked by an asterisk) during a short time in Tehran. However, until the *Rubiaceae* account of Flora Iranica becomes available, the following list has a provisional character.

Galium aparine L. Sp. Pl.: 157 (1753).

Mat.: A-11309, 11103, 11652	
Hab.: Closed montane forest, <i>Stipa</i> steppe, waste places with shrubs and rarely rocky outcrops	
Dist.: Map 608	Alt.: 650-2120
Ch.: PL ^(North Temperate, alien elsewhere)	GF.: TCR
Th. (GNP): RAR (10)	Th. (IR): NOT

Galium decumbens (Ehrend.) Ehrend. & Schönbeck-Temesy, Pl. Syst. Evol. 174: 207 (1991). Syn.: *G. subvelutinum* (DC.) K. Koch subsp. *decumbens* Ehrend., Notes Roy. Bot. Gard. Edinburgh 22: 370 (1958).

Mat.: A-11042, 11330	
Hab.: Limestone ground in <i>Juniperus excelsa</i> woodland and alpine formation (mixed of shrubs and thorn-cushions)	
Dist.: Map 609	Alt.: 1600-2400
Ch.: IT ^{Alborz}	GF.: ± CHU
Th. (GNP): END (2)	Th. (IR): IND

The above cited plants have been compared with the type specimen: Shahrud-Bustam [E. Mazandaran]: In declivibus australibus montium Shahvar, 20.-26.VII.1948, Rechinger 5983 (Iso. M).

Other material seen outside the Park: Mazandaran: In declivibus montium Shahvar, Ostamidan, in saxosis calc. 3500 m, 26.-27.1948 Rechinger 6018 a (M, det: Schönbeck-Temesy); Kujur In monte Ulodj, substr. calc., 3200-3400 m, 9.8.1948, Rechinger 6475-a (M).

Galium ghilanicum Stapf, Akad. Wiss. Wien, Math.-Naturwiss. Kl., Denkschr. 50: 53 (1886). Syn.: *G. transcaasicum* Stapf.

Mat.: A-10567*; Z&al-86/2949	
Hab.: <i>Artemisia-Stipa</i> steppe in Nekarbandi (7-8 km NW Soolegerd) and one locality in Tangegol	
Dist.: C, N	Alt.: 650-1050
Ch.: IT ^{omni}	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

Galium humifusum M. Bieb., Fl. Taur.-Caucas. 1: 104 (1808). Syn.: *Asperula humifusa* (M. Bieb.) Besser; *A. pycnantha* Boiss.



Fig. 24: A, *Ranunculus lingua*; B, *Paliurus spina-christi*; C, *Cerasus avium*; D, *Crataegus ambigua* subsp. *ambigua*; E, *Crataegus microphylla*; F, *Crataegus pentagyna* subsp. *pentagyna*; G, *Prunus divaricata*; H, *Rubus sanctus*; I, *Spiraea hypericifolia*; K, *Crucianella sintenisii*.

Mat.: A-4342, 9542, 9688, 11066*, 11552*; GA-4883; Z-82/179; ZK-82/104	
Hab.: <i>Crataegus-Prunus</i> and <i>Paliurus excelsa</i> thickets, over-grazed open <i>Crataegus</i> woodland, river bed, mountain steppes with scattered shrubs and moist meadows	
Dist.: Map 610	Alt.: 450-1750
Ch.: IT-M ^E	GF.: HCR
Th. (GNP): NOT (29)	Th. (IR): NOT

Galium odoratum (L.) Scop., Fl. Carn. ed. 2, 1: 105 (1771). Syn.: *Aperula odorata* L., Sp. Pl.: 103 (1753).

Mat.: A-9883, 9983, 10607, 10396; AS-6116; Z-82/299 (The locality of Z-82/299 "between Sharleq and Cheshmeh Khan" is most likely wrong)	
Hab.: Closed montane and submontane forest, rarely lowland forest	
Dist.: Map 611	Alt.: 500-2130
Ch.: ES <small>(also in E Asia)</small>	GF.: HSC
Th. (GNP): NOT (83)	Th. (IR): NOT

Galium spurium L. Sp. Pl.: ed. 1: 106 (1753).
subsp. **spurium**

Mat.: A-11380, 10756, 11291	
Hab.: Often moist soils in scrub valley	
Dist.: Map 612	Alt.: 1300-1560
Ch.: ES-IT-M	GF.: TCR
Th. (GNP): IND	Th. (IR): NOT

The status of A-10756, 11291 is doubtful. These specimens are characterized by more flowered (6-8) and much longer axillary cymes than the other specimens of the species.

subsp. **ibicinum** (Boiss.) Ehrend., Pl. Syst. Evol. 127: 305 (1977). Syn.: *G. ibicinum* Boiss., Fl. Orient. 3: 70 (1875).

Mat.: A-6220, 10581, 10816, 11825, 10988*, 11961*	
Hab.: <i>Acer monspessulanum</i> , <i>Paliurus spina-christi</i> and <i>Crataegus</i> scrubs, scrub valley with scattered <i>Haloxylon</i> shrubs, moist soils around Sulukli Lake	
Dist.: Map 612	Alt.: 450-1820
Ch.: IT	GF.: TCR
Th. (GNP): RAR (10)	Th. (IR): NOT

Galium tenuissimum M. Bieb., Fl. Taur.-Caucas. 1: 104 (1808).

Mat.: A-10574, 11210, 11455, 11149	
Hab.: <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes, <i>Stipa</i> steppe with scattered shrubs, rocky outcrops	
Dist.: Map 613	Alt.: 880-1350
Ch.: IT-? ES ^{EH}	GF.: TSC
Th. (GNP): VUL (6)	Th. (IR): NOT

Galium verticillatum Danth. ex Lam., Encycl. 2: 585 (1788).

Mat.: A-10312*, 10550*	
Hab.: <i>Juniperus excelsa</i> woodland, <i>Artemisia-Stipa</i> , <i>Artemisia-Festuca</i> and <i>Stipa</i> steppes, rocky outcrops	
Dist.: Map 614	Alt.: 880-1860
Ch.: IT-M	GF.: TSC
Th. (GNP): RAR (14)	Th. (IR): NOT

Galium verum L. Sp. Pl.: ed. 1: 107 (1753).

Mat.: A-9405, 9479, 9559, 9587, 11285, 11381, 11730*, 11180*; Z-82/228	
Hab.: Mountain steppes with grasses and thorn-cushions, <i>Stipa</i> steppe, mountain meadows, <i>Acer monspessulanum</i> scrub, rarely in mountain summits and <i>Juniperus excelsa</i> woodland	
Dist.: Map 615	Alt.: 900-2180
Ch.: PL <small>(N Temperate Eurasia)</small>	GF.: HSC
Th. (GNP): NOT (38)	Th. (IR): NOT

Rubia florida Boiss. Diagn. ser. 1, 6: 70 (1846).

Type: Prope ruinas Perspolis, 16.4.1842, Th. Kotschy 245 (M).

Mat.: A-11059; AS-5967; F-1050; R-52804, 52841; Z&a-86/2629	
Hab.: <i>Paliurus spina-christi</i> scrub, <i>Juniperus excelsa</i> woodland, <i>Artemisia</i> steppe (mainly on sandy gravelly soils, margin of dry brooklets), <i>Artemisia-Stipa</i> steppe, <i>Stipa</i> steppe with scattered <i>Rhamnus pallasii</i> shrubs	
Dist.: Map 616	Alt.: 950-2020
Ch.: IT ^C	GF.: ± CSC
Th. (GNP): NOT (25)	Th. (IR): NOT

Rubia rechingeri Ehrend., Ann. Naturhist. Mus. Wien 56: 213 (1948).

Mat.: A-10545, 10688, 11151	
Hab.: <i>Juniperus</i> woodland (usually under the shade of shrubs and trees), mountain steppe with scattered shrubs and thorn-cushions	
Dist.: Map 617	Alt.: 1100-2380
Ch.: IT ^{KK}	GF.: ± CSS/CSE
Th. (GNP): RAR (14)	Th. (IR): IND

Rutaceae

Dictamnus albus L., Sp. Pl.: 383 (1753).

Mat.: A-11456, 9905, 9650; R-52653; WF-12801	
Hab.: Rocky outcrops, above rocky escarpments, forest valley along river, lowland forest	
Dist.: Map 618	Alt.: 500-1500
Ch.: ES	GF.: HSC
Th. (GNP): VUL (8)	Th. (IR): END

D. albus has been recorded by Assadi & Wendelbo (1977: 102) from the Park and from Arasbaran Protected Area in NW Iran. The occurrence of the species in easternmost and westernmost parts of the hyrcanian forest is a good evidence that the species may grow in other places along the Caspian forest, but probably as a rare plant.

Haplophyllum acutifolium (DC.) G. Don, Gen. Hist. 1: 780 (1831). Syn.: *Haplophyllum perforatum* (M. Bieb.) Vved.

Mat.: A-9570 (sterile); GA-4875; R-52822*; U-19160*; WF-12668*; ZK-82/327	
Hab.: <i>Juniperus</i> woodland; scrubs of <i>Acer monspessulanum</i> , <i>Paliurus spina-christi</i> and <i>Crataegus</i> ; grassy mountain steppes with thorn-cushions, <i>Stipa</i> steppe, <i>Artemisia-Stipa</i> steppes; disturbed habitats and along streams and rivers on moist soils	
Dist.: Map 619	Alt.: 900-2020
Ch.: IT ^{C&E}	GF.: HSC
Th. (GNP): NOT (62)	Th. (IR): NOT

* Det.: C. C. Townsend

Haplophyllum obtusifolium (Ledeb.) Ledeb., Fl. Ross. 1: 490 (1842). Syn.: *Ruta obtusifolia* Ledeb. in Eichw., Pl. Casp. Cauc.: 37, t. 32 (1831-1833).

Mat.: A-11068, 11247	
Hab.: <i>Artemisia-Stipa</i> steppe, road margin (in <i>Artemisia</i> steppe)	
Dist.: Map 620	Alt.: 1100-1350
Ch.: IT ^{Aralo-Caspian or KK}	GF.: HSC
Th. (GNP): END (3)	Th. (IR): END

H. obtusifolium was recently reported from Iran in NE Khorasan, S of Daregaz (Akhani & Joharchi 1995: 264). The known distribution range of the species now extends to NW Khorasan. Akhani 11068 is a sterile plant collected from a locality near to 11247.

Salicaceae

Populus caspica Bornm., Feddes Repert. 47: 70 (1939). Syn.: *P. hyrcana* Grossh.

Mat.: A-11554, 12305; R-52533; Z-83/1354	
Hab.: Alluvial forest along Madrasu river	
Dist.: Map 621	Alt.: 450-700
Ch.: ES ^{HY}	GF.: PTS
Th. (GNP): VUL (5)	Th. (IR): VUL

Populus euphratica Oliv., Voy Emp. Ottoman 3: 449 (1807).

Mat.: A-9874	
Hab.: Only one locality in S border of the Park, along Qez-Qaleh stream valley (Dasht)	
Dist.: S	Alt.: 1080
Ch.: IT-SS	GF.: PTS
Th. (GNP): END (1)	Th. (IR): NOT

Populus nigra L. Sp. Pl.: 1034 (1853).

Mat.: A-11731	
Hab.: Cultivated around stations and as cultivation remnant in evacuated areas	
Dist.: Map 622	Alt.: 450-1600
Ch.: ES-IT-M	GF.: PTS
Th. (GNP): VUL (4)	Th. (IR): NOT

A-11731 was sampled from Hamamli valley, NE parts of the Park, a remnant of old cultivation before the area came under protection.

Salix aegyptiaca L., Cent. Plant. 1: 33 (1755). Syn.: *S. medemii* Boiss.

Mat.: A-9862; GA-4865; WF-12733 (det.: Skvortov); Z-85/139; ZK-82/328	
Hab.: Along rivers and streams, particularly in valleys	
Dist.: Map 623	Alt.: 850-1980
Ch.: ES ^{HY} -IT ^C	GF.: PTS/PSS
Th. (GNP): RAR (12)	Th. (IR): NOT

Salix alba L., Sp. Pl.: 1021 (1753). s. l. Incl. *S. excelsa* S. G. Gmel.

Mat.: A-4509, 6175, 10492, 10969, 11722; R-52457 (det.: Rechinger); R-53165 (det.: Rechinger as <i>S. excelsa</i>); W&C-14267 (det.: Skvortov); WF-12742 (det.: Skvortov); Z&al-86/2630	
Hab.: Bank of rivers, streams and springs in forest and steppe zone	

Dist.: Map 624	Alt.: 450-1750
Ch.: ES-IT-M	GF.: PTS
Th. (GNP): RAR (12)	Th. (IR): NOT

Some of the above cited specimens were already revised by Skvortsov and Rechinger. Skvortsov (in sched.) has named several post Flora Iranica specimens in M and W as *S. alba* s. l. (incl. *S. excelsa*), a view which is followed here.

Salix cf. caprea L., Sp. Pl.: 1020 (1753).

Mat.: A-12358	
Hab.: Bank of Sulukli Lake	
Dist.: NW	Alt.: 1380
Ch.: ES	GF.: PSS/PTS
Th. (GNP): END (1)	Th. (IR): END

S. caprea was not reported from Iran by Skvortsov (Flora Iranica 65, 1969). The above cited specimen is poor and has been collected very late in November 1996. Therefore its identification is uncertain. I compared it with many European and Asian plants in M. The leaves are broader in the middle with even indumentum on the upper surface which usually distinguishes *S. caprea* from its close relative *S. aegyptiaca*. In this latter species, the leaves are broader in the upper middle and the indumentum of the upper surface of the leaves is more dense towards the midrib.

Santalaceae

Thesium arvense Horv., Fl. Tyrnaviensis indig. 1: 27 (1774). Syn.: *Th. ramosum* Hayne.

Mat.: A-9684, 10361; AS-6033; R-53118 (n.v.)	
Hab.: In thickets of <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> , mountain meadow and <i>Stipa</i> steppe, rocky outcrops	
Dist.: Map 625	Alt.: 600-1950
Ch.: M-IT [? ES]	GF.: GRH
Th. (GNP): RAR (12)	Th. (IR): NOT

Thesium kotschyianum Boiss., Diagn. Pl. Orient. Nov. sér. 1, 7: 86 (1845). Syn.: *Th. impressum* Steud. ex DC.

Type: Fars: Sabz Pushan prope Shiraz, Kotschy 416/418 (iso. M).

Mat.: A-10254, 10408; AS-5958; RZ-53191 (n.v.); TM-34917 (n.v.)	
Hab.: <i>Artemisia</i> , <i>Artemisia-Stipa</i> and <i>Stipa</i> steppes, mountain steppe with grasses and thorn-cushions, <i>Juniperus excelsa</i> woodland	
Dist.: Map 626	Alt.: 1000-2380
Ch.: IT ^{W&C}	GF.: GRH
Th. (GNP): NOT (25)	Th. (IR): NOT

Scrophulariaceae

Digitalis nervosa Steud. & Hochst. ex Benth. in DC., Prodr. 10: 450 (1846). Fig. 25, A.

Mat.: A-9646; Remaudière 6799 (n.v.); W&C-14283 (n.v.)	
Hab.: Lowland and montane forest (often at forest margin and more or less open forest); rocky outcrops often with <i>Carpinus orientalis-Quercus castaneifolia</i> or <i>Q. macranthera</i> ; forest opening with <i>Pteridium aquilinum</i>	
Dist.: Map 627	Alt.: 500-2050
Ch.: ES ^{EH}	GF.: HSC
Th. (GNP): NOT (45)	Th. (IR): NOT

Leptorhabdos parviflora (Benth.) Benth. in DC., Prodr. 10: 510 (1846). Syn.: *Gerardia parviflora* Benth., Scroph. Ind. 48 (1835); *L. glutinosa* Freyn.

Mat.: A-9526, 11672, 12275, 12316	
Hab.: <i>Acer monspessulanum</i> and <i>Crataegus</i> scrubs, <i>Juniperus excelsa</i> woodland, rocky outcrops (<i>Carpinus orientalis-Quercus castaneifolia</i> open scrub)	
Dist.: Map 628	Alt.: 1000-2050
Ch.: IT ^{C&E}	GF.: TSC
Th. (GNP): NOT (25)	Th. (IR): IND

Linaria dalmatica (L.) Mill., Gard. Dict. ed. 8: n° 13 (1768).

Mat.: A-9689, 9690, 11109, 11442, 11925; GA-4907; F-1179, 1105; Z-82/214; ZK-82/110, 82/159	
Hab.: Open scrubs in rocky outcrops on gentle and steep slopes or open woodland with grass patches, road and forest margin	
Dist.: Map 629	Alt.: 650-1700
Ch.: M ^E -ES ^{EH}	GF.: HSC
Th. (GNP): NOT (20)	Th. (IR): ? NOT

Linaria pyramidalis (Vent.) F. G. Dietr., Nachtr. Vollst. Lexic. 4: 417 (1818).

subsp. *kopetdaghensis* (Kuprian.) D. A. Sutton, Rev. Tribe Antirrhineae: 299 (1988). Syn.: *Linaria kopetdaghensis* Kuprian., Trudy Bot. Inst. Akad. Nauk SSSR, ser. 19: 66 (1950). Fig. 25, C.

Mat.: A-9398, 11024; GA-4873; E-786 (n.v. fide Sutton 1988: microfiche page 154)	
Hab.: Road margin, scrub valley	
Dist.: Map 630	Alt.: 1500-1750
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): VUL (4)	Th. (IR): IND

Linaria simplex (Willd.) DC. in Lam. & DC., Fl. Fr. ed. 3, 3: 588 (1805). Syn.: *Antirrhinum simplex* Willd., Sp. Pl.: 3 (1): 243 (1800).

Mat.: A-10452, 10501	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes, <i>Juniperus excelsa</i> woodland	
Dist.: Map 631	Alt.: 1100-1450
Ch.: IT-M	GF.: TRO
Th. (GNP): VUL (8)	Th. (IR): NOT

Linaria sp. (aff. *grandiflora*). Fig. 25, B.

Mat.: A-11277, 11413, 11569, 11627, 12041-b	
Hab.: Steep slopes with open <i>Carpinus orientalis-Quercus castaneifolia</i> scrub, open scrub with <i>Crataegus</i>	
Dist.: Map 632	Alt.: 560-2000
Ch.: ?	GF.: HSC
Th. (GNP): RAR (11)	Th. (IR): ?

Further studies are necessary to provide reliable names for the above cited plants.

Kickxia elatine (L.) Dumort., Fl. Belg.: 35 (1827). Syn.: *Linaria elatine* L., Sp. Pl. 612 (1753). According to Sutton (1988: 176), the Iranian plants belong to subsp. *crinita* (Mabille) Greuter, Boissiera 13: 108 (1967).

Mat.: ZK-82/101	
Hab.: As weed around Tangegol station	
Dist.: C	Alt.: 680
Ch.: ES-IT-M	GF.: TCR
Th. (GNP): END (1)	Th. (IR): NOT

Odontites verna (Bellardi) Dumort., Fl. Belg. 32 (1827). Syn.: *Euphrasia verna* Bellardi, Mem. Acad. Sci. Turin 5: 239, 1793).

Mat.: A-12207	
Hab.: Lowland forest margin (<i>Carpinus orientalis-Quercus castaneifolia-Parrotia persica</i>) in W Beili Kuh	
Dist.: NW	Alt.: 1000
Ch.: ES	GF.: TSC
Th. (GNP): END (1)	Th. (IR): END

The above cited specimen matches well with subsp. *vera*, characterized by the bracts exceeding the flowers and the slightly branched stem. Only two specimens of this taxon have been reported by Rechinger (Fl. Iranica 147: 188, 1981) in Iran; one in Mazandaran: Firuzabad and another near Karaj.

Rhynchocorys maxima K. Richt., Akad. Wiss. Wien, Math.-Naturwiss. Kl., Denkschr. 50: 25 (1825). Fig. 25, D.

Mat.: A-10603; F-1082	
Hab.: Closed montane forest	
Dist.: Map 633	Alt.: 1500-1850
Ch.: ES ^{HY}	GF.: HSC
Th. (GNP): VUL (4)	Th. (IR): NOT

The finding of the *R. maxima* in the easternmost boundaries of hyrcanian forest extends the previously known distribution of this showy species. The nearest previously known locality is in Gorgan, ca. 150 km E of our area.

Scrophularia gaubae Bornm., Feddes Repert. 44: 267 (1940).

Mat.: A-9805, 9342, 11266; AS-6030; R-52635, 52544; W&C-14331; Wa-209 (under <i>S. rostrata</i>)	
Hab.: Closed lowland and montane forest, riverside in forest, forest openings (bottom of a karstic gully), rarely thickets of <i>Paliurus spina-christi</i> and <i>Acer monspessulanum-Crataegus</i>	
Dist.: Map 634	Alt.: 500-2050
Ch.: ES ^{HY}	GF.: HSC
Th. (GNP): NOT (20)	Th. (IR): RAR

Grau (Fl. Iranica 147: 242, 1981) reported *S. rostrata* Boiss. & Buhse from the Park, based on material collected by Walton: Gulestan forest, 1000 m, Walton 209 (E). He stated that the specimen has a characteristically robust growth form and differs from typical *S. rostrata* by a number of minor characters. I have studied the material in E. The

plant has been collected from the dried up river bed and is completely covered by mud caused by flooding water. The corolla structure is identical with *S. gaubae* (compared with several specimens from the area) in which the upper corolla lips are coloured and directed upright. The capsules are also abruptly beaked, compared with gradually narrowed beak in *S. rostrata*. The atypical robust growth form may be caused by the moist habitat in a river bed.

Scrophularia scoparia Pennel, Acad. Nat. Scienc. Philad. Monogr. 5: 48 (1943).

Mat.: A-10824	
Hab.: Very open <i>Juniperus excelsa</i> woodland in Chondeh-Abbas Mountain	
Dist.: S	Alt.: 1650
Ch.: IT ^E	GF.: CHU/CSC
Th. (GNP): END (1)	Th. (IR): NOT

Scrophularia striata Boiss., Fl. Orient. 4: 413 (1875). Syn.: *S. juncea* C. Richter ex Stapf; *S. persica* Benth.

Mat.: R-52934, 52749; Z-82/251	
Hab.: <i>Artemisia</i> steppe, <i>Paliurus spina-christi</i> scrub	
Dist.: S, E	Alt.: 1000-1200
Ch.: IT ^{C&±W}	GF.: CHU/CSC
Th. (GNP): END (3)	Th. (IR): NOT

Scrophularia variegata M. Bieb., Fl. Taur.-Cauc. 2: 78 (1808).

subsp. **rupestris** (M. Bieb.) Grau in Fl. Iranica 147: 250 (1981). Syn.: *S. rupestris* M. Bieb., Fl. Taur.-Caucas. 2: 79 (1808); *S. nitida* C. Richter.

Mat.: A-12320, 11725, 12027*; R-37634, 52746; ZA-15846	
Hab.: In crevices and ledges of steep and vertical limestone cliffs (scrub and steppe zones of the Park)	
Dist.: Map 635	Alt.: 600-2000
Ch.: IT ^C	GF.: CHU/HSC
Th. (GNP): NOT (17)	Th. (IR): NOT

* A subalpine form whose habit and leaves are very small.

Verbascum blattaria L., Sp. Pl.: 178 (1753). Syn.: *V. repandum* Willd.

Mat.: A-9696; Z-85/187	
Hab.: Forest margin, rocky outcrops with scrub of <i>Carpinus orientalis-Quercus castaneifolia</i>	
Dist.: Map 636	Alt.: 600-1100

Ch.: ES-M [IT]	GF.: HSC (biennial)
Th. (GNP): END (3)	Th. (IR): VUL

Verbascum cheiranthifolium Boiss., Diagn. Pl. Orient. Nov. sér. 1, 4: 56 (1844).

Only var. **transcaspicum** Murb., Acta Univ. Lund. 2, 29, 2: 278 (1933), occurs in Iran.

Mat.: A-11658, 11694, 11715, 12061; K-7732 (n.v.)	
Hab.: Openings in montane forest, waste places around the stations, scrub of <i>Acer monspessulanum</i> and <i>Crataegus</i>	
Dist.: Map 637	Alt.: 1200-1800
Ch.: IT ^{W&C}	GF.: HSR
Th. (GNP): RAR (9)	Th. (IR): NOT

Verbascum gossypinum M. Bieb., Fl. Taur.-Caucas. 3: 152 (1819). Syn.: *V. hohenackeri* Fisch. & C. A. Mey. Fig. 25, E-F.

Mat.: A-1115, 11609, 11292 (flowers yellow), 11293 (flowers white)	
Hab.: Mountain meadows and grassland at margin of forest	
Dist.: Map 638	Alt.: 1500-1900
Ch.: ES ^{EH} /IT ^{Cauc.-Turk.}	GF.: HSR
Th. (GNP): VUL (4)	Th. (IR): NOT

Verbascum sinuatum L., Sp. Pl.: 178 (1753).

var. **sinuatum**

Mat.: A-11490	
Hab.: Lowland forest opening	
Dist.: Map 639	Alt.: 1000
Ch.: M	GF.: HSC
Th. (GNP): END (1)	Th. (IR): END

var. **adenosepalum** Murb., Acta Univ. Lund. 2, 29, 2: 371 (1933).

Mat.: A-9960, 11559, 11816; WF-12847, ZK-82/106	
Hab.: Weed in Park gardens, disturbed scrubs and surrounding cultivated lands	
Dist.: Map 639	Alt.: 450-1600
Ch.: IT ^{W&C}	GF.: HSC
Th. (GNP): VUL (7)	Th. (IR): NOT

Verbascum speciosum Schrad., Hort. Gotting. 2: 22, tab. 16 (1811). Syn.: *V. longifolium* DC. Fig. 25, G-H.

Mat.: A-4309, 9440, 9523, 9582; GA-4879; R-52950; WF-12709	
Hab.: Common in mountain steppes consisting of grasses and thorn-cushions, <i>Stipa</i> steppe, and mountain meadows; <i>Artemisia-Stipa</i> steppe; various kinds of scrubs and thickets (often with <i>Crataegus</i> , <i>Acer monspessulanum</i> , <i>Juniperus excelsa</i> woodland)	
Dist.: Map 640	Alt.: 970-2060
Ch.: ? IT ^W -M ^E	GF.: HSR
Th. (GNP): NOT (83)	Th. (IR): NOT

Verbascum sublobatum Murb., Acta Univ. Lund. 2, 29, 2: 308, tab. 15, fig. 14 (1933).

Mat.: A-11194; F-1182	
Hab.: Thicket of <i>Crataegus</i> and open woodland (transition between montane forest and steppe with dense patches of grasses)	
Dist.: Map 641	Alt.: 750-1500
Ch.: ES ^{HY}	GF.: HSR
Th. (GNP): VUL (6)	Th. (IR): VUL

Verbascum thapsus L., Sp. Pl.: 177 (1753).

Mat.: A-9880, 9697, 11509, 11610; IZ-15308	
Hab.: Lowland and montane forest, usually in forest openings and forest margins	
Dist.: Map 642	Alt.: 500-1900
Ch.: PL ^(Mainly ES)	GF.: HSC
Th. (GNP): VUL (6)	Th. (IR): RAR

Verbascum spec. A

A-12040

Above cited specimen is probably related to *V. sinuatum*; differs from this species by distinctly discoloured leaves which are subglabrous and green on the upper side, and whitish-tomentose on the lower side and regularly dentate at the margin, with obtuse teeth. The basal leaves are rotundate at the base, with distinct petiole. Pedicels are up to 20 mm in length. Furthermore, one of the anthers is clearly smaller than the other and therefore the species might have affinities with *V. oreophilum* K. Koch.

Verbascum spec. B

Z-85/203

Above cited plant is in habit very similar to *V. blattaria*, but differs in having a mix of branched and simple hairs, very short pedicels and slightly branched inflorescences. The specimen is poor and

the author was unable to identify it with the account of Flora Iranica and Flora of Turkey (It was compared with all the possibilities in the M herbarium!). It has been collected from the same locality as *B. blattaria* (Zehzad 85/187). This may be a hybrid between *V. sinuatum* and *V. blattaria*. Both species grow in the area. Huber-Morat (Flora of Turkey, 6: 592, 1978) reported the hybridization of the two species in Turkey. But I have no authentic material available for comparison.

Veronica anagallis-aquatica L., Sp. Pl.: 12 (1753).

subsp. **oxycarpa** (Boiss.) A. Jelen., Bull. Soc. Nat. Mosc. Biol. 74, 6: 76 (1969). Syn.: *V. oxycarpa* Boiss. in Kotschy, Pl. Pers. austr. ed. R. F. Hohen. 639 (1845); *V. montioides* Boiss.

Mat.: A-4482; AS-5961	
Hab.: In shallow water along the streams between Sharleq and Cheshmeh Khan, and Jakhtikalan Pass	
Dist.: S, E	Alt.: 1100-1450
Ch.: IT	GF.: GRH/ARH
Th. (GNP): END (2)	Th. (IR): NOT

The leaves of A-4482 are up to 135 mm long and 55 mm broad. The range of the leaf size given for this taxon by Fischer (Fl. Iranica 147: 151, 1981) is (15-) 30-100 mm long and (7-) 10-40 mm broad.

Veronica anagalloides Guss., Pl. Rar. 5: tab. 3 (1826).

subsp. **heureka** M. A. Fischer in Fl. Iranica 147: 158 (1981).

Mat.: AS-5962	
Hab.: Shallow water along a stream between Cheshmeh Khan and Sharleq	
Dist.: S	Alt.: 1100
Ch.: IT	GF.: HCR/ARH
Th. (GNP): END (1)	Th. (IR): NOT

Veronica argute-serrata Regel & Schmalh. in Regel, Trudy Glavn. Bot. Sada 5 (2): 626 (1878). Syn.: *V. bornmuelleri* Hausskn.; *V. bartsiaefolia* Boiss. ex Freyn; *V. karatavica* Pavl. ex Nevski.

Mat.: A-6160, 10991-b, 10539; R-53120; RZ-53194	
Hab.: Mountain steppes in Almeh, <i>Juniperus</i> woodland in 7 km W Soolegerd	
Dist.: C, NE	Alt.: 1400-2100
Ch.: IT ^{omni}	GF.: TSC
Th. (GNP): VUL (6)	Th. (IR): NOT

Veronica arvensis L., Sp. Pl.: 13 (1753).

Mat.: A-10681-a, 11213-a	
Hab.: Open woodland (transition between montane forest and steppe)	
Dist.: Map 643	Alt.: 1350-1500
Ch.: PL	GF.: TSC
Th. (GNP): END (3)	Th. (IR): RAR

Veronica beccabunga L., Sp. Pl.: 12 (1753).

subsp. *muscosa* (Korsh.) A. Jelen., Bull. Soc. Nat. Mosc. Biol. 82: 153 (1977). Syn.: *V. beccabunga* L. var. *muscosa* Korsh., Zap. Akad. Nauk, Fiz.-Mat. Otd. 4, 4: 96 (1896).

Mat.: A-11834, 11880, 12164 (sterile, determination uncertain)	
Hab.: Waterside in forest and steppe	
Dist.: Map 644	Alt.: 800-1800
Ch.: PL ^(N Temperate)	GF.: HCR/ARH
Th. (GNP): END (3)	Th. (IR): END

Veronica campylopoda Boiss., Diagn. Pl. Orient. Nov. sér. 1, 4: 80 (1844). Syn.: *V. microtheca* Boiss. & Bal.

Mat.: A-10521; AS-5935; Foroughi-8121; K-5675 (n.v.); W&al-10966	
Hab.: Mountain steppe, dry valley with <i>Haloxylon</i> shrubs, dry and moderately saline <i>Artemisia-Anabasis</i> steppe	
Dist.: Map 645	Alt.: 1050-1900
Ch.: IT ^{omni}	GF.: TSC
Th. (GNP): VUL (8)	Th. (IR): NOT

Veronica cardiocarpa (Kar. & Kir.) Walp., Repert. Bot. Syst. 3: 335 (1845). Syn.: *Diplophyllum cardiocarpum* Kar. & Kir., Bull. Soc. Nat. Mosc. 15 (2): 417 (1842); *V. griffithii* Benth.

Mat.: R-53121-b	
Hab.: One locality in Almeh (without detail)	
Dist.: C	Alt.: ? 1500-1800
Ch.: IT ^E	GF.: TSC
Th. (GNP): END (1)	Th. (IR): END

The record of *V. cardiocarpa* in Iran is based only on the above cited plant in the Park (Fischer, Fl. Iranica:147: 94, 1991).

Veronica crista-galli Steven, Mém. Soc. Imp. Naturalites Moscou 3: 251 (1812).

Mat.: A-10364; RE-16155 p.p.; TM-34929	
Hab.: Road and forest margin in Tangerang	
Dist.: W	Alt.: 450-500
Ch.: ES ^{EH}	GF.: TCA
Th. (GNP): END (3)	Th. (IR): RAR

Veronica gaubae Bormm., in Bormm. & Gauba, Feddes Repert. 51: 219 (1942). Syn.: *V. issaa* Parsa; *V. turkmenorum* B. Fedtsch. ex Boriss.

Mat.: A-12036	
Hab.: Rock cliffs, eastern corner of Qorqon rocks	
Dist.: C	Alt.: 2000
Ch.: IT ^{Alborz}	GF.: TSC/HSC
Th. (GNP): END (1)	Th. (IR): NOT

Veronica hederifolia L., Sp. Pl.: 13 (1753).

Mat.: A-10288; K-5747 p.p. (n.v.), 5749 (n.v.); R-52615; RE-16155-E, p. p.	
Hab.: Forest margin and open scrub in Tangegol and Koilar	
Dist.: C, N	Alt.: 750-1450
Ch.: ES-IT-M	GF.: TCA
Th. (GNP): VUL (5)	Th. (IR): NOT

Veronica intercedens Bormm., Beih. Bot. Centralbl. 2, 22: 112 (1907). Syn.: *V. mogoltavica* Popov ex Vved.; *V. elbursensis* Boiss.; *V. afghanica* Gilli.

Mat.: A-(s.n. fragment, 29.5.1995); R-53121-a; T-36866	
Hab.: Mountain steppe with grasses and thorn-cushions, <i>Acer monspessulanum</i> scrub	
Dist.: C	Alt.: 1500-1800
Ch.: IT ^{C&E}	GF.: TSC
Th. (GNP): VUL (6)	Th. (IR): NOT

Veronica khorassanica Czerniak., Feddes Repert. 27: 280 (1930).

Mat.: A-4557, 10508, 11404	
Hab.: <i>Juniperus</i> woodland, <i>Artemisia-Stipa</i> and <i>Stipa</i> steppes	
Dist.: Map 646	Alt.: 1000-2100
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): RAR (11)	Th. (IR): VUL

Veronica persica Poir. in Lam., Encycl. Meth. Bot. 8: 542 (1808).

Mat.: R-52417 (n.v.), 52470 (n.v.); TM-34928 (n.v.)	
Hab.: Weed in Tangerang	
Dist.: W	Alt.: 450-500
Ch.: SCO	GF.: TSC
Th. (GNP): END (3)	Th. (IR): NOT

Veronica polita Fries, Nov. Fl. Suec. 63 (1819).

Mat.: A-10289-a, 10482 (not seen materials reported in Fl. Iranica 147: 100, 1981: K-38; R-52545, 52595; RE-16156; TM-34931; U-14902)	
Hab.: As weed in disturbed places around the stations and the road, transition woodland between forest and steppe, <i>Artemisia-Stipa</i> steppe	
Dist.: Map 647	Alt.: 450-1450
Ch.: PL	GF.: TCA
Th. (GNP): RAR (9)	Th. (IR): NOT

Veronica rubrifolia Boiss., Diagn. Pl. Orient. Nov. sér. 1, 12: 46 (1853).

Only subsp. *respectissima* M. A. Fischer, Fl. Iranica 147: 71 (1981) occurs in our area.

Mat.: R-52969, 53119	
Hab.: Probably in <i>Artemisia</i> steppe and mountain steppes between Almeah and Mirza-Baylu	
Dist.: C, E	Alt.: 1300-1800
Ch.: IT ^{C&E}	GF.: TSC
Th. (GNP): END (3)	Th. (IR): NOT

Veronica siaretensis Lehm., Bull. Herb. Boissier, sér. 2, 8: 348 (1908).

Mat.: A-10403, 11213-b, 10289-b; R-52546 (n.v.); W&al-11026 (n.v.)	
Hab.: In lowland <i>Quercus castaneifolia</i> forest; transitional woodland between montane forest and steppe	
Dist.: Map 648	Alt.: 500-1500
Ch.: ES ^{HY}	GF.: TCA
Th. (GNP): VUL (6)	Th. (IR): VUL

Veronica verna L., Sp. Pl.: 14 (1753).

Mat.: A-10681-b	
Hab.: Steep slopes with open <i>Carpinus orientalis-Quercus castaneifolia</i> scrub	
Dist.: SW	Alt.: 1350
Ch.: PL	GF.: TSC
Th. (GNP): END (1)	Th. (IR): END

V. verna was recorded in Flora Iranica 147, 77, 1981, only from two localities in Mazandaran (Bandar-i Gaz and Hazar Jerib).

Solanaceae

The identification of *Atropa* species is provisional.

Atropa acuminata Royle ex Miers, Hook. Journ. Bot & Kew Misc. 1: 138 (1849)

Mat.: A-11511; Wa-223	
Hab.: At the margin or clearings in forest	
Dist.: C, W	Alt.: 1000-1550
Ch.: ES ^{HY} - HIM (Afghanistan, Pakistan, Mongolia)	GF.: HSC
Th. (GNP): END (2)	Th. (IR): END

Atropa komarovii Blin. ex Schal., Izv. Turkm. Fil. Akad. Nauk SSSR. 3-4: 183 (1945).

Mat.: A-9289, 9879, 9900, 11689	
Hab.: Forest openings, along moist valleys	
Dist.: Map 649	Alt.: 550-1500
Ch.: IT ^{KK}	GF.: HSC
Th. (GNP): VUL (4)	Th. (IR): SUN

A-9878, 9982 have been collected from Loveh and Kondeskuh (outside the Park borders) in disturbed submontane forest in altitudes from 1000 to 1400 m. They belong most likely to *A. belladonna* L.

Hyoscyamus niger L., Sp. Pl.: 179 (1753).

Mat.: A-11195	
Hab.: Found once in open woodland with dense patches of grasses in Koilar	
Dist.: N	Alt.: 1400
Ch.: PL ^(N Temperate Eurasia, alien elsewhere)	GF.: HSC
Th. (GNP): END (1)	Th. (IR): RAR

Hyoscyamus pusillus L., Sp. Pl.: 180 (1753).

Mat.: A-6230, 10870	
Hab.: <i>Artemisia</i> steppe and along the road to Almeah valley with scattered <i>Haloxylon</i> shrubs	
Dist.: Map 650	Alt.: 1200-1400
Ch.: IT [SS]	GF.: HSC
Th. (GNP): END (3)	Th. (IR): NOT

Hyoscyamus turcomanicus Pojark., Bot Zhurn. SSSR. 27, 6: 127, tab. 3 (1942).

Mat.: A-9415, 9548; Wa-220; W&al-11004	
Hab.: Mountain steppe with grasses, thorn-cushions and scattered shrubs, <i>Stipa</i> steppes; <i>Acer monspessulanum</i> scrub, moderately saline soils in <i>Anabasis-Artemisia</i> steppe	
Dist.: Map 651	Alt.: 1000-1820
Ch.: IT ^E	GF.: HSC
Th. (GNP): RAR (10)	Th. (IR): RAR

Lycium depressum Stokes, Hook. Journ. Bot. & Kew Misc. 4: 179 (1852). Fig. 25, I.

Mat.: A-12216	
Hab.: Saline soils in <i>Tamarix</i> stand near Cheshmeh Khan	
Dist.: S	Alt.: 1200
Ch.: IT	GF.: PSS ^{±TH}
Th. (GNP): END (1)	Th. (IR): NOT

Lycium kopetdagi Pojark., Bot. Mater. Gerb. Glavn. Bot. Sada SSSR 13: 273 (1950).

Mat.: A-4502, 4484; R-52953; Z-82/256*	
Hab.: <i>Juniperus excelsa</i> woodland, dry valley with <i>Haloxylon</i> shrubs, mountain steppe with scattered shrubs, transition between <i>Artemisia</i> steppe and mountain scrub	
Dist.: Map 652*	Alt.: 1200-1450
Ch.: IT ^{KK}	GF.: PSS
Th. (GNP): VUL (7)	Th. (IR): VUL

* The locality of Z-82/256 between Sharleq and Cheshmeh Khan cannot be localized for mapping.

Lycium ruthenicum Murray, Comment, Soc. Sci. Gotting. 2: 9-13 (1779). Syn.: *L. tataricum* Pall.; *L. foliosum* Stokes.

Mat.: A-12162	
Hab.: Around Mirza Baylu stream	
Dist.: E, ? S	Alt.: 1200
Ch.: IT	GF.: PSS
Th. (GNP): IND	Th. (IR): NOT

The cited specimen from Mirza-Baylu spring is a late gathering (6.10.1995) and lacks flower and fruit. This is a spiny-intricate shrub to 70 cm height with ca. 1 mm broad linear leaves. Based on my observations in many parts of Iran, these characters are in combination characteristic for *L. ruthenicum*.

Similar plants have frequently been observed along the southern border of the Park near Dasht village. However, flowering and fruiting material is necessary for a reliable identification.

Physalis alkekengi L., Sp. Pl.: 183 (1753).

Mat.: A-9294, 9364; Z-85/178.	
Hab.: Lowland forest	
Dist.: Map 653	Alt.: 450-1000
Ch.: ES	GF.: GRH
Th. (GNP): END (3)	Th. (IR): NOT

Solanum dulcamara L., Sp. Pl.: 185 (1753). Syn.: *S. persicum* Willd. ex Roem. & Schult.

Mat.: A-9764, 12356; GA-4895, 4936; ZK-82/127	
Hab.: Bank of rivers, streams and Sulukli Lake	
Dist.: Map 654	Alt.: 660-1700
Ch.: ES-IT-M	GF.: CSS
Th. (GNP): VUL (6)	Th. (IR): NOT

Solanum kieseritzkii C. A. Mey., Verz. Pfl. Cauc. 113 (1831).

Mat.: A-12191	
Hab.: Closed montane forest on steep northern slopes of Alu-Baq (S Tangeqol)	
Dist.: C	Alt.: 1450
Ch.: ES ^{HY}	GF.: CSP
Th. (GNP): END (1)	Th. (IR): END

Solanum nigrum L., Sp. Pl. 186 (1753).

Mat.: A-12247, 12252, 11571	
Hab.: Along the stream in Khan Doushan and sandy ruderal places in Tangerang and disturbed soils in pionner forest in Lateh Khoda-Qoli	
Dist.: W, C	Alt.: 450-900
Ch.: COS	GF.: TSC
Th. (GNP): END (3)	Th. (IR): NOT

Solanum olgae Pojark., Bot. Mater. Gerb. Glavn. Bot. Sada SSSR 17: 333 (1955). Syn.: *S. pseudo-flavum* Pojark.

Mat.: A-12246; Wa-186	
Hab.: Sandy waste places or dreid up river bed	
Dist.: W	Alt.: 450-1000
Ch.: IT ^E	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

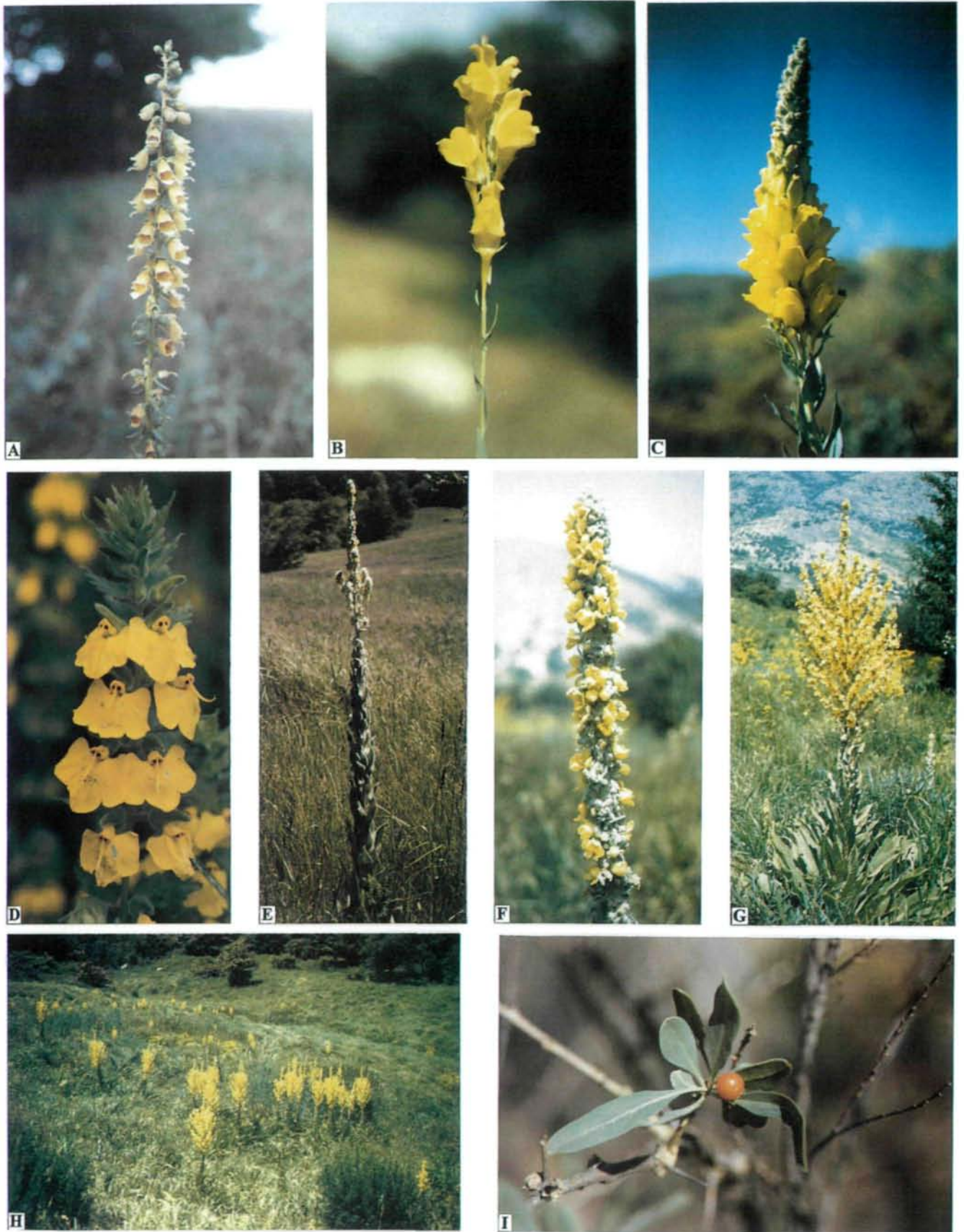


Fig. 25: A, *Digitalis nervosa*; B, *Linaria* sp. (aff. *grandiflora*); C, *Linaria pyramidalis* subsp. *kopetdaghensis*; D, *Rhynchosorys maxima*; E-F, *Verbascum gossypinum*; G-H, *Verbascum speciosum*; I, *Lycium depressum*.

Tamaricaceae

Reaumuria alternifolia (Labill.) Britten, J. Bot. 54: 110 (1916). Syn.: *Hypericum alternifolium* Labill., Icon. Pl. Syr. 2: 17, t. 10 (1791).

Mat.: A-9834	
Hab.: Saline, subsaline and salty gypsum soils with <i>Suaeda physophora</i> stands and <i>Artemisia</i> steppe	
Dist.: Map 655	Alt.: 1050-1250
Ch.: IT ^{omni}	GF.: CHU
Th. (GNP): VUL (6)	Th. (IR): NOT

Tamarix androssowii Litw., Sched. Herb. Fl. Ross. 5: 41 (1905).

Mat.: AS-5942	
Hab.: Saline and moist soils N Cheshmeh Khan	
Dist.: S	Alt.: 1000-1200
Ch.: IT	GF.: PSS
Th. (GNP): END (2)	Th. (IR): NOT

Tamarix cf. aralensis Bunge

Mirza-Baylu towards Almeh, 11.7.1982, Zehzad 82/310.

Above cited plant differs from the more common *T. ramosissima* by deciduous petals and by amplexicaul leaves. It lacks papillae on the rachis and due to its poor condition makes a reliable identification difficult. According to Baum (1978) the papillose rachis is an important diagnostic character for *T. aralensis*. The only specimen of this species seen by the author from SE Iran (Rechinger 4099, identified by Baum) lacks such papillae on the rachis!

Tamarix ramosissima Ledeb., Fl. Altaica 1: 424 (1829).

Mat.: A-9845, 10748, 10760, 10914	
Hab.: Sandy alluvial stream bed	
Dist.: Map 656	Alt.: 1000-1400
Ch.: PL	GF.: PSS/PTS
Th. (GNP): END (3)	Th. (IR): NOT

Almost all cited specimens are characterized by keeled petals and match with *T. smyrnensis* Bunge according to Baum's revision (1978). Assadi (Flora of Iran, 1: 39, 1989) argued that keeled versus non-keeled petals cannot be used as a constant character. Furthermore there is not any correlation with other characters.

Thymelaeaceae

Diarthron vesiculosum (Fisch. & C. A. Mey. ex Kar. & Kir) C. A. Mey. Bull. Phys.-Math. Acad. Petersb. 1: 359 (1843).

Mat.: A-11137; Z-82/180	
Hab.: <i>Stipa</i> steppe in N parts of the Park (8 km SW Lohondor) and Sharleq (no detail)	
Dist.: S, N	Alt.: 900-1250
Ch.: IT	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

Stelleropsis antoninae Pobed., Bot. Mater. Gerb. Glavn. Bot. Sada SSSR 12: 157 (1949). Syn.: *Diarthron anthoninae* (Podeb.) Kit Tan.

Mat.: A-10458, 10409; AS-5948	
Hab.: <i>Artemisia</i> steppe and transition between <i>Artemisia</i> steppe and <i>Paliurus spina-christi</i> scrub	
Dist.: Map 657	Alt.: 1000-1200
Ch.: IT ^{KK}	GF.: CHE
Th. (GNP): END (3)	Th. (IR): VUL

The following specimens have been seen in M: Semnan, 43 km SW Damghan, 1300 m. 25.4.1975, Rechinger 50265; 33 km NE Semnan versus Damghan, 1600-1700 m, 25.4.1975, Rechinger 50248; in montibus prope Tuweh a Damghan boreo-occidentem versus, 1900-2250 m, 7.6.1977, Rechinger 56469. The two former were originally identified by Peterson as *St. turcomanica* and the latter as *Stelleropsis iranica* Pobed. But he has reported all of them as *St. antoninae* (Peterson 1980).

Thymelaea passerina (L.) Coss. & Germ., Syn. Fl. Env. Paris, ed. 2, 360 (1859). Syn.: *Stellera passerina* L., Spec. Pl. 559 (1753).

Mat.: A-11469	
Hab.: Rocky outcrops between Tangegol and Abshar in <i>Carpinus orientalis</i> scrub	
Dist.: C	Alt.: 750-800
Ch.: ES-IT-M	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

Tiliaceae

Tilia platyphyllos Scop., Fl. Carn. ed. 2, 1: 373 (1772).

subsp. *caucasica* (Rupr.) Loria, Bot. Zhurn. SSSR. 52, 12: 179 (1967). Syn.: *T. caucasica* Rupr. Mém. Acad. Imp. Sci. Saint Pétersbourg, sér. 7, 15, 2: 253 (1869). (For more synonyms see Browicz in Fl. Iranica 148, 6-7, 1981).

Mat.: A-9339, 9967; R-52534; W&C-14339	
Hab.: Closed montane forest, rarely lowland forest and forest margin	
Dist.: Map 658	Alt.: 600-2000
Ch.: ES ^{EH}	GF.: PTS
Th. (GNP): NOT (64)	Th. (IR): NOT

Browicz (1982: 57) in his chorology of trees and shrubs in South-West Asia used the name of *T. caucasica* Rupr., but in his account for the Flora Iranica (148, 1981) he considered this as subspecies of *T. platyphyllos*.

Ulmaceae

Celtis australis L., Spec. Plant 1043 (1753).

Mat.: A-12196; R-52538	
Hab.: Along streams and rivers in the forested zone of the Park	
Dist.: Map 659	Alt.: 600-930
Ch.: M-ES ^{EH}	GF.: PTS
Th. (GNP): VUL (4)	Th. (IR): RAR

Celtis caucasica Willd., Sp. Pl.: 4, 2: 994 (1806). Syn.: *C. tupalangi* Vassilcz.

Mat.: A-11440, 11086, 12099; R-52599; W&C-24269; Z-82/183	
Hab.: Steep and vertical cliffs in forest and steppe zones of the Park	
Dist.: Map 660	Alt.: 600-1600
Ch.: IT	GF.: PSS/PTS
Th. (GNP): NOT (25)	Th. (IR): NOT

Ulmus glabra Huds., Fl. Angl. 95 (1762).

Mat.: A-9343, 9823, 12199, 11486, 12033, 11520, 11545, 11219, 11593, 9968, 11909, 11954	
Hab.: Lowland and montane forest, more frequent in higher elevation over 1000 m	
Dist.: Map 661	Alt.: 500-2130
Ch.: ES	GF.: PTS
Th. (GNP): NOT (55)	Th. (IR): VUL

Ulmus minor Mill., Gard. Dict. ed. 8, n° 6 (1768). Syn.: *U. campestris* L. (nom. ambig.); *U. carpini-folia* G. Suckow; *U. araxina* Takht.

Mat.: A-11949, 11874, 11875, 11938, 11811, 11193, 11163, 12047; GA-4911; R-52456, 52539; Z-84/34, 83/1361	
Hab.: Open scrub, particularly in <i>Crataegus pentagyna</i> thickets, along river valley	
Dist.: Map 662	Alt.: 600-1500
Ch.: ES-M	GF.: PSS/PTS
Th. (GNP): RAR (13)	Th. (IR): VUL

Zelkova carpinifolia (Pall.) K. Koch, Linnaea 22: 598 (1849). Syn.: *Rhamnus carpinifolius* Pall., Fl. Ross. 2: 24, tab. 60 (1788); *Zelkova crenata* Spach; *Zelkova ulmoides* (Kuntze) Schneider; *Z. hyrcana* Grossh. & Yarm.

Mat.: A-9288, 9362, 9783, 11937; R-52450; W&C-14291	
Hab.: Lowland forest and forest margin, rocky outcrops, open scrubs of <i>Paliurus spina-christi</i> and <i>Crataegus</i>	
Dist.: Map 663	Alt.: 450-1000 (1550)
Ch.: ES ^{EH}	GF.: PTS/PSS
Th. (GNP): NOT (40)	Th. (IR): NOT

Urticaceae

Parietaria judaica L., Fl. Palaest. 32 (1756). Syn.: *P. persica* et *P. thymifolia* Stapf; *P. juxartica* Pavlov.

Mat.: A-9564; R-37637	
Hab.: In crevices of vertical cliffs	
Dist.: Map 664	Alt.: 670-1440
Ch.: ES-IT-M	GF.: CHU
Th. (GNP): RAR (9)	Th. (IR): NOT

Parietaria officinalis L., Sp. Pl.: 1052 (1752). Syn.: *P. erecta* Mert. & Koch.

Mat.: A-9257, 9330; AS-6045; GA-4959	
Hab.: Lowland forest on flat and moist soils and bank of streams and rivers, often with <i>Oplismenus undulatifolius</i>	
Dist.: Map 665	Alt.: 450-1220 (-1900)
Ch.: ES-M	GF.: HSC
Th. (GNP): NOT (21)	Th. (IR): NOT

Urtica dioica L., Sp. Pl.: 984 (1753).

Mat.: A-4361	
Hab.: Waste and moist places in forest margin and forest openings (lowland and montane), forest openings with <i>Pteridium aquilinum</i> , mountain meadows, open scrubs on gentle and steep slopes	
Dist.: Map 666	Alt.: 450-2000
Ch.: SCO	GF.: HSC
Th. (GNP): NOT (30)	Th. (IR): NOT

Valerianaceae**Valeriana sisymbriifolia** Vahl., Enum. Pl. 2: 7 (1805).

Mat.: A-10977, 11001, 11783; Z&al-86/2649	
Hab.: Scrub valleys and rocky slopes with <i>Acer monspessulanum</i> , <i>Juniperus excelsa</i> and <i>Quercus macranthera</i>	
Dist.: Map 667	Alt.: 1280-2380
Ch.: IT ^C	GF.: HSC
Th. (GNP): VUL (6)	Th. (IR): NOT

Valerianella amblyotis Fisch. & C. A. Mey. in Hohen., Bull. Soc. Nat. Mosc. 11: 263 (1838).

Mat.: A-10495	
Hab.: Waste places around Soolegerd station	
Dist.: NE	Alt.: 1200
Ch.: IT ^{Cauc.-Turk.}	GF.: TSC
Th. (GNP): END (1)	Th. (IR): END

Rechinger (Fl. Iranica 62: 12, 1969) has mentioned only three localities for this species within the Flora Iranica Area: Talish, Tatuni, Hohen. (Type), Iran: Azerbaijan, Szov. and Turcomania: Firyuza, Litw. 640. As only the latter specimen was provided with an exclamation mark, the plant from Iran may not have been seen by Rechinger.

Valerianella dentata (L.) Poll., Hist. Pl. Palat. 1: 30 (1776). Syn.: *V. locusta* L. var. *dentata* L., Sp. Pl.: 34 (1753).

Mat.: A-11445, 10620	
Hab.: Steep rocky outcrops and forest clearing	
Dist.: Map 668	Alt.: 700-1500
Ch.: ES	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): RAR

Valerianella oxyrrhyncha Fisch. & C. A. Mey., Ind. Sem. Horti Peterop. 3: 51 (1837). Syn.: *V. diodon* Boiss.; *V. diplosodon* Boiss.; *V. stocksii* Boiss.

Mat.: A-10868	
Hab.: <i>Artemisia</i> steppe in Mirza-Baylu plain (north of Armadlu) and along Darreh Derazi	
Dist.: S	Alt.: 1200-1250
Ch.: IT ^{omni}	GF.: TSC
Th. (GNP): END (2)	Th. (IR): NOT

It is interesting that this very common species was found in our area only two times. But the closely related species *V. sclerocarpa* was found five times in the area. This latter species has only been recorded from a few localities in Flora Iranica (62: 7, 1969).

Valerianella platycarpa Trautv., Trudy Glavn. Bot. Sada 9: 453 (1886).

Mat.: A-10496, 10742, 10580-c; F-1102	
Hab.: <i>Paliurus spina-christi</i> scrub, ruderal and disturbed soils around the station (Soolegerd) and along stream (Darreh Derazi)	
Dist.: Map 669	Alt.: 950-1200
Ch.: IT ^{Cauc.-Turk.}	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): SUN

Valerianella sclerocarpa Fisch. & C. A. Mey., Ind. Sem. Horti Petrop. 2: 53 (1835).

Mat.: A-6167, 10493, 10494, 10741; AS-5990	
Hab.: <i>Artemisia</i> steppe, margin of the road along Alme valley, disturbed places in steppe zone	
Dist.: Map 670	Alt.: 1200-1500
Ch.: IT ^C	GF.: TSC
Th. (GNP): VUL (4)	Th. (IR): RAR

V. sclerocarpa and *V. turkestanica* are very close and difficult to separate. However, they seem to be well distinguished by their fully ripe fruits. A detailed study with enough material and cultivation of these two species in connection with *V. oxyrrhyncha* is desirable. See notes under *V. oxyrrhyncha* Fisch. & C. A. Mey.

Valerianella szowitsiana Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 3: 48 (1837). Syn.: *V. aucheri* Boiss.

Mat.: A-10869	
Hab.: <i>Artemisia</i> steppe and ruderal places along the road in Mirza Baylu plain (1-2 km NEN of Armadlu)	
Dist.: S	Alt.: 1200
Ch.: IT ^{omni}	GF.: TSC
Th. (GNP): END (1)	Th. (IR): NOT

Valerianella turkestanica Regel & Schmalh. ex Regel, Descr. Pl. Nov. Fedtsch. in Isv. obsh. ljub. Estv. Abtr. Etnogr. 34, 2: 43 (1882).

Mat.: A-10741-b	
Hab.: <i>Artemisia</i> steppe and disturbed habitats along Darreh Derazi	
Dist.: S	Alt.: 1250
Ch.: IT ^E	GF.: TSC
Th. (GNP): END (1)	Th. (IR): RAR

Valerianella uncinata (M. Bieb.) Dufur., Hist. Valer. 60 (1811). Syn.: *Valeriana uncinata* M. Bieb., Fl. Taur.-Caucas. 1: 26 (1808).

Mat.: A-10611, 11478; AS-6143	
Hab.: Rocky outcrops, often in <i>Carpinus orientalis</i> and <i>Acer monspessulanum</i> scrubs	
Dist.: Map 671	Alt.: 780-1820
Ch.: IT	GF.: TSC
Th. (GNP): VUL (5)	Th. (IR): NOT

Verbenaceae

Verbena officinalis L., Sp. Pl.: 20 (1753). Syn: *V. tenuispicata* Stapf.

Mat.: A-5004; Z-82/121	
Hab.: Disturbed places margin of road and around the stations from Tangerang to Tanggol and 2 km E of Dast-e Shah station	
Dist.: C, SW, W	Alt.: 450-1440
Ch.: PL ^(mostly ES-IT-M; alien elsewhere)	GF.: HSC
Th. (GNP): IND	Th. (IR): NOT

Violaceae

Viola alba Bess., Primit. Fl. Galic. 1: 171 (1809). subsp. *sintensisii* (W. Becker) W. Becker, Beih. Bot. Centralbl. 36, 2: 21 (1918). Syn.: *V. sintensisii* W. Becker, Mitt. Thür. Bot. Ver. 24: 1 (1909).

Mat.: A-10232, 10393; Kiabi-83/203; W&al-10958; R-52528, 52621	
Hab.: Lowland and montane closed and open forest and scrub	
Dist.: Map 672	Alt.: 450-2230
Ch.: ? ES	GF.: HRO
Th. (GNP): NOT (170)	Th. (IR): NOT

V. alba s. l. is the most common species in our area (170 records!). I was not able to distinguish easily this species from *V. suavis*. The flowers are only available early spring. The other characters in the key of Flora Iranica need to be studied.

Viola jordanii Hanry, Prodr. Hist. Nat. Var.: 169 (1853).

Mat.: A-11812, 12005; Noll, s. n. (8.4.1971); W&Al-11017 (n. v.)	
Hab.: Forest opening on steep slopes, often with <i>Pteridium aquilinum</i> and <i>Calamagrostis epigejos</i> ; bottom of a karstic gully surrounded by montane forest	
Dist.: Map 673	Alt.: 550-2000
Ch.: ? M	GF.: HSC
Th. (GNP): VUL (6)	Th. (IR): END

Viola jordanii seems to be very rare in Iran. Schmidt (Fl. Iranica 169: 13, 1992) cited only two specimens: one from Golestan National Park and another one from neighbouring Loveh forest.

Viola kitaibeliana Schult. in Roem. & Schult., Syst. Veg. 5: 383 (1819). Syn.: *V. karakalensis* Klok.; *V. hymettia* Boiss. & Heldr.; *V. brachyantha* Stapf.

Mat.: A-10294; AS-6072; TM-34942	
Hab.: <i>Paliurus spina-christi</i> scrub, open woodland with scattered shrubs and dense patches of <i>Pteridium aquilinum</i> or grasses	
Dist.: Map 674	Alt.: 580-1500
Ch.: ES-M	GF.: TSC ^{DW}
Th. (GNP): VUL (4)	Th. (IR): RAR

Viola occulta Lehm., Ind. Sem. Hort. Bot. Hamburg (1829).

Mat.: A-10202, 10797; U-16070 (n.v.); Z-82/283	
Hab.: <i>Juniperus</i> woodland, mountain steppe with grasses and thorn-cushions or scattered shrubs, mountain meadow	
Dist.: Map 675	Alt.: 1280-1750
Ch.: IT ^{omni}	GF.: TSC ^{DW}
Th. (GNP): RAR (9)	Th. (IR): NOT

Viola sieheana W. Becker, Bull. Herb. Boissier sér. 2, 2: 751 (1902). Syn.: *V. neglecta* M. Bieb.; *V. caspica* Freyn.

Mat.: A-9824, 9370, 9287, 9306, 9369; AS-6126, 6028; R-52467	
Hab.: Closed lowland and montane forest, scrubs on rocky outcrops, riverside	
Dist.: Map 676	Alt.: 450-2130
Ch.: ES ^{EH} (occurs also on Balkan Peninsula)	GF.: HSC
Th. (GNP): NOT (86)	Th. (IR): NOT

Viola suavis M. Bieb., Fl. Taur.-Caucas. 3: 164 (1819). Syn.: *V. pontica* W. Becker.

Mat.: A-10301; AS-6095; Kiabi 83/202; W&al-10958 (n.v.); W&al-10989	
Hab.: Forest and scrub	
Dist.: Map 762	Alt.: ? 820-2000
Ch.: M-IT	GF.: HRO
Th. (GNP): SUN	Th. (IR): NOT

See notes under *V. alba*.

Vitaceae

Vitis sylvestris C. C. Gmel., Fl. Bad. 1: 543 (1805). Syn.: *V. hyrcanica* Vassilcz.

Mat.: A-9357, 9896, 9692, 11159	
Hab.: Closed lowland forest in forested zone and as riparian in <i>Juniperus</i> zone of the Park	
Dist.: Map 677	Alt.: 450-1000 (-1400)
Ch.: ? ES ^{EH}	GF.: PLI
Th. (GNP): RAR (10)	Th. (IR): NOT

Vitis vinifera L., Sp. Pl.: 202 (1753).
A-11732 (Cultivated remnant in Hamamli valley and elsewhere).

Zygophyllaceae

Malacocarpus crithmifolius (Retz.) Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 9: 78 (1843). Syn.: *Peganum crithmifolium* Retz., Obs. Bot. 3: 34 (1783).

Mat.: A-11708	
Hab.: On limestone ground under <i>Juniperus excelsa</i> northern border of the Park	
Dist.: Map 678	Alt.: 1200
Ch.: IT ^{Aralo-Caspian}	GF.: PLI/CSS ^{SU}
Th. (GNP): END (1)	Th. (IR): END

M. crithmifolius is an endangered species in Iran and has previously been known only from two localities: Touran Protected area, ca. 8 km NE of Rازه, river bed in *Tamarix* stands 30.10.1987, Akhani 4154, and Khorasan: Kotal-e Yek Chenar Koelz 16738 (according to Hadidi in Fl. Iranica 98: 11, 1972). The occurrence of this highly threatened species in the Park is of great interest. The succulent shiny leaves, the scandent habit and red fruits make the species very unique. I have seen that this plant was planted in Nebet Dagh Desert Research station (W Turkmenistan) as a scandent wall ornamental. The fruit can be eaten, but I do not know exactly its local use in Central Asia.

Nitraria schoberi L., Syst. Nat. ed. 10: 1004 (1759). Type: 624.1 LINN !

Mat.: A-12140	
Hab.: Near a brackish spring in N parts of Mirza-Baylu plain	
Dist.: E	Alt.: 1280
Ch.: IT ^{omni}	GF.: CFR
Th. (GNP): END (1)	Th. (IR): VUL

Peganum harmala L., Sp. Pl.: 444 (1753).

Mat.: Z-82/149	
Hab.: Disturbed steppe around Mirza-Baylu station	
Dist.: E	Alt.: 1200
Ch.: IT-M-SS	GF.: HSC
Th. (GNP): END (1)	Th. (IR): NOT

Tribulus terrestris L., Sp. Pl.: 387 (1753).

Mat.: Z-82/125	
Hab.: Weed in disturbed and ruderal places found once in Tangegol	
Dist.: C	Alt.: 680
Ch.: PL	GF.: TCR
Th. (GNP): END (1)	Th. (IR): NOT

Zygophyllum atriplicoides Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 1: 41 (1835). Syn.: *Z. euryptherum* Boiss. & Buhse.

Mat.: A-4506, 10277; GA-4831	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes	
Dist.: Map 679	Alt.: 1100-1300
Ch.: IT ^{C&E}	GF.: CFR ^{±SU}
Th. (GNP): VUL (4)	Th. (IR): NOT

Zygophyllum fabago L. Sp. Pl.: 385 (1753).

Mat.: A-12222, 12282; R-37622; Wa-185; Z-82/1187	
Hab.: Saline and disturbed soils	
Dist.: Map 680	Alt.: 900-1200
Ch.: IT	GF.: HSC
Th. (GNP): VUL (5)	Th. (IR): NOT

Z. oxianum Boriss., Fl. URSS 14: 723 (1949) is mentioned for the Park by Hadidi in Fl. Iranica 98, 28: (1972): Inter Dasht, 37°17'N, 56°07'E, et Lovveh, 37°24'N, 55°45'E, 125-130 km W Bojnurd 37°28'N, 57°20'E, 1200 m, 10.8.1967 Rechinger 37622 (M). The specimen is completely similar to the above cited plants under *Z. fabago*. It is characterized by reflexed pedicels and 18-20 x 5-7 mm capsules. These figures correspond with the description given under the species ("Capsula 20 x 5-7 mm ..."). However, *Z. oxianum* and *Z. fabago* are distinguished in the key of Flora Iranica (page 22) as follows:

- 9a. Capsula 15-40 x 30-50 mm, oblong-cylindrica, pedicello recurvo. Planta tota longitudine fructifera 7. *Z. Fabago* L.
 b. Capsula 10-12 x 4-8 mm, ovoidea usque ovoideo-oblonga, pedicello erecto. Planta in parte superiore tantum fructifera
8. *Z. oxianum* Boriss.

The illustrations given for both species in Fl. URSS (14, page 163, Tab. 9, Fig. 5 & 6, 1949) are very similar except the recurved pedicels in *Z. fabago* and the erect pedicel in *Z. oxianum*. Studies of the type specimen and more material is necessary to decide whether the "recurved" versus the "erect" pedicel is a constant character in *Z. fabago* s. l. According to the author's experiences, there are many such mistakes in the account of *Zygo-phylloaceae* in Flora Iranica which needs a critical review. The very recent Persian account of this family by Kh. Akhiani (not Akhani!) in Flora of Iran, vol. 7, 1993, is more a translation than a revision.

3.3.4 ANGIOSPERMS (II. MONOCOTYLEDONES)

Most of the bulbous, tuberous and rhizomatous Monocotyledones (incl. *Amaryllidaceae*, *Araceae*, *Iridaceae*, *Liliaceae* and *Orchidaceae*) are either early spring/late winter flower bearing plants or have a short flowering period. A few of them are autumn flowering plants (like some *Crocus* and *Colchicum*). The flower characters are necessary for a reliable identification. A large part of this research (particularly phytosociological sampling) has been carried out during the main vegetation period, at a time when the majority of the flora is in flower. Plants of these families were therefore either absent in relevés or were found only fragmentarily and could not identified. A further problem that the author was confronted with was the very dry conditions in the study year in which many geophytes have not completed their life cycles. As the plants of the above mentioned families are highly important with regard to conservation practices, further detailed research is highly desirable.

Alismataceae

Alisma lanceolatum With., Arr. Br. Pl. ed. 3, 2: 362 (1796).

Mat.: A-11980	
Hab.: Shallow water at bank of Sulukli Lake	
Dist.: Map 681	Alt.: 1380
Ch.: PL ^{±ES-IT-M}	GF.: HRO/ARH
Th. (GNP): END (1)	Th. (IR): NOT

Amaryllidaceae

Ixiolirion tataricum (Pall.) Herb., App. Bot. Reg. 37 (1821). Syn.: *Amaryllis* ? *tataricum* Pall., Reise 3: 727 (1776).

Mat.: AS-5919	
Hab.: Moist mountain meadows, disturbed places in <i>Artemisia</i> steppe and around the stations	
Dist.: Map 682	Alt.: 1200-1750
Ch.: IT	GF.: GBT
Th. (GNP): IND	Th. (IR): NOT

Sternbergia fischeriana (Herb.) Rupr. in Regel, Gartenflora 17: 100, t. 576 (1868). Syn.: *Oporanthus fischerianus* Herb. Amaryllidaceae 412 (1837).

Mat.: No voucher have been seen	
Hab.: Forest clearings	
Dist.: C, W	Alt.: ? 400-800
Ch.: IT	GF.: GBT
Th. (GNP): IND	Th. (IR): ? END
LN.: Jam-e Zarrin-e Golestan (جام زرین گلستان)	

Although no specimens have been collected or seen by the author, the species certainly occurs in our area according to several authors (photo in Hasanzadeh-Kiabi et al. 1994: p 47, Fig. 13; Wendelbo 1977: 56; Mathew 1983: 10). The two latter authors have mentioned that a form with double flowers has been found in our area which has been taken into cultivation. Mathew (l.c.) mentioned that there is a photograph in the Journal of the Royal Horticultural Society, October 1973.

Sternbergia lutea (L.) Ker Gawl. ex Spreng., Syst. Veg. 2: 57 (1825). Syn.: *Amaryllis lutea* L., Sp. Pl.: 292 (1753). Fig. 26, A-B.

Mat.: A-12183, 12262, 12273	
Hab.: As clumps in open scrubs (i. e. <i>Paliurus spina-christi</i> and <i>Zelkova carpinifolia</i> shrubs) on steep slopes with gravelly and stony ground	
Dist.: Map 683	Alt.: 670-900
Ch.: M-ES ^{EH}	GF.: GBT
Th. (GNP): VUL (5)	Th. (IR): END

Araceae

Arum rupicola Boiss., Diagn. Plant. Orient. 1 (13): 7 (1853). Syn.: *A. conophalloides* Kotschy . var. *virescens* (Stapf) Boyce, The Genus Arum: 135 (1993). Syn.: *A. virescens* Stapf ex Schott, Akad. Wiss. Wien, Math.-Naturwiss. Kl., Denkschr. 50 (1): 6 (1885).

Mat.: A-9271, 9663, 9663, 9772 (Det.: J. Bogner, Munich)	
Hab.: Lowland forest, S-facing rocky outcrops, forest clearing and forest margin, open scrub (<i>Acer monspessulanum</i>) and open woodland with dense patches of grasses	
Dist.: Map 684	Alt.: 550-1600
Ch.: IT ^{W&±C}	GF.: GBT
Th. (GNP): VUL (7)	Th. (IR): NOT

Eminium alberti (Regel) Engl., Pflanzenr. IV, 23 F: 131 (1920). Syn.: *Helicophyllum alberti* Regel., Trudy Glavn. Bot. Sada 8: 683 (1884).

Mat.: A-10438	
Hab.: In mixed <i>Artemisia</i> steppe and shrubs near Dasht in a shallow valley	
Dist.: S	Alt.: 1100
Ch.: IT ^E	GF.: GBT
Th. (GNP): END (1)	Th. (IR): RAR

Cyperaceae

The account of *Cyperaceae* for Flora Iranica (by Kukkonen) is not yet published. I have seen only the specimens of the genus *Carex* for the Flora Iranica account in W. I avoid here to include the unpublished records seen in W, except a few of them which may fill the gaps. The nomenclature and identification of many species followed several published papers by Kukkonen and neighbouring Floras (i.e. Flora of Turkey, vol. 9 and Flora of Iraq vol. 8).

Bolboschoenus maritimus (L.) Palla in W. D. J. Koch, Syn. Deutschl. Fl. ed. 3, 3: 2532 (1905). Syn.: *Scripus maritimus* L., Sp. Pl.: 51 (1753).

Mat.: A-9865, 10751	
Hab.: Moist soils, often around running water	
Dist.: Map 685	Alt.: 1100-1200
Ch.: COS	GF.: HGR/GRH
Th. (GNP): END (2)	Th. (IR): NOT

Carex depauperata Curtis ex With., Arr. Brit. Pl. ed. 2, 2: 1049 (1787).

Mat.: A-9605, 10640	
Hab.: Found once in lowland forest (<i>Carpinus betulus-Zelkova carpinifolia</i>) in Golzar and montane forest (<i>Carpinus betulus</i>) in Shakha	
Dist.: C, SW	Alt.: 850-1550
Ch.: ES [M]	GF.: HGR
Th. (GNP): END (2)	Th. (IR): END

The identification is uncertain. The cited plants differ from European specimens in having a shorter, up to 1 mm long urticule beak. The urticule beak in European plants reaches up to 3 mm long. If the identification is confirmed, the species will be a new record for Iran. Within the Flora Iranica area (Kukkonen 1987), it has only been known from Talish.

Carex digitata L., Sp. Pl.: 975 (1753).

Mat.: R-33125 (Det.: Kukkonen)	
Hab.: Forest margin in Loveh	
Dist.: W (off the Park)	Alt.: 400
Ch.: ES	GF.: HGR
Th. (GNP): END	Th. (IR): SUN

The species has not yet been found within the border of the Park, but as the species occurs in the neighbouring Loveh forest, its occurrence in our area is most likely.

Carex diluta M. Bieb., Fl. Taur.-Caucas. 2: 388 (1808).

Mat.: A-10689	
Hab.: Moist soils and damp places along Derazi stream	
Dist.: S	Alt.: 1200
Ch.: IT	GF.: HGR
Th. (GNP): END (1)	Th. (IR): SUN

Carex divisa Huds., Fl. Angl. 348 (1762).

Mat.: A-10793, 10739, 11030, 10692, 10480	
Hab.: Margin of stream and damp places	
Dist.: Map 686	Alt.: 1200-1750
Ch.: ES-IT-M ^(introduced elsewhere)	GF.: HGR
Th. (GNP): VUL (5)	Th. (IR): SUN

Carex divulsa Stokes in With., Arr. Brit. Pl. ed. 2, 2: 1035 (1787).subsp. *divulsa*

Mat.: A- 9604, 9711, 9799, 11544; AS-6018, 6027; R-52565 (Det.: I. Kukkonen)	
Hab.: Lowland forest and forest clearing (with <i>Pteridium aquilinum</i>)	
Dist.: Map 687, 688*	Alt.: 950-1100
Ch.: ES-M	GF.: HGR
Th. (GNP): NOT (74)*	Th. (IR): NOT

* *sensu lato*

Carex divulsa Stokes subsp. *leersii* (Kneuck.) W. Koch. in Mitt. Bad. Landesvereins Naturk. s. 11: 259 (1923). Syn.: *C. muricata* var. *leersii* Kneuck. in Seubert-Klein, Exkursionsfl. Baden ed. 5: 52 (1891).

Mat.: A-4427, 11898, 11254, 11599, 12013, 10598; F-1014; R-52649	
Hab.: Closed montane forest and forest openings (with <i>Pteridium aquilinum</i> and <i>Calamagrostis epigejos</i>)	

Dist.: Map 687*, 689	Alt.: 750-2000
Ch.: ES	GF.: HGR
Th. (GNP): NOT (74)*	Th. (IR): NOT

* *sensu lato*

Carex flacca Schreb. Spic. App. 178 (1771). subsp. *serrulata* (Biv.) Greuter, Boissiera 13: 167 (1967). Syn.: *C. serrulata* Biv., Stirp. Rar. Sic. Descr. 4: 9. 1818).

Mat.: A-9988, 10381, 11431, 11468, 11562, 10677, 11685; AS-6073	
Hab.: Rocky slopes, forest clearings with <i>Pteridium aquilinum</i> , montane meadows, ruderal places, lowland forest, <i>Crataegus-Prunus divaricata</i> scrub	
Dist.: Map 690	Alt.: 450-2170
Ch.: IT-M	GF.: HGR
Th. (GNP): NOT (23)	Th. (IR): NOT

Carex grioletii Roem. in Schkuhr, Besch. Abbild. Riedgr. Nachtr. 76, t. 209 (1806).

Mat.: A-9280, 11462; WF-12774 (Det.: I. Kukkonen)	
Hab.: Lowland forest, montane scrub	
Dist.: Map 691	Alt.: 600-1900
Ch.: M-ES ^{EH}	GF.: HGR
Th. (GNP): VUL (5)	Th. (IR): SUN

Carex hallerana Asso, Syn. Stirp. Arag. 133 (1779). Syn.: *C. alpestris* All.

Mat.: A-10523, 10671, 11453	
Hab.: Steep rocky outcrops often in <i>Carpinus orientalis</i> scrub, vertical cliffs	
Dist.: Map 692	Alt.: 700-2000
Ch.: M-IT	GF.: HGR
Th. (GNP): RAR (15)	Th. (IR): SUN

Carex melanostachya M. Bieb., Sp. Pl.: 4 (1): 299 (1805). Syn.: *C. ledebourii* Boiss.

Mat.: A-11970, 10367, 11081, 10793-b; AS-6026; Z-831359 (young, uncertain status)	
Hab.: Moist montane meadows, garden and roadside weed, open woodland with dense patches of grasses	
Dist.: Map 693	Alt.: 450-2060
Ch.: ES-IT-M	GF.: HGR
Th. (GNP): NOT (19)	Th. (IR): NOT

Carex otrubae Podp., Spisy Přír. Fak. Masarykovy Univ. 12: 15 (1922).

Mat.: A-11719	
Hab.: Riverside	
Dist.: Map 694	Alt.: 1320
Ch.: ES-IT-M	GF.: HGR
Th. (GNP): END (1)	Th. (IR): SUN

A very rare plant in the Park, found once at a river bank in Degarmanli valley. A specimen from the Park named by I. Kukkonen (Tang-e-Gol, 600-650 m, 19.5.1976, Terme 34798, W) is probably a misidentification of *C. divulsa*.

Carex pachystylis J. Gay, Ann. Sci. Nat. Bot. sér. 2, 10: 301 (1838). Syn.: *C. stenophylla* Wahlenb. var. *planifolia* Boiss; *C. desertorum* Litw.

Mat.: A-10311; R-53010 (Det.: I. Kukkonen)	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes, dry valley with <i>Haloxylon</i> shrubs (usually on sandy-gravelly soils at bottom of shallow to flat valleys in which the rain water flows)	
Dist.: Map 695	Alt.: 1000-1400
Ch.: IT	GF.: HGR
Th. (GNP): RAR (9)	Th. (IR): SUN

Characteristic with its short habit, linear-filiform leaves and terminal-subcapitate inflorescence.

Carex pendula Huds., Fl. Angl. ed. 1: 352 (1762).

Mat.: A-11495, 11664; AS-6005	
Hab.: Stream and riverside in forest	
Dist.: Map 696	Alt.: 500-1500
Ch.: ES-M	GF.: HGR
Th. (GNP): RAR (9)	Th. (IR): SUN

Carex pseudocyperus L., Sp. Pl.: 978 (1753).

Mat.: A-11988	
Hab.: Shallow water in Sulukli Lake with <i>Schoenoplectus lacustris-Lemna minor</i> comm.	
Dist.: Map 697	Alt.: 1380
Ch.: ES/Boreo-Amer.	GF.: HGR
Th. (GNP): END (1)	Th. (IR): END

Known as new record for Iran (Akhani 1999).

Carex remota L., Cent. Pl. 1: 33 (1755).

Mat.: A- 4429, 11530, 11972	
Hab.: Montane forest	
Dist.: Map 698	Alt.: 1350-1500
Ch.: ES-M	GF.: HGR
Th. (GNP): END (3)	Th. (IR): SUN

Carex sylvatica Huds., Fl. Angl. 353 (1762).

Mat.: A-4430, 9273, 10385, 11498, 11523; AS-6018	
Hab.: Lowland and montane forest, river and streamside (in forest)	
Dist.: Map 699	Alt.: 450-2130
Ch.: ES	GF.: HGR
Th. (GNP): NOT (47)	Th. (IR): NOT

Cyperus longus L., Sp. Pl.: 45 (1753).

Mat.: A- 4333, 9864	
Hab.: Margin of stream associated with <i>Phragmites australis</i>	
Dist.: Map 700	Alt.: 1100-1200
Ch.: M-IT	GF.: HGR
Th. (GNP): END (2)	Th. (IR): NOT

Cyperus rotundus L., Sp. Pl.: 45 (1753).

Mat.: A-12113	
Hab.: Weed in Tangerang garden	
Dist.: W	Alt.: 450
Ch.: SCO	GF.: HGR
Th. (GNP): END (1)	Th. (IR): SUN

Eleocharis mitracarpa Steud., Syn. Pl. Glum. 2: 77 (1854).

Mat.: A-11967	
Hab.: Bank of Sulukli Lake	
Dist.: Map 697	Alt.: 1380
Ch.: ES ^{EH}	GF.: HGR
Th. (GNP): END (1)	Th. (IR): SUN

Schoenoplectus lacustris (L.) Palla in Bot. Jahrb. Syst. 10: 299 (1888).

subsp. *tabernaemontani* (C. C. Gmel.) Á. & D. Löve, Folia Geobot. Phytotax. 10: 275 (1975). Syn.: *Scripus tabernaemontani* C. C. Gmel., Fl. Bad. 1: 101 (1805).

Mat.: A-4486, 11987, 10738	
Hab.: Shallow water in Sulukli Lake and along stream and rivers with <i>Phragmites</i>	
Dist.: Map 701	Alt.: 1200-1380
Ch.: PL ^{ES-IT-M-Temperate Asia}	GF.: HGR
Th. (GNP): VUL (5)	Th. (IR): NOT

Schoenoplectus mucronatus (L.) Palla, Bot. Jahrb. Syst. 10: 299 (1888). Syn.: *Scirpus mucronatus* L., Sp. Pl.: 50 (1753).

Mat.: A-11973	
Hab.: Moist meadows, margin of Sulukli Lake	
Dist.: Map 697	Alt.: 1380
Ch.: PL ^(Temperate Eurasia, N Africa)	GF.: HGR
Th. (GNP): END (1)	Th. (IR): SUN

Dioscoreaceae

Tamus communis L., Sp. Pl.: 1028 (1753).

Mat.: A-9611, 9989; W&al-11034; Z-85/197	
Hab.: Lowland and montane forest, rocky outcrops in closed forest	
Dist.: Map 702	Alt.: 550-1950
Ch.: ES-M	GF.: GSC
Th. (GNP): NOT (42)	Th. (IR): NOT

Iridaceae

Crocus almehensis C. D. Brickell & B. Mathew, J. Roy. Hort. Soc. 98, 8: 360 (1973).

Mat.: AS-6107; Ala 2 (Golestan, n.v.); K-5714; Polunin 11864 (n.v.)	
Hab.: Mountain steppes by melting snow	
Dist.: Map 703	Alt.: 1600-2000
Ch.: IT ^{KK}	GF.: GBT
Th. (GNP): VUL (4)	Th. (IR): END
LN.: Za'faran-e Almeh زعفران آلمه	

The species is endemic within the Golestan National Park.

Crocus biflorus Mill., Gard. Dict. ed. 8, sp. 4 (1768). Syn.: *C. adami* J. Gay.

Mat.: Fu-5114 (fide Wendelbo & Mathew in Flora Iranica 112: 6, 1975)	
Hab.: Open scrub	
Dist.: W or C	Alt.: 800
Ch.: M ^E -ES ^{EH}	GF.: GBT
Th. (GNP): END (1)	Th. (IR): RAR

Crocus michelsonii B. Fedtsch., Fl. Turkmen. 1 (2): 328 (1932) descr. ross.; Fl. URSS 4: 749 (1935), descr. lat.

Mat.: W&al-11082 (n. v., fide Wendelbo & Mathew in Fl. Iranica 112: 75, 1975). The specimen was not found in W	
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Hab.: Probably <i>Artemisia</i> steppe in eastern border of the Park towards Almeh	
Dist.: E	Alt.: 1250
Ch.: IT ^{KK}	GF.: GBT
Th. (GNP): END (1)	Th. (IR): END

Crocus speciosus M. Bieb., Besch. Länd. Terek Kur Kasp.: 129 (1800); Fl. Taur.-Caucas. 1: 27 (1808).

Mat.: A-12178, 12309	
Hab.: Scrub and moist montane meadow with <i>Elymus repens</i> and <i>Euphorbia virgata</i>	
Dist.: Map 704	Alt.: 670-1720
Ch.: ES ^{EH}	GF.: GBT
Th. (GNP): END (3)	Th. (IR): VUL

Gladiolus italicus Mill., Gard. Dict., ed. 8, n° 2 (1768). Syn. *G. segetum* Ker Gawl., *G. turkmenorum* Czerniak.

Mat.: A-11438; AS-6139; F-1107	
Hab.: Scrub and rocky outcrops	
Dist.: Map 705	Alt.: 560-1000
Ch.: IT-M	GF.: GBT
Th. (GNP): VUL (5)	Th. (IR): NOT

Iris acutiloba C. A. Mey., Verz. Pfl. Cauc. 32 (1831).

subsp. **lineolata** (Trautv.) B. Mathew & Wendelbo, Fl. Iranica 112: 32 (1975).

Syn.: *I. acutiloba* var. *lineolata* Trautv., Trudy Glavn. Bot. Sada. 1: 24 (1870). Fig. 26, C.

Mat.: A-10426, 10473, 10467, 10332; AS-5963	
Hab.: On gravelly soils in <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes, <i>Juniperus</i> woodland, <i>Paliurus spina christi</i> - <i>Acer monspessulanum</i> scrub, dry valley with scattered <i>Juniperus excelsa</i> and <i>Haloxylon ammodendron</i> scrubs	
Dist.: Map 706	Alt.: 1000-1450
Ch.: IT ^C	GF.: GRH
Th. (GNP): RAR (15)	Th. (IR): NOT

Iris fosterana Aitch. & Baker, Trans. Linn. Soc. London, Bot. 3: 114 (1888). Syn.: *Juno fosterana* (Aitch. & Baker) Rodian.

Mat.: A-10252; I-8017 (n.v.)	
Hab.: <i>Artemisia-Stipa</i> and <i>Artemisia-Festuca</i> and <i>Stipa</i> steppes, <i>Juniperus excelsa</i> woodland, mountain steppes with grasses and thorn-cushions	
Dist.: Map 707	Alt.: 750-1900
Ch.: IT ^{KK}	GF.: GTU
Th. (GNP): RAR (13)	Th. (IR): RAR

Iris kopetdaghensis (Vved.) B. Mathew & Wendelbo in Fl. Iranica 112: 61 (1975). Syn.: *Juno kopetdaghensis* Vved., Consp. Fl. Asiae Mediae 2: 322 (1971). Fig. 26, D.

Mat.: A. 6185, 10333; K-5734 (n.v.)	
Hab.: <i>Paliurus spina-christi</i> scrub, scrub valley with various shrubs (Almeh)	
Dist.: Map 708	Alt.: 1000-1600
Ch.: IT ^{KK}	GF.: GTU
Th. (GNP): VUL (4)	Th. (IR): IND

Iris reticulata M. Bieb., Fl. Taur.-Caucas. 1: 34 (1808). Syn.: *I. hyrcana* Woron. ex Grossh., Fl. Kawk. 1: 250 (1928); *Iridodictyum reticulatum* (M. Bieb.) Rodion.

Mat.: AS-6089, Jaffari in Akhani 12241; (not seen material reported in Fl. Iranica: I-8019, Ala, K-5712)	
Hab.: By melting snow in rocky outcrops and mountain steppes	
Dist.: Map 709	Alt.: 600-2000
Ch.: IT ^C	GF.: GBT
Th. (GNP): VUL (5)	Th. (IR): NOT

Iris songarica Schrenk in Fisch. & Mey., Enum. Pl. Nov. 1: 3 (1841).

Mat.: A-11245	
Hab.: Along the road in northeastern border of the Park (margin of <i>Artemisia</i> steppe), ca. 7 km NW Soolegerd	
Dist.: NE	Alt.: 1120
Ch.: IT ^{C&E}	GF.: GRH
Th. (GNP): END (1)	Th. (IR): NOT

Iris spuria L., Sp. Pl.: 39 (1753).
subsp. *musulmanica* (Fomin) Takht., Fl. Erevana 330 (1972). Syn.: *I. musulmanica* Fomin, Vestn. Tbilissk. Bot. Sada 14: 46 (1909).

Mat.: A-10800, 11799; F-1141	
Hab.: Margin of mountain springs (closed forest, scrub and steppe)	
Dist.: Map 710	Alt.: 1600-1900
Ch.: IT ^{C&W}	GF.: GRH
Th. (GNP): END (3)	Th. (IR): NOT

A-10800 lacks flower and fruit and A-11799 is in fruiting state. Their subspecific position is therefore uncertain. But their habit correspond to subsp. *musulmanica*.

A specimen (Akhani 11592) which probably belongs to *Iris* was collected around Cheshmeh Qolam (spring) in an altitude of 1750 m, under the shade of *Tilia platyphyllos* subsp. *caucasica* and *Acer velutinum*. It lacks flower and fruit. The leaves are 50-70 cm long and 15-21 mm broad, with a very soft texture and a distinct midrib. *Iris spuria* subsp. *musulmanica* has been collected from the same locality (F-1141). But the leaf texture and rhizomes of the cited plant are markedly dissimilar to that species and any other rhizomatous *Iris*.

Juncaceae

Juncus articulatus L., Sp. Pl.: 327 (1753).

Mat.: A-11737, 11873	
Hab.: Margin of mountain streams	
Dist.: Map 711	Alt.: 1500-1700
Ch.: SCO	GF.: HGR
Th. (GNP): END (2)	Th. (IR): NOT

Juncus effusus L., Sp. Pl.: 326 (1753).

Mat.: A-11976	
Hab.: Moist soils bank of Sulukli Lake	
Dist.: Map 712	Alt.: 1380
Ch.: PL (SCO)	GF.: HGR
Th. (GNP): END (1)	Th. (IR): NOT

Above cited material is characterized by the compact inflorescence and by the unusually thick stem, to 5 mm diameter (in pressed form).

Juncus fontanesii J. Gay, apud Laharpe in Mém. Soc. Hist. Nat. Paris 3: 130 (1827).

Mat.: A-11974	
Hab.: Moist soils at bank of Sulukli Lake	
Dist.: Map 712	Alt.: 1380
Ch.: M	GF.: HGR
Th. (GNP): END (1)	Th. (IR): RAR

Above cited material is characterized by the distinct rooting and creeping long stem. It probably belongs to subsp. *fontanesii* (not yet reported for Iran). Additional material is required for a reliable identification.

Juncus gerardi Loisel., J. Bot. 2: 284 (1809).
subsp. **persicus** (Boiss.) Snogerup, Fl. Iranica 75:
14 (1971). Syn.: *J. persicus* Boiss., Diagn. Pl.
Orient. Nov. sér. 1, 7: 101 (1846).

Mat.: A-9871, 10937	
Hab.: Margin of fresh water stream and on moist and moderately saline soils around brooklets together with <i>Artemisia cf. fragrans</i>	
Dist.: Map 713	Alt.: 1080-1200
Ch.: IT ^c	GF.: HGR
Th. (GNP): END (2)	Th. (IR): NOT

A-9871 is young with uncertain subspecific status.

Juncus inflexus L., Sp. Pl.: 326 (1753). Syn.: *J. glaucus* Ehrh.; *J. tenax* Banks & Sol.; *J. warakensis* Nab.; *J. brachytepalus* Trautv. ex V. I. Krecz. & Gontsch.

Mat.: A-4378, 4417, 9495, 9872, 11653, 11666, 12079, 12152	
Hab.: Margin of mountain springs and streams in forest and steppe	
Dist.: Map 714	Alt.: 1100-1800
Ch.: PL (mostly ES-IT-M-S Africa, introduced elsewhere)	GF.: HGR
Th. (GNP): RAR (10)	Th. (IR): NOT

Juncus maritimus Lam., Encycl. 3: 264 (1789).

Mat.: A-12151	
Hab.: On moist saline soils around a saline spring in Mirza-Baylu plain	
Dist.: Map 715	Alt.: 1280
Ch.: ES-M-IT	GF.: HGR/GRH
Th. (GNP): END (1)	Th. (IR): RAR

Golestan National Park is the easternmost known range of *J. maritimus* in Iran (cf. Snogerup in Fl. Iranica 75: 55, 1993 and Taheri in Flora of Iran 10: 19: 1993). I have also collected the species from the central parts of Iran: Arak, Kavire-Meyghan, 1650 m, Akhani 967.

Juncus rigidus Desf., Fl. Atlant. 1: 312 (1798).

Mat.: A-10876	
Hab.: Moist soils around a saline spring in Mirza-Baylu plain	
Dist.: Map 716	Alt.: 1250-1280
Ch.: PL ^{IT-M-SS-SM} (Somalia-Masai)	GF.: HGR/GRH
Th. (GNP): END (1)	Th. (IR): NOT

Luzula forsteri (Sm.) DC. in Lam. & DC., Syn. Pl. Fl. Gall. 150 (1806). Syn.: *Juncus forsteri* Sm., Fl. Br. 3: 1395 (1804).

Mat.: A-11591	
Hab.: Closed montane forest	
Dist.: Map 717	Alt.: (? 500-) 1550-1650
Ch.: ES-M	GF.: HGR
Th. (GNP): END (3)	Th. (IR): NOT

Lemnaceae

Lemna gibba L., Sp. Pl.: 970 (1753).

Mat.: A-11250 (Det.: E. Landolt)	
Hab.: Water in a karstic pool	
Dist.: Map 718	Alt.: 1750
Ch.: COS	GF.: APL
Th. (GNP): END (1)	Th. (IR): RAR

Lemna minor L., Sp. Pl.: 970 (1753). Fig. 24, A.

Mat.: A-11984-a (Det.: E. Landolt, Zürich)	
Hab.: Water in a karstic pool and Sulukli Lake	
Dist.: Map 719	Alt.: 1380-1750
Ch.: COS	GF.: APL
Th. (GNP): END (2)	Th. (IR): RAR

Lemna trisulca L., Sp. Pl.: 970 (1753).

Mat.: A-11984-b	
Hab.: Sulukli Lake, shallow water with <i>L. minor</i> and <i>Schoenoplectus lacustris</i>	
Dist.: Map 720	Alt.: 1380
Ch.: COS ^(except S America)	GF.: APL
Th. (GNP): END (1)	Th. (IR): RAR

Spirodela polyrhiza (L.) Schleid. in Linnaea 13: 392 (1839). *Lemna polyrhiza* L., Sp. Pl.: 970 (1753).

Mat.: A-11984-c	
Hab.: Sulukli Lake, in shallow water in <i>Lemna minor</i> - <i>Schoenoplectus lacustris</i> community	
Dist.: Map 720	Alt.: 1380
Ch.: SCO	GF.: APL
Th. (GNP): END (1)	Th. (IR): VUL

Liliaceae (incl. Alliaceae)

Allium affine Ledeb., Fl. Ross. 4: 166 (1852).

Mat.: A-11932, 11900	
Hab.: Transitional montane woodland (between forest and steppe)	
Dist.: Map 721	Alt.: 1470-2100
Ch.: IT ^{W&C}	GF.: GBT
Th. (GNP): END (1)	Th. (IR): RAR

The occurrence of this species in the Park extends its distribution to the easternmost extension of the Alborz Range. The closest known localities are in Chalus and Gilan (see Wendelbo in Fl. Iranica 76: 52, 1971).

Allium atrovioleaceum Boiss., Diagn. Pl. Orient. Nov. sér. 2, 7: 112 (1846).

Mat.: A-4460 (Det.: Khassanov)	
Hab.: Scrub valley (<i>Acer monspessulanum</i>) in Yakhtikalan Pass	
Dist.: NE	Alt.: 1400-1500
Ch.: IT ^{W&C} [ES ^{± pontic}]	GF.: GBT
Th. (GNP): END (1)	Th. (IR): NOT

Allium chelotum Wendelbo, Acta Horti Gothob. 28: 42 (1966).

Mat.: A-10795, 11305, 11769; AS-6004 (det.: Khassanov); specimens cited by Fritsch (1996: 15): I-4834; WF-10957	
Hab.: <i>Acer monspessulanum</i> and <i>Paliurus spinachristi</i> scrubs, mountain meadows, mountain steppes with scattered shrubs; <i>Quercus macranthera</i> forest, transition woodland on rocky slopes (mixed of <i>Carpinus orientalis</i> , <i>Quercus macranthera</i> & <i>Juniperus excelsa</i>)	
Dist.: Map 722	Alt.: 1000-2380
Ch.: ES ^{HY} or IT ^{Alborz}	GF.: GBT
Th. (GNP): RAR (12)	Th. (IR): VUL

Fritsch (1996: 15) mentioned that *A. chelotum* and *A. grande* were merged by Wendelbo on the determination label in W. The presence of bulbils in the umbells, as cited by Wendelbo (Fl. Iranica 76: 5 & 87-88, 1971) dose not find in above studied plants.

Allium convallarioides Grossh. in Grossh. & Schischk., Pl. Or. Exs. No. 107 (1924).

Mat.: A-11368	
Hab.: <i>Acer monspessulanum</i> scrub valley in Yakhtikalan Pass	
Dist.: NE	Alt.: 1550
Ch.: IT ^C	GF.: BGT
Th. (GNP): END (1)	Th. (IR): END

The finding of *A. convallarioides* in the Park provides a geographical link between the area of this species in Turkmenistan and West and Central Iran (Wendelbo in Fl. Iranica 76: 62, 1971). Kollman (Fl. Turkey 8: 160, 1984) placed *A. convallarioides* under synonymy of *A. myrianthum* Boiss., with a question mark. This species and other members of the Sect. *Codonoprasum* Rchb. need a critical review in Iran.

Allium cristophii Trautv., Trudy Glavn. Bot. Sada 9: 268 (1884). Syn.: *A. albopilosum* C. H. Wright.

Mat.: A-11003, 11023, 10502, 10810, 11110, 11620, 10965, 11153; AS-6147, AS-6034; Fu-7275 (n.v.); Merton 3965 (n.v.); Wa-219 (n.v.)	
Hab.: Mountain steppes with grasses and thorn-cushions; mountain meadows, rocky outcrops with open montane woodland; <i>Artemisia-Stipa</i> steppe; <i>Juniperus</i> woodland; transitional woodland with dense patches of grasses	
Dist.: Map 723	Alt.: 900-1920
Ch.: IT ^{KK} (occurs distjunctly in Central Anatolia)	GF.: GBT
Th. (GNP): RAR (14)	Th. (IR): NOT

Allium dictyoscordum Vved., Bot. Mater. Gerb. Glavn. Bot. Sada RSFRS 5: 90 (1924).

Mat.: WF-12833 (TARI) (Det.: P. Wendelbo)	
Hab.: <i>Artemisia</i> steppe in NE of the Park in road to Behkadeh	
Dist.: NE	Alt.: 1250-1300
Ch.: IT ^{KK}	GF.: GBT
Th. (GNP): END (1)	Th. (IR): END

The above cited material was recently reported for Iran by Matin (1991: 8). The material may have been collected from a locality outside the present boundaries of the Park.

Allium helicophyllum Vved., Bjull. Sredne-Aziatsk. Gosud. Univ. 19: 127 (1934). Fig. 26, E.

Mat.: A-10941; R-52913 (Det.: P. Wendelbo)	
Hab.: On salty clay soils, in <i>Artemisia-Anabasis aphylla</i> steppe	
Dist.: Map 724	Alt.: 1200
Ch.: IT ^{KK}	GF.: GBT
Th. (GNP): END (2)	Th. (IR): VUL

Allium lenkoranicum Misch. in Grossh., Fl. Kawk. 1: 214 (1928).

Mat.: A-11859, 12338; Fu-8988	
Hab.: On rocks in closed forest, forest meadow (<i>Elymus-Carex</i>), closed submontane forest	
Dist.: Map 725	Alt.: 1000-1140
Ch.: ES ^{HY}	GF.: GBT
Th. (GNP): VUL (7)	Th. (IR): RAR

Allium paradoxum (M. Bieb.) G. Don, Monograph Allium: 72 (1827). Syn.: *Scilla paradoxa* M. Bieb., Fl. Taur.-Caucas. 3: 267 (1819).

Mat.: A-10602; AS-6019; R-33149	
Hab.: Forest and scrub	
Dist.: Map 726	Alt.: ? 450-1800
Ch.: ES ^{EH}	GF.: GBT
Th. (GNP): IND	Th. (IR): NOT
LN: Tarre Soqan (تره سوغان)	

The treated map is very incomplete, because the species is a vernal one and can only be traced in early spring. The leaves are used by the local people as a wild vegetable.

Allium rubellum M. Bieb., Fl. Taur.-Caucas. 1: 264 (1808). Syn.: *A. albanum* Grossh.

Mat.: A-10573, 10809, 10618, 10513, 10881; AS-6060 (Det.: Khassanov); 5970; F-1108-b, 1139; Fu-7270 (n.v.); I-7074	
Hab.: The most frequent <i>Allium</i> in our area in different habitats: several types of open scrubs, steep and gentle rocky outcrops, <i>Juniperus</i> woodland, mountain meadows, mountain steppes with grasses and thorn-cushions or scattered shrubs; <i>Stipa</i> , <i>Artemisia-Stipa</i> and <i>Artemisia</i> steppes; <i>Quercus macranthera</i> forest	
Dist.: Map 727	Alt.: 800-2380
Ch.: IT ^{Cauc.-Turk.}	GF.: GBT
Th. (GNP): NOT (65)	Th. (IR): NOT

A-10881 is characterized by the white flowers. Further studies are required to name it with certainty. See also notes under *A. umblicatum*.

Allium sarawschanicum Regel, Trudy Glavn. Bot. Sada 3, 2: 244 (1875).

Mat.: F-1135 (det: Wendelbo); material cited by Fritsch (1996: 13): R-53053 (doubtful); T-10.6.1975	
Hab.: Mountain steppes in Almeh	
Dist.: C	Alt.: 1600-?
Ch.: IT ^{E&KK}	GF.: GBT
Th. (GNP): END (3)	Th. (IR): VUL

Closely related and superficially similar to *A. chelotum*: *A. sarawschanicum* differs from *A. chelotum* by the distinctly corniculate capsule and non-notched petals at the tip. Wendelbo cited only one specimen in Flora Iranica 76: 87, 1971) from NE Iran, but Fritsch (1996: 13) cited more (10) specimens also from NE Iran, some with doubtful status.

Allium scabriscapum Boiss. & Kotschy in Boiss., Diagn. Pl. Orient. Nov. sér. 1, 13: 31. (1854).

Mat.: A-10762; F-1108-a (det.: Wendelbo, Rev.: Khassanov)	
Hab.: <i>Juniperus excelsa</i> woodland, <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes, mountain steppe with grasses and thorn-cushions	
Dist.: Map 728	Alt.: 1000-1950
Ch.: IT ^{W&C}	GF.: GBT
Th. (GNP): RAR (9)	Th. (IR): NOT

Allium stamineum Boiss., Diagn. Pl. Orient. Nov. sér. 2, 4: 119 (1859).

Mat.: A-12073	
Hab.: Transition woodland mixed of <i>Carpinus orientalis</i> , <i>Quercus macranthera</i> and <i>Juniperus excelsa</i> woodland on rocky slopes E of Gerieh Sar	
Dist.: C	Alt.: 1880
Ch.: M ^E - IT ^{W&C}	GF.: GBT
Th. (GNP): END (1)	Th. (IR): NOT

Almost all recorded localities of this species in Flora Iranica, 76: 63-64, 1971, are located in W, C and S-Centre of Iran, except one syntype from an unknown locality in Gilan.

Allium aff. stamineum

Mat.: A-9699, 11565	
Hab.: Open woodland along Madrasu basin	
Dist.: W, C	Alt.: 450-1800 ?
Ch.: cf. ES ^{HY}	GF.: GBT
Th. (GNP): VUL (4)	Th. (IR): ?

A-9699 was named by Dr Khassanov as *A. stamineum*. The cited specimens differ clearly from *A. stamineum* by a number of characters: 50-70 cm height, 10-30 cm long valves of spathe, and pale yellow flowers. According to Wendelbo, Fl Iranica 76: 63, 1971, and my own observations of many plants from the Mediterranean area and SW Asia, *A. stamineum* is characterized by the spathes which are

ca. 3 times as long as umbell-rays and the colour of flowers are pale lilac. Ecologically these are also separated: The above cited plants were found in mesic parts of the Park, but *A. stamineum* from drier zone of the Park. It seems that the concerned material belongs to a related species to *A. flavum* L. (perhaps *A. pseudoflavum* Vved. from Talish). No authentic material of this latter species is available for comparison.

Allium subvineale Wendelbo, Fl. Iranica 76: 53 (1971)

Type: Gilan prov., Yehlah, Ispili, August 1936, Lindsay 1162 (holotype BM).

Mat.: A-11311	
Hab.: Mountain meadow around Morq-Zar spring	
Dist.: Map 729	Alt.: 1900
Ch.: IT ^C	GF.: GBT
Th. (GNP): END (1)	Th. (IR): END

An interesting species characterized by a bulbiferous inflorescence. The type specimen shortly studied by me in BM (see above) has fewer bulbils than the material from Golestan. Kollmann (Fl. Turkey 8: 185, 1984) considered it conspecific with *A. vineale* L. But Mathew (1996: 142) prefers to keep them as separate species, before further field studies are available.

Allium umbilicatum Boiss., Diagn. Pl. Orient. Nov. sér. 2, 4: 113 (1859). Syn.: *A. scabrellum* Boiss. & Buhse; *A. aitchisonii* Regel.

Mat.: A-11121	
Hab.: Margin of <i>Quercus castaneifolia</i> forest in Gorg-Meydan (Koilar)	
Dist.: N	Alt.: 1550
Ch.: IT ^C	GF.: GBT
Th. (GNP): END (1)	Th. (IR): NOT

This may be distinguished from *A. rubellum* by the taller scape (65-80 cm) and by paler (whitish lilac) and longer tepals (6-8 mm long). The above cited plant lacks bulbils. It should be investigated whether these differences fall within the variation range of *A. rubellum* (see also notes by Wendelbo in Fl. Iranica 76: 34-36, 1971).

Allium vavillovii Popov & Vved., Bjull. Sredne-Aziatsk. Gosud. Univ. 19: 122 (1934). Fig. 26, F.

Mat.: A-11854	
Hab.: Vertical cliffs with <i>Gypsophila aretioides</i>	
Dist.: Map 730	Alt.: 1000-1100
Ch.: IT ^{KK}	GF.: GBT
Th. (GNP): END (2)	Th. (IR): END

A new record for Iran. See Akhiani (1999) for details on the taxonomy and ecology of the species.

Allium xiphopetalum Aitch. & Baker, Trans. Linn. Soc. London, Bot. ser 2, 3: 118 (1888).

Mat.: A-10570, 10499	
Hab.: <i>Artemisia-Stipa</i> steppe	
Dist.: Map 731	Alt.: 1000-1200
Ch.: IT ^{C&E}	GF.: GBT
Th. (GNP): END (2)	Th. (IR): NOT

Asparagus griffithii Baker, J. Linn. Soc., Bot. 14: 604 (1875).

Mat.: A-12136	
Hab.: Margin of a saline spring associated with <i>Phragmites australis</i> , <i>Samolus valerendi</i> , <i>Apium graveolens</i> and <i>Juncus inflexus</i>	
Dist.: Map 715	Alt.: 1280
Ch.: IT ^C	GF.: CHE
Th. (GNP): END (1)	Th. (IR): END

A. griffithii is a halophytic species, known only from two localities from C Iran (Browicz in Fl. Iranica 165: 174, 1990): Esfahan: In stepposis salsis prope Edjijeh, Stapf 1985 (n.v.) and Fars: Ad ripam lacus Neyriz, ca. 1400 m, VIII.1949, F. Starmuelner 22 (M).

Asparagus verticillatus L., Sp. Pl.: ed. 2: 313 (1762).

Mat.: A-4935, 9477, 9589, 11120, 11648; W&C-14323	
Hab.: Open rocky outcrops, shrubby steep slopes, thickets of <i>Crataegus</i> , <i>Acer monspessulanum</i> and <i>Paliurus spina-christi</i> ; open lowland <i>Quercus castaneifolia</i> and montane <i>Q. macranthera</i> forests, scrub valleys and gorge with brooks, rarely <i>Juniperus excelsa</i> woodland	
Dist.: Map 732	Alt.: 700-2070
Ch.: ? ES ^{EH}	GF.: ± CSS
Th. (GNP): NOT (45)	Th. (IR): NOT

Colchicum kurdicum (Bornm.) Stef., Monogr. Colchicum: 42: (1926). Syn.: *Merendera kurdica* Bornm., Bull. Herb. Boissier, sér.1, 7: 79 (1899).

Mat.: A-10291	
Hab.: Transitional open woodland with dense patches of grasses in Koilar	
Dist.: N	Alt.: 1450
Ch.: IT ^{Alborz} /ES ^{HY}	GF.: GBT
Th. (GNP): END (1)	Th. (IR): VUL

The finding of *C. kurdicum* in our area extends the known range of the species to the easternmost parts of the South Caspian forest belt.

Colchicum robustum (Bunge) Stef., Monogr. Colchicum: 24 (1926). Syn.: *Merendera robusta* Bunge, Beitr. Fl. Russl. in Mém. Sav. Etrang. Acad. Pétersbg. 7: 339 (1852); *Merendera persica* Boiss.; *Merendera jolante* Czerniak.

Mat.: Fu-5144	
Hab.: Unknown	
Dist.: ? W	Alt.: 900 m
Ch.: IT ^{C & E}	GF.: GBT
Th. (GNP): IND	Th. (IR): NOT

C. robustum was known from several localities near and around the Park by Persson (Fl. Iranica 170: 8, 1992): It is not certain whether Furse's collection from 72 km ENE Gonbad-e Kavus may be from a place within the boundaries of the National Park. This species is included here for further attention.

Colchicum speciosum Steven, Nouv. Mém. Soc. Imp. Naturalistes Moscou, 1: 265 (1829). Syn.: *C. bornmuelleri* Freyn; *C. hyrcanicum* Woronov ex Stef. Fig. 26, G.

Mat.: A-12008, 12035, 12052, 12075, 11196	
Hab.: Montane forest, margin of open woodland, forest margin in association with <i>Pteridium aquilinum</i>	
Dist.: Map 733	Alt.: 1400-2000
Ch.: ES ^{EH}	GF.: GBT
Th. (GNP): VUL (6)	Th. (IR): NOT

Colchicum szovitsii Fisch. & C. A. Mey., Index Sem. Hort. Petrop. 1: 24 (1835). see Persson, Fl. Iranica 170: 24-25, 1992 for synonyms.

Mat.: R-33133	
Hab.: One locality probably in steppe zone within or around the Park	
Dist.: S	Alt.: 1200

Ch.: IT ^{W & C}	GF.: GBT
Th. (GNP): END (1)	Th. (IR): NOT

Colchicum trigynum (Steven ex Adam) Stearn, J. Bot. 72: 344 (1934). Syn.: *Bulbocodium trigynum* Steven ex Adam in Weber & Mohr, Beitr. Naturk. 1: 49 (1805); *Merendera trigyna* (Steven ex Adam) Stapf, *Colchicum caucasicum* (M. Bieb.) Spreng.

Mat.: Ala 19 (fide Fl. Iranica 170, 17, 1992)	
Hab.: A locality near Alme (no more detail)	
Dist.: C	Alt.: ?
Ch.: IT ^{Cauc.-Alborz}	GF.: GBT
Th. (GNP): END (1)	Th. (IR): ? NOT

Danaë racemosa (L.) Moench, Meth. 179 (1794). Syn.: *Ruscus racemosus* L., Sp. Pl.: 1041 (1753). Fig. 27, C-D.

Mat.: A-9756, 9668, 9293; R-52542; W&C-14301	
Hab.: Closed forests (lowland and submontane) with rocky outcrops, closed vertical and steep cliffs, gorges and valley by spring and stream	
Dist.: Map 734	Alt.: 540-1580
Ch.: ES ^{EH}	GF.: PSB
Th. (GNP): NOT (32)	Th. (IR): NOT

Eremurus

During my excursion in July 1988, I have seen *Eremurus* plants abundantly in sloping grounds in Alme and many other steppic places in E, C, and NE parts of the Park. But due to unsuitably dry conditions in the years before my detailed field studies (1994 and 1995) many of these plants did not grow or did not complete their growth. In many relevés; I have seen only the rosette leaves which are not sufficient for identification. Therefore the maps are very incomplete.

Eremurus inderiensis (Steven) Boiss., Fl. Orient. 5: 323 (1882). Syn.: *Asphodelus inderiensis* Steven, Bull. Soc. Nat. Mosc. 4: 257 (1832); *E. velutinus* Boiss. & Buhse; *E. pauciflorus* Baker.

Mat.: A-6180; R-52941	
Hab.: Sloping ground in Alme valley with scattered <i>Juniperus</i> and <i>Acer monspessulanum</i> shrubs, mountain steppe with grasses and thorn-cushions; probably <i>Artemisia</i> steppe in E parts of the Park (Rechinger's collection)	
Dist.: Map 735	Alt.: 1200
Ch.: IT ^{C & E}	GF.: GRH/HRO ^{SU}
Th. (GNP): IND	Th. (IR): NOT

Eremurus kopetdaghensis Popov ex B. Fedtsch., Fl. Turkmén. 1: 257 (1932), descr. ross. Syn.: *E. giselae* Bornm.

Mat.: A-6179; F-1137, 1136; R-52948; W&al-10983	
Hab.: Sloping steppe with shrub	
Dist.: Map 736	Alt.: 1200-1700
Ch.: IT ^C	GF.: GRH/HRO ^{SU}
Th. (GNP): RAR (9)	Th. (IR): NOT

Eremurus olgae Regel, Trudy Glavn. Bot. Sada 2: 430 (1873). Syn.: *E. angustifolius* Baker, p. p.; *E. aschersonii* Kuntze. Fig. 26, H.

Mat.: A-4311, 4498, 9441, 11733, 11361; R-52795	
Hab.: Mountain steppe with grasses and thorn-cushions, bottom of dry scrub valleys, <i>Paliurus spina-christi</i> scrub	
Dist.: Map 737	Alt.: 1000-1750
Ch.: IT ^{KK&E}	GF.: GRH/HRO ^{SU}
Th. (GNP): VUL (6)	Th. (IR): NOT

Eremurus spectabilis M. Bieb., Fl. Taur.-Caucas. 3: 269 (1819).

subsp. *subalbiflorus* (Vved.) Wendelbo, Fl. Iranica 151: 15 (1982). Syn.: *E. subalbiflorus* Vved., Consp. Fl. As. Med. 2: 311 (1971).

Mat.: A-10803; F-1140; TM-34883	
Hab.: Mountain steppe with grasses and thorn-cushions	
Dist.: Map 738	Alt.: 1600-1800
Ch.: IT ^{KK}	GF.: GRH/HRO ^{SU}
Th. (GNP): RAR (9)	Th. (IR): RAR

Fritillaria gibbosa Boiss., Diagn. Pl. Orient. Nov. sér. 1, 7: 107 (1846). Syn.: *F. pterocarpa* Stocks; *F. karelini* (Fisch.) Regel & Baker; *F. gibbosa* (Fisch.) Bornm.

Mat.: W&al-11074 (Fl. Iranica 165: 66, 1990)	
Hab.: <i>Artemisia</i> steppe in NW of the Park, road to Behkadeh	
Dist.: NE	Alt.: 1250
Ch.: IT ^C	GF.: GBT
Th. (GNP): END (1)	Th. (IR): NOT

The above cited specimen was not found in W.

Fritillaria kotschyana Herb. in Lindl., Bot. Reg. 30: misc. 43 (1844). Fig. 27, A.

Only subsp. *kotschyana* is known in Iran.

Mat.: A-10302, 11232; AS-6136	
Hab.: Closed montane forest or open woodland and forest margin	
Dist.: Map 739	Alt.: 1000-1700
Ch.: ES ^{HY}	GF.: GBT
Th. (GNP): END (3)	Th. (IR): IND

Fritillaria raddeana Regel, Trudy Glavn. Bot. Sada 10: 365 (1887). Syn.: *F. askabadensis* Micheli.

Mat.: A-6196, 10216; (not seen material cited in Fl. Iranica 165: 64-65, 1990: D-38639;; I-7078; R-33145, 52816; Rz-s.n; Sabeti 5649; W&al-11006)	
Hab.: In scrubs and scrub valleys (<i>Acer monspessulaum</i> , <i>Paliurus spina-christi</i> , <i>Juniperus excelsa</i> and transitional woodland with <i>Juniperus excelsa</i> , <i>Carpinus orientalis</i> and <i>Quercus macranthera</i>)	
Dist.: Map 740	Alt.: 1000-1900
Ch.: IT ^{KK}	GF.: GBT
Th. (GNP): RAR (12)	Th. (IR): END

Gagea chomutowae Pascher, Bull. Soc. Imp. Nat. Mosc. 19: 372 (1907).

Mat.: A-10213; D-38637 (n.v.); W&al-10978 (n.v.)	
Hab.: Mountain steppes in Almeh area	
Dist.: C	Alt.: ? 1400-1700
Ch.: IT ^{C&E}	GF.: GBT
Th. (GNP): ? VUL (4)	Th. (IR): NOT

Characterized by the fistulose basal leaves, alternate cauline leaves and rounded tepals.

Gagea confusa A. Terracc., Bull. Soc. Mutuo Socc. Palermo II, 3: 33 (1904). Syn.: *G. minimoides* Pascher; *G. platyphyllos* Pascher.

Mat.: ER-16199 (det: Rechinger)	
Hab.: Probably in W of the Park (no detail is available)	
Dist.: W	Alt.: 700
Ch.: IT ^{W&C}	GF.: GBT
Th. (GNP): SUN	Th. (IR): NOT

Gagea gageoides (Zucc.) Vved., Fl. Turkmén. 1, 2: 261 (1932). Syn.: *Bulbillaria gageoides* Zucc., Abh. Bayer. Akad. Wiss. 3: 229 (1843); *Gagea persica* Boiss.



Fig. 26: A-B, *Sternbergia lutea*, early flowering stage with undeveloped leaves (A, 7.10.1995), late flowering stage with well developed leaves (B, 14.11.1996); C, *Iris acutiloba* subsp. *lineolata*; D, *I. kopetdaghensis*; E, *Allium helicophyllum*; F, *Allium vavillovii*; G, *Colchicum speciosum*; H, *Eremurus olgae*.

Mat.: A-10214	
Hab.: Mountain steppe with grasses and thorn-cushions in Almeah flats	
Dist.: C	Alt.: 1700
Ch.: IT ^{W&C}	GF.: GBT
Th. (GNP): SUN	Th. (IR): NOT

Easily to be distinguished by the bulbils in the axil of leaves.

Gagea glacialis K. Koch in Linnaea 22: 228 (1849).

Mat.: AS-6102	
Hab.: Alpine meadow by melting snow, together with <i>Crocus almeahensis</i> , <i>Iris reticulata</i> and <i>Hyacinthus litwinowii</i>	
Dist.: Map 741	Alt.: 2000
Ch.: IT ^{±Cauc.-Alborz}	GF.: GBT
Th. (GNP): END (1)	Th. (IR): END

Known as a new record for Iran (Ahani 1999).

Gagea lutea (L.) Ker Gawl., Bot. Mag. 30: tab. 1200 (1809). Syn.: *Ornithogalum luteum* L., Sp. Pl.: 306 (1753) p. p.

Mat.: A-10305	
Hab.: Open woodland with dense patches of grasses (transition between closed montane forest and steppe) in Koilar	
Dist.: N	Alt.: 1100-1450
Ch.: Pl ^(ES, Temperate and E Asia)	GF.: GBT
Th. (GNP): END (1)	Th. (IR): END

The species can easily be distinguished by the flat and 5-15 mm broad leaves which are abruptly narrowed at the apex, besides the hairy margins of the cauline leaves and the greenish tepals. There is a further record of this apparently rare species outside the Park in Loveh forest, 132 km E of Gorgan, Alt. 1100 m, 1.5.1976, Hewer 3659 (W).

Gagea reticulata (Pall.) Schult. & Schult. f., Syst. Veg. 7: 542 (1829). Syn.: *Gagea tenuifolia* (Boiss.) Fomin; *G. circinnatum* L. f.) Loudon.

Mat.: A-11015, 10240, 10268, 10229; Fu-5142*; R-52904*	
Hab.: <i>Artemisia-Stipa</i> and <i>Stipa</i> steppes; mountain steppe with grasses, thorn-cushions and scattered shrubs; sunny limestone rocks	

Dist.: Map 742	Alt.: 1200-1800
Ch.: IT-? SS	GF.: GTB
Th. (GNP): VUL (8)	Th. (IR): NOT

*under *G. tenuifolia*

I follow here Wendelbo's opinion in Flora of Iraq (8: 70, 1985) considering *G. reticulata* in a broad sense. The minor differences given in the Flora Iranica to distinguish *G. tenuifolia*, *G. circumplexa* Vved. and *G. anonyma* Rech. f. are very difficult to distinguish in herbarium specimens. The group or the whole genus in Iran needs a modern review.

Gagea stipitata Merckl. ex Bunge, Mém. Sav. Etrang. Petersb. 7: 512 (1851). Syn.: *G. persica* Boiss. var. *ebulbillosa* Boiss.

Mat.: A-10529; F-1138*; W&al-10977 (n.v.)	
Hab.: Very open <i>Juniperus</i> woodland, <i>Artemisia-Festuca</i> steppe, <i>Paliurus spina-christi</i> scrub	
Dist.: Map	Alt.: 950-1500
Ch.: IT ^{C&E}	GF.: GBT
Th. (GNP): VUL (4)	Th. (IR): NOT

* F-1138 lacks bulbs and cauline leaves; determination is uncertain.

Gagea vegeta Vved., Bot. Mat. Herb. Inst. Bot. Akad. Nauk Uzbeksk. SSR. 9, 4-12: 238 (1946).

Mat.: ER-16203; Fu-5093; R-33147	
Hab.: Forest and steppe zones of the Park	
Dist.: ? C, E	Alt.: 600-1200
Ch.: IT ^E	GF.: GBT
Th. (GNP): SUN	Th. (IR): NOT

Only those specimens which were cited in Flora Iranica, 165: 31, 1990, and have been seen by me are mentioned. The species belongs more likely to the *G. reticulata* complex.

Hyacinthus litwinowii Czerniak., Bot. Mater. Gerb. Glavn. Bot. Sada SSSR 4: 148 (1923).

Mat.: A-10244, 10342, 10215, 10568, 10224, 10243; AS-6096	
Hab.: <i>Paliurus spina-christi-Acer monspessulanum</i> scrub, <i>Juniperus excelsa</i> woodland; mountain steppe with grasses, thorn-cushions and scattered shrubs usually by melting snow, <i>Artemisia-Stipa</i> steppe	
Dist.: Map 744	Alt.: 1000-2000
Ch.: IT ^{KK}	GF.: GBT
Th. (GNP): RAR (12)	Th. (IR): VUL

A-10224 & 10342 differ markedly from other specimens by their broad and shorter leaves which the inflorescence is hidden. They may belong to another species.

Muscari caucasicum (Griseb.) Baker, J. Linn. Soc., Bot. 11: 414 (1871). Syn.: *Bellevalia caucasicum* Griseb., Spicil. Fl. Rummel. 2: 387 (1844).

Fig. 27, B.

Mat.: A-6188, 10264, 10357; AS-5951; F-1134	
Hab.: <i>Juniperus</i> woodland, <i>Artemisia-Stipa</i> and <i>Stipa</i> steppes, <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> scrubs	
Dist.: Map 745	Alt.: 1000-1900
Ch.: IT ^{W&C}	GF.: GBT
Th. (GNP): NOT (24)	Th. (IR): NOT

Muscari neglectum Guss. in Ten., Syll. Pl. Fl. Neap. App. 5: 13 (1842). Syn.: *M. pulchellum* Heldr. & Sart.; *M. nivale* Stapf; *M. macranthum* Freyn; *M. leucostomum* Woron.

Mat.: A-10228; R-33170; ER-16205	
Hab.: <i>Artemisia-Stipa</i> steppe, <i>Juniperus</i> woodland, disturbed places and road margin, <i>Paliurus spina-christi</i> scrub	
Dist.: Map 746	Alt.: 1000-1700
Ch.: ES-IT-M	GF.: GBT
Th. (GNP): RAR (11)	Th. (IR): NOT

Ornithogalum bungei Boiss., Fl. Orient. 5: 213 (1884). Syn.: *O. hyrcanum* Grossh.

Mat.: A-10609; F-1060 (det. Wendelbo); R-33135; RE-16209	
Hab.: Closed montane forest and forest margin	
Dist.: Map 747	Alt.: ? 1200-1750
Ch.: ES ^{HY}	GF.: GBT
Th. (GNP): VUL (6)	Th. (IR): IND

Ornithogalum sintenisii Freyn, Bull. Herb. Boissier, sér. 2, 11: 911 (1902).

Mat.: A-10401, 10295; ER-16209; Noll 1363	
Hab.: Lowland forest, open montane woodland with dense patches of grasses, top of mountain by melting snow, above rock cliffs	
Dist.: Map 748	Alt.: 500-2000
Ch.: ES ^{HY}	GF.: GBT
Th. (GNP): VUL (6)	Th. (IR): IND

Polygonatum orientale Desf., Ann. Mus. Hist. Nat. 9: 50 (1807). Syn.: *Convallaria polyanthema* M.

Bieb.; *Polygonatum polyanthema* (M. Bieb.) A. Dietrich.

Mat.: A-9984, 10599; W&C-14325	
Hab.: Montane and submontane forest	
Dist.: Map 749	Alt.: 1000-2130
Ch.: ES ^{EH}	GF.: GRH
Th. (GNP): NOT (43)	Th. (IR): NOT

Polygonatum sewerzowii Regel, Bull. Soc. Imp. Nat. Mosc. 41, 1: 436 (1868). Syn.: *P. aflatanense* B. Fedtsch.; *P. haussknechtii* Bornm. & Sint.

Mat.: R-53054; Rz-53178; WF-12651	
Hab.: <i>Juniperus excelsa</i> woodland, <i>Acer monspessulanum</i> scrub	
Dist.: Map 750	Alt.: 1300-2100
Ch.: IT ^E	GF.: GRH
Th. (GNP): VUL (6)	Th. (IR): VUL

Scilla gorganica Speta, Linzer Biol. Beitr. 7, 2: 253 (1975). Syn.: *S. gorganensis* Meikle.

Mat.: Jaffari in Akhani 12242; R-33134; Iranshahr & Dezfoulan-7067, 8010	
Hab.: Forest and scrubs in Tanggol and Loveh	
Dist.: W	Alt.: 450-?
Ch.: ES ^{HY}	GF.: GBT
Th. (GNP): VUL (4)	Th. (IR): VUL

Tulipa biebersteiniana Schult. & Schult. f., Syst. Veg. 7: 382 (1829). Syn.: *T. silvestris* var. *biebersteiniana* (Schult. & Schult. f.) Regel.

Mat.: Akhani (photo); R-33126; Fu-5123 (n. v.); Iranshahr & Dezfoulan-7078	
Hab.: Rock crevices in <i>Juniperus excelsa</i> woodland, known also in forest and steppe zones of the Park (without detail)	
Dist.: W, C, NE	Alt.: ? 750-1300
Ch.: IT-? ES ^{EH}	GF.: GBT
Th. (GNP): VUL (4)	Th. (IR): RAR

Tulipa biflora Pall., Reise 3 "Anhang": 727 (1776). Syn.: *T. buhseana* Boiss.; *T. crispata* Boiss. & Buhse; *T. polychroma* Stapf; *T. halophila* Bornm. & Gauba.

Mat.: A-10217; R-33173	
Hab.: Mountain steppe with grasses and thorn-cushions, <i>Artemisia</i> steppe	
Dist.: Map 751	Alt.: 1200-1850
Ch.: IT	GF.: GBT
Th. (GNP): VUL (4)	Th. (IR): NOT

Tulipa clusiana DC. in Redouté, Liliacées 1: tab. 37 (1803). Syn.: *T. hafisii* Bornm. & Gauba.

Mat.: Golestan forest, Iranshahr (fide Flora Iranica, 165: 88, 1990)	
Hab.: Probably in forest	
Dist.: ? W	Alt.: ?
Ch.: IT ^{W&C}	GF.: GBT
Th. (GNP): END (1)	Th. (IR): VUL

The cited material was neither found in W nor in IRAN (= EVIN). As it is not marked by an exclamation mark, Rechinger may not have seen it.

Tulipa hoogiana B. Fedtsch., Gard. Chron. 48: 53 (1910).

Mat.: A-10231, 10220*; AS-6090; W&al-10941	
Hab.: Mountain steppe, scrub, road margin	
Dist.: Map 752	Alt.: 820-2000
Ch.: IT ^{±KK} (further E)	GF.: GBT
Th. (GNP): VUL (4)	Th. (IR): END

* A-10220 shows intermediate form between *T. hoogiana* and *T. wilsoniana*

Tulipa micheliana Hoog, Gard. Chron. 31: 350 (1902). Syn.: *T. greigii* Boiss. Fig. 27, E.

Mat.: A-10469, 10218, 10536, 10258; Rz-(16.4.1973);	
Hab.: <i>Juniperus</i> woodland, mountain steppes with grasses, thorn-cushions and scattered shrubs, <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes, disturbed and cultivated lands margin and around the Park	
Dist.: Map 753	Alt.: 1100-1950
Ch.: IT ^{KK}	GF.: GBT
Th. (GNP): NOT (20)	Th. (IR): ? NOT

Tulipa montana Lindl., Bot. Reg. 13: tab. 1106 (1827). Fig. 27, F.

Mat.: A-10280*, 10282*, 10468* A-10281**, D-38642	
Hab.: <i>Artemisia</i> steppe and <i>Juniperus</i> woodland and transition zones between them	
Dist.: Map 754	Alt.: 1100-1600
Ch.: IT ^C	GF.: GBT
Th. (GNP): RAR (10)	Th. (IR): NOT

* Tepals red: var. *montana*

** Tepals yellow var. *chrysantha* (Boiss.) Wendelbo in Fl. Iranica 165: 90 (1990). Syn.: *T. chrysantha* Boiss.

In *Juniperus* woodland, SW Soolegerd, both varieties with intermediates growing together (Fig. 27, F.). Hallenberg and W&al-10980 were cited in Fl. Iranica 165: 91, 1990, as intermediate forms.

Tulipa wilsoniana Hoog, Gard. Chron. 32 (3. Ser.) No. 812: 50 (1902). Fig. 27, I.

Mat.: A-6086, 6158, 10219, 10352; 10464; R-33162; Renz-(19.4.1973, det.: Wendelbo)	
Hab.: Mountain steppes with grasses and thorn-cushions and shrubs, <i>Paliurus spina-christi</i> scrub, <i>Juniperus</i> woodland	
Dist.: Map 755	Alt.: 1000-1750
Ch.: IT ^{KK}	GF.: GBT
Th. (GNP): RAR (11)	Th. (IR): RAR

Tulipa linifolia Regel was reported in Flora Iranica 165: 89, 1990, from Iran based on one specimen collected within the Park: Golestan forest, 12. Apr. 1967, Iranshahr & Dezfulian 8008-E. I have briefly studied the material in IRAN (with kind cooperation by Ms. Farideh Matin, Plant Pests & Diseases Research Institute, Evin). I see no differences between this material and the common *T. montana* in NE parts of the Park. *T. linifolia* is probably only endemic in NE Afghanistan and Central Asia (Pamir). The material of this latter species seen in M, seems to be different from the Iranian plants. Their status should be studied in the future.

Orchidaceae

The orchids belong to the well studied plants in the Park, as compared with other plant families. The area has been searched for orchids by Renz, the author of Flora Iranica 126, 1978, and Shahsavari (1990). *Listera ovata*, *Orchis palustris*, *O. coriophora*, and *Platanthera bifolia* are new records for the area. A few previously known species were not found by the author.

Anacamptis pyramidalis (L.) Rich., Mém. Mus. Hist. Nat. Paris 4: 55 (1818). Syn.: *Orchis pyramidalis* L., Sp. Pl.: 940 (1753).

Mat.: A-11615; F-1061; Rz-10846, 10823 (two latter not seen)	
Hab.: Lowland and montane forest	
Dist.: Map 756	Alt.: 600-1880
Ch.: M-ES ^{EH}	GF.: GBT
Th. (GNP): RAR (9)	Th. (IR): VUL

Cephalanthera caucasica Kränzl., Feddes Repert. Beih. 65: 67 (1931).

Mat.: A-10630, 11642, 11228, 11253; F-1132, p.p.; W&C-14374	
Hab.: Closed montane forest	
Dist.: Map 757	Alt.: 1350-2000
Ch.: ES ^{HY}	GF.: GRH
Th. (GNP): NOT (17)	Th. (IR): IND

Cephalanthera damasonium (Mill.) Druce, Ann. Scot. Nat. Hist. 60: 225 (1906). Syn.: *Serapias damasonium* Mill., Gard. Dict. ed. 8, n° 2 (1768).

Mat.: A-11740, 11770, 10628	
Hab.: Montane forest: <i>Quercus macranthera</i> and <i>Quercus macranthera-Carpinus orientalis</i> forest; transition woodland (various kinds of trees and shrubs), pure <i>Carpinus orientalis</i> forest	
Dist.: Map 758	Alt.: 1100-2230
Ch.: ES-M	GF.: GRH
Th. (GNP): VUL (6)	Th. (IR): END

Cephalanthera longifolia (L.) Fritsch, Österr. Bot. Z. 38: 81 (1888). Syn.: *Serapias helleborine* L. var. *longifolia* L., Sp. Pl.: 950 (1753); *Cephalanthera ensifolia* Rich.

Mat.: A-10398, 10627, 10631, 11529, 11229, 11895; AS-6150; F-1132	
Hab.: Closed lowland and montane forest	
Dist.: Map 759	Alt.: 500-1950
Ch.: PL (Eurasia)	GF.: GRH
Th. (GNP): NOT (30)	Th. (IR): NOT

Cephalanthera rubra (L.) Rich., Mém. Mus. Hist. Nat. 4: 60 (1818). Syn.: *Serapias rubra* L., Mantissa Alt. 490 (1771).

Mat.: A-10399, 11230, 11590; F-1132	
Hab.: Lowland and montane forest	
Dist.: Map 760	Alt.: 500-1800
Ch.: ES-M	GF.: GRH
Th. (GNP): RAR (9)	Th. (IR): RAR

Dactylorhiza romana (Seb.) Soó, Ann. Univ. Scient. Budapest, Sect. Biol. 5: 3 (1962). Syn.: *Orchis romana* Seb.; Romanorum Plantarum 1: 12 (1813).

subsp. *georgica* (Klinge) Soó, Ann. Univ. Scient. Budapest, Sect. Biol. 5: 3 (1962). Syn.: *Orchis mediterranea* Klinge subsp. *georgica* Klinge, Trudy Glavn. Bot. Sada 17, 1: 166 (1898).

Mat.: A-10623, 10636, 11231; Rz-10762 (n.v.)	
Hab.: Montane and submontane forest	
Dist.: Map 761	Alt.: 900-1700
Ch.: ES ^{EH}	GF.: GRH
Th. (GNP): VUL (8)	Th. (IR): RAR

Epipactis helleborine (L.) Crantz, Stirp. Austr. ed. 2: 467 (1769). Syn.: *Serapias helleborine* L., var. *latifolia* L. Sp. Pl.: 949 (1753). Fig. 27, G.

Mat.: A-4439, 11641, 11660, 11754, 11896, 11742, 12206; W&C-14387 (n.v.); WF-12792	
Hab.: Montane and submontane forest and forest margin	
Dist.: Map 762	Alt.: 750-2120
Ch.: PL	GF.: GRH
Th. (GNP): RAR (14)	Th. (IR): NOT

Epipactis microphylla (Ehrh.) Sw., Acta Acad. Holm. 232 (1800). Syn.: *Serapias microphylla* Ehrh., Beitr. Naturk. 4: 42 (1789).

Mat.: A-11496, 11527, 11771; Rz-10947 (n.v.); WF-12804 (n.v.)	
Hab.: Lowland and montane forest	
Dist.: Map 763*	Alt.: 500-2300
Ch.: ES-M	GF.: GRH
Th. (GNP): VUL (6)	Th. (IR): END

* The localities of Rz-10947 (between Tangeogol and Tangerang) and WF-12804 (S Tangeogol, 1000 m) cannot be localized.

Epipactis persica (Soó) Nannefeldt, Bot. Not. 1946: 11 (1946). Syn.: *Helleborine perica* Soó, Feddes Repert. 24: 36 (1927).

Mat.: A-11528, 12043, 11883, 12096, 11589; 11533*, 11207*, 11252*; W&C-14388 (n.v.)	
Hab.: Montane and submontane forest, with or without rocky outcrops	
Dist.: Map 764	Alt.: 700-2000
Ch.: IT-ES ^{HY}	GF.: GRH
Th. (GNP): NOT (16)	Th. (IR): NOT

* Without flowers, uncertain determination.

Epipactis rechingeri Renz, Die Orchidee 24: 253 (1973).

Mat.: A-11982, 11741, 11958; W&C-14408	
Hab.: Montane forest with or without rocky outcrops, usually close to wet places	
Dist.: Map 765	Alt.: 1350-2000
Ch.: ES ^{HY}	GF.: GRH
Th. (GNP): VUL (6)	Th. (IR): VUL

Limodorum abortivum (L.) Sw., Nov. Act. Soc. Sci. Upsal. 6: 80 (1799). Syn.: *Orchis abortiva* L., Sp. Pl.: 943 (1753).

Mat.: A-10664; F-1058 (See Shahsavari 1990 for more vouchers)	
Hab.: Limestone rocky outcrops often with <i>Carpinus orientalis-Quercus castaneifolia</i> scrub	
Dist.: Map 766	Alt.: 800-1540
Ch.: ES-M	GF.: GRH ^(Mycotrophic)
Th. (GNP): VUL (6)	Th. (IR): IND

Listera ovata (L.) R. Br. in Aiton, Hort. Kew, ed. 2, 5: 201 (1813). Syn.: *Ophrys ovata* L., Sp. Pl.: 946. (1753).

Mat.: A-11226	
Hab.: Closed montane forest (<i>Carpinus betulus</i> , <i>Quercus castaneifolia</i> , <i>Tilia platyphyllos</i> subsp. <i>caucasica</i> and <i>Ilex spinigera</i>)	
Dist.: Map 767	Alt.: 1700
Ch.: PL ^(N Temperate)	GF.: GRH
Th. (GNP): END (1)	Th. (IR): VUL

The species is new for the area. It has been reported only from very few localities in N. Iran, Azerbaijan and North-Central Iran (Renz in Fl. Iranica 126: 18, 1978). Shahsavari (1990: 77) reported the species near Gorgan (Nahar-Khoran).

Neottia nidus-avis (L.) Rich., Mém. Mus. Hist. Nat. 4: 59 (1818). Syn.: *Ophrys nidus-avis* L., Sp. Pl.: 945 (1753).

Mat.: A-10585, 10626, 11205, 11587	
Hab.: Closed montane and submontane forest	
Dist.: Map 768	Alt.: 900-1050
Ch.: ES	GF.: GRH ^(Mycotrophic)
Th. (GNP): NOT (34)	Th. (IR): NOT

Ophrys scolopax Cav., Icon. Descr. 2: 46, tab. 161 (1793).

Mat.: AS-6024 (Material not studied: Rz-10759, 10825, Shahsavari-17081)	
Hab.: Lowland forests from Tangerang to Abshar	
Dist.: Map 769	Alt.: 750-1200
Ch.: M-ES ^{EH}	GF.: GBT
Th. (GNP): VUL (6)	Th. (IR): IND

Ophrys sphegodes Mill., Gard. Dict. ed. 8, n° 8 (1768).

subsp. **transhyrcana** (Czerniak.) Soó, Acta Bot. Acad. Sci. Hung. 5: 444 (1959). Syn.: *Ophrys transhyrcana* Czerniak., Bot. Mater. Gerb. Glavn. Bot. Sada RSFRS 4: 1 (15.1.1923). *O. sintenisii* Fleischm. & Bornm.; *O. sphegodes* subsp. *sintenisii* (Fleischm. & Bornm.) Nelson.

Mat.: Not studied: Rz-10954; Shahsavari-17256, 17003, 17150 (Shahsavari 1990: 113)	
Hab.: Lowland forest and scrub	
Dist.: Map 770	Alt.: 800-1100
Ch.: IT [M ^E]	GF.: GBT
Th. (GNP): VUL (4)	Th. (IR): IND

Orchis adenocheila Czerniak., Bot. Mater. Gerb. Glavn. Bot. Sada RSFRS 5: 173 (1924). Syn.: *O. stevenii* auct Fl. Iranica 126: 115, 1978 non Rchb. f. Fig. 27, H.

Mat.: A-10584, 10292, 10624; AS-6058, 6080; Z-83/1350 (more records see in Fl. Iranica 126: 116, 1978 under <i>O. stevenii</i> , and Shahsavari 1990: 127 under <i>O. adenocheila</i>)	
Hab.: Lowland and submontane forest and scrub	
Dist.: Map 771	Alt.: 600-1500
Ch.: ES ^{HY}	GF.: GBT
Th. (GNP): RAR (16)	Th. (IR): NOT

Renz in Fl. Turkey, 8: 522, 1984, mentioned that he has incorrectly used the name of *O. stevenii* for the plants occurring in the Caspian area. Therefore the correct name of the plants in our area is *O. adenocheila* Czerniak., described from the Turkmenistan mountains, near the Iranian border.

Orchis coriophora L., Sp. Pl.: 940 (1753). Syn.: *O. cassidea* M. Bieb.

Mat.: A-10629	
Hab.: Closed montane forest	
Dist.: Map 772	Alt.: 1500
Ch.: ES-M	GF.: GBT
Th. (GNP): END (1)	Th. (IR): END

The status of the above cited specimen needs confirmation. The solely found material is over-ripe and all flowers are damaged by insects. The collected material from E Loveh, Merton 3983 (n.v., cited in Fl. Iranica 126: 110, 1978) is from a locality close to the Park. Shahsavari (1990: 10) mentioned that *O. coriophora* probably belongs to the extinct orchids of Iran.

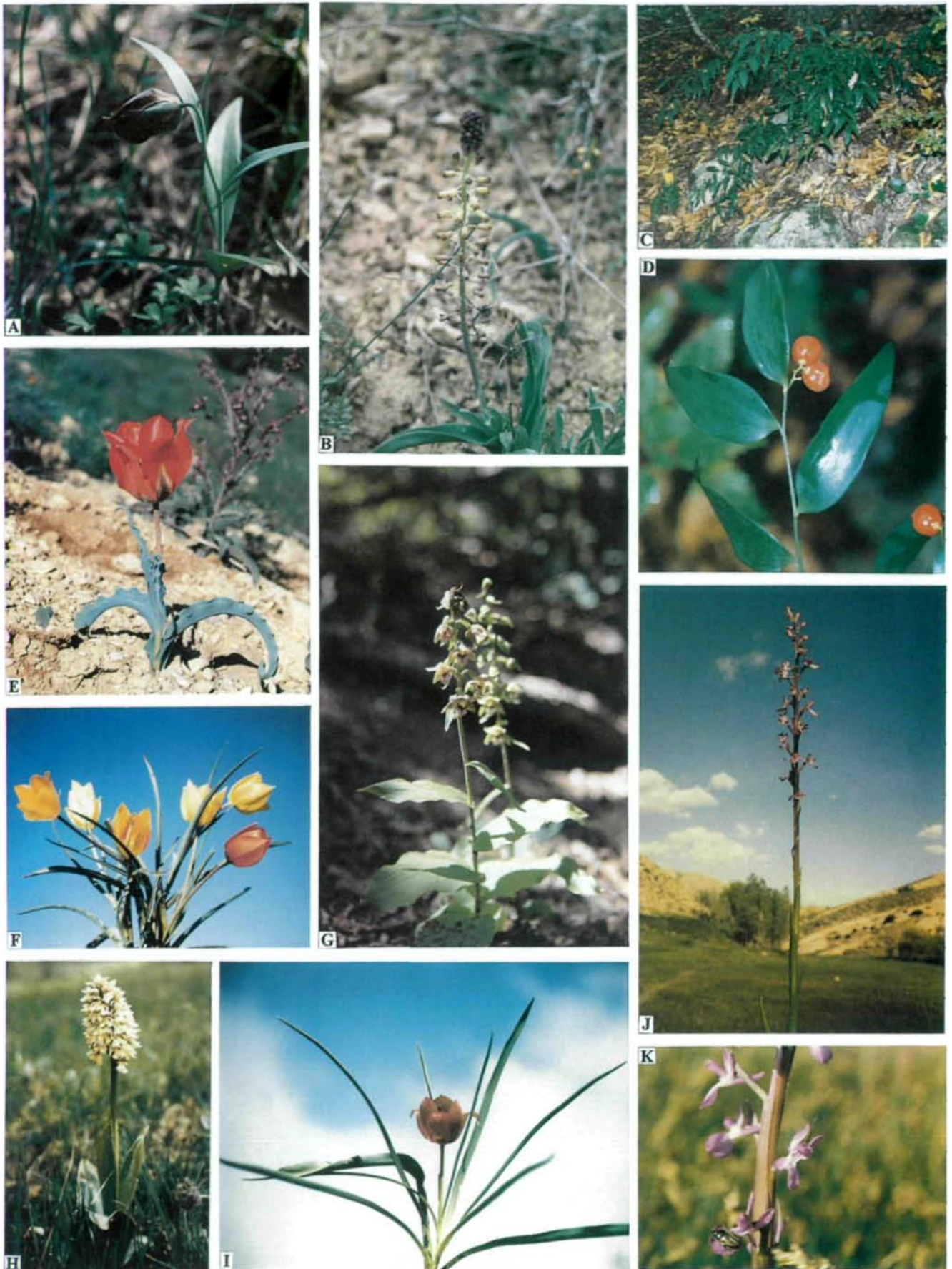


Fig. 27: A, *Fritillaria kotschyana*; B, *Muscari caucasicum*; C-D, *Danaë racemosa*; E, *Tulipa micheliana*; F, *Tulipa montana*, red (var. *montana*) and yellow (var. *chrysantha*) forms and intermediates; G, *Epipactis helleborine*; H, *Orchis adenocheila*; I, *Tulipa wilsoniana*; J-K, *Orchis palustris*.

Orchis mascula L., Fl. Suec. ed. 2: 310 (1755).
subsp. **pinetorum** (Boiss. & Kotschy) Camus,
Monogr. Orch. Europe 156 (1908). Syn.: *O. pineto-*
rum Boiss. & Kotschy in Boiss., Fl. Orient. 5: 68
(1882).

Mat.: A-11526 (det.: J. J. Wood, Kew); Fu-5096 (n.v.); Noll-1231.	
Hab.: Closed lowland forest (<i>Carpinus</i> , <i>Quercus</i> , <i>Tilia</i> , <i>Parrotia</i>)	
Dist.: Map 773	Alt.: 600-1200
Ch.: ES ^{EH}	GF.: GRH
Th. (GNP): VUL (5)	Th. (IR): NOT

Orchis palustris Jacq., Collect. Bot. 1: 75 (1787).
Fig. 27, J-K.

Mat.: A-10698; F-1009	
Hab.: Damp and moist habitats around Derazi stream with <i>Carex divisa</i> , <i>Bolboschoenus</i> <i>maritimus</i> and Soolegerd with <i>Phragmites australis</i>	
Dist.: Map 774	Alt.: 1150-1200
Ch.: ES-IT-M	GF.: GBT
Th. (GNP): END (2)	Th. (IR): NOT

Orchis simia Lam., Fl. Fr. 3: 507 (1778).

Mat.: A-10339; AS-6007, 6020, 6074, 6055 (see Fl. Iranica 126: 113, 1978 and Shabsavari 1990: 123 for further material)	
Hab.: Lowland forest and lowland and submontane open scrub	
Dist.: Map 775	Alt.: 600-1300
Ch.: ES-M	GF.: GBT
Th. (GNP): RAR (13)	Th. (IR): NOT

Orchis simia x **O. adenocheila** (under *O. stevenii*)
= **O. x golestonica** Renz in Fl. Iranica 126: 118
(1978).

O. x golestonica has been known only from the type
collection: Tang-e Gol, in territorio Golestan dicto,
in silvis graminosis quercetis, substr. calc., 800 m,
inter parentes crescens, 24.4.1973, Renz 10763
(n.v.)

Platanthera bifolia (L.) Rich., Mém. Mus. Hist.
Nat. 4: 57 (1818). Syn.: *Orchis biflora* L., Sp. Pl.:
939 (1753).

Mat.: A-4432, 10635, 11233, 11586, 11535, 11525, 11623	
Hab.: Closed foggy montane forest	
Dist.: Map 776	Alt.: 1380-1900
Ch.: ES-M	GF.: GBT
Th. (GNP): RAR (9)	Th. (IR): IND

Steveniella satyrioides (Spreng.) Schltr., Feddes
Repert. 15: 295 (1918). Syn.: *Himantoglossum sa-*
tyrioides Spreng., Syst. Veg. 3: 694 (1826).

Mat.: Fu-5095; Rz-10757; Shabsavari-17005 (all n.v., two first Fl. Iranica 126: 92, 1978, the last Shabsavari 1990: 102)	
Hab.: In closed lowland forest W parts of Park	
Dist.: W	Alt.: 600-1000
Ch.: ES ^{EH}	GF.: GBT
Th. (GNP): END (3)	Th. (IR): VUL

Poaceae (*Gramineae*)

Poaceae is the largest family of monocotyledones in
our area, and the third largest angiosperm family
after *Asteraceae* and *Fabaceae*. However, it is
expected that more grass species within the Park,
and the cultivated lands surrounding the area will be
found. As the *Gramineae* account of Flora Iranica
70, 1970, by Bor, is out-dated, the nomenclature
(and interpretation of some species) presented here
may differ from that of Flora Iranica. As far as
possible, new data have been taken into account,
both from recent literature and from specialists (by
courtesy of Prof. Dr H. Scholz, Berlin). The
distribution data in Flora Iranica are also scant for
evaluation of the threatened status. Therefore the
proposed threat categories are far from complete.
This is also true for the chorotypes which are
difficult to assign due to the wide distribution range
of many grasses.

Aegilops cylindrica Host, Gram. Austr. 2: 6, t. 7.
(1802). Syn.: *Ae. caudata* Link.

Mat.: Z-8431	
Hab.: Rocky outcrops (<i>Carpinus orientalis-Quercus</i> <i>castaneifolia</i>) and mountain steppe	
Dist.: Map 777	Alt.: 840-1650
Ch.: IT [ES]	GF.: TGR
Th. (GNP): END (2)	Th. (IR): RAR

Aegilops tauschii Coss., Not. Crit. 3: 69 (1850).

Mat.: A-6224, 11019, 10722, 11677, 11146, 11201; AS-5966; F-1377	
Hab.: Rocky outcrops, <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes, <i>Juniperus</i> woodland, dry valley with <i>Haloxylon</i> shrubs, transition between mountain steppe and <i>Quercus macranthera</i> forest, open <i>Crataegus</i> scrub	

Dist.: Map 778	Alt.: 700-2000
Ch.: IT	GF.: TGR
Th. (GNP): NOT (25)	Th. (IR): NOT

Aegilops triuncialis L., Sp. Pl.: 1051 (1753). Syn.: *Ae. bushirica* Rozhev.

Mat.: A-11147, 10687; AS-5973	
Hab.: <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes, <i>Juniperus</i> woodland, transition between <i>Artemisia</i> steppe and mountain scrub	
Dist.: Map 779	Alt.: 1200-1450
Ch.: IT-M	GF.: TGR
Th. (GNP): VUL (7)	Th. (IR): NOT

Aeluropus littoralis (Gouan) Parl., Fl. Ital. 1: 461 (1848). Syn.: *Poa littoralis* Gouan, Fl. Monsp. 470 (1765).

Mat.: A-11406, 10898; Kowalski-1310	
Hab.: Muddy saline soils around a saline spring in Mirza-Baylu plain, ± saline-gypsum soils near the road in Yakhtikalan Pass (<i>Stipa</i> steppe)	
Dist.: Map 780	Alt.: 1280-1530
Ch.: IT-M-SS	GF.: HGR
Th. (GNP): END (3)	Th. (IR): NOT

Agropyron cristatum (L.) Gaertn., Novi Comment. Acad. Sci. Imp. Petrop. 14: 540 (1770). Syn.: *Bromus cristatus* L., Sp. Pl.: 78 (1753). subsp. *pectinatum* (M. Bieb.) Tzvelev in Sched. Herb. Fl. URSS 18: 25 (1970). Syn.: *Triticum pectinatum* M. Bieb., Fl. Taur.-Caucas. 1: 87 (1808).

Mat.: A-9436, 9530, 10938; Colo State University Team 1311	
Hab.: Mountain steppe with grasses and thorn-cushions, <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes, <i>Juniperus</i> woodland, saline soils in <i>Anabasis aphylla-Artemisia</i> steppe, <i>Acer monspessulanum</i> scrub	
Dist.: Map 781	Alt.: 1160-2000
Ch.: PL	GF.: HGR
Th. (GNP): NOT (17)	Th. (IR): NOT

Agrostis gigantea Roth, Fl. Germ. 1: 31 (1788). s.l.

Mat.: A-12076 (Det.: H. Scholz)	
Hab.: <i>Salix aegyptiaca</i> scrub valley along the Janlar stream	
Dist.: Map 782	Alt.: 1700
Ch.: PL	GF.: HGR
Th. (GNP): END (1)	Th. (IR): NOT

Agrostis stolonifera L., Sp. Pl.: 62 (1753). s.l.

Mat.: A-11738 (Det.: H. Scholz, doubtful)	
Hab.: Along the Degarmanli stream	
Dist.: Map 783	Alt.: 1700
Ch.: PL	GF.: HGR
Th. (GNP): END (1)	Th. (IR): NOT

Alopecurus aequalis Sobol., Fl. Petrop. 16 (1799).

Mat.: A-11969	
Hab.: Margin of Sulukli Lake	
Dist.: Map 784	Alt.: 1380
Ch.: ES ^(Introduced elsewhere)	GF.: TGR
Th. (GNP): END (1)	Th. (IR): END

A new record for Iran; see Akhiani & Scholz (1999) for details on the ecology and associated species.

Alopecurus arundinaceus Poir. in Lam., Encycl. Meth. Bot. 8: 776 (1808).

Mat.: A-10996, 10754, 10796	
Hab.: Mountain meadows, along the stream, surrounded by <i>Artemisia</i> steppe	
Dist.: Map 785	Alt.: 1200-1800
Ch.: PL ^(N Temperate Eurasia)	GF.: HGR
Th. (GNP): END (3)	Th. (IR): NOT

Alopecurus textilis Boiss., Diagn. Pl. Orient. Nov. sér. 1, 13: 40 (1853).

Mat.: A-11338	
Hab.: Rocky ground at mountain summits in steppes dominated by thorn-cushions and shrubs (often <i>Juniperus communis</i> , <i>J. sabina</i> and <i>Acer monspessulanum</i>)	
Dist.: Map 786	Alt.: 2000-2400
Ch.: IT ^{W&C}	GF.: HGC
Th. (GNP): END (2)	Th. (IR): NOT

Arrhenatherum elatius (L.) P. Beauv. ex J. & C. Presl, Fl. Cechica 17 (1819). Syn.: *Avena elatior* L., Sp. Pl.: 79 (1753).

Mat.: A-9601, 9822, 11531, 11682; R-52619*	
Hab.: Rocky outcrops, montane forest (frequently in <i>Carpinus orientalis</i> and <i>Quercus macranthera</i> forest), rarely lowland forest, thickets of <i>Crataegus</i> , <i>Lonicera</i> and <i>Acer monspessulanum</i>	
Dist.: Map 787	Alt.: 670-2230
Ch.: ES [IT-M]	GF.: TGR
Th. (GNP): NOT (30)	Th. (IR): VUL

* Det.: H. Scholz

Only one specimen is cited in Bor, Fl. Iranica 70: 333, 1970 from Iran (Semnan: Kuh-i Nizwa, near Taru, 2000 m, Wendelbo 1178, n.v.).

Avena sterilis L., Sp. Pl.: ed. 2, 118 (1762).
subsp. *ludoviciana* (Durieu) Gillet & Magne, Nouv. Fl. Fr. ed. 3: 532 (1873). Syn.: *A. ludoviciana* Durieu, Actes Soc. Linn. Bordeaux 2: 41 (1855); *A. persica* Steud.

Mat.: A-5971, 9678.11446; AS-6141; F-1025; R-52569 (under <i>A. ludoviciana</i> by H. Scholz); 52555 (under <i>A. ludoviciana</i> var. <i>macrantha</i> by H. Scholz)	
Hab.: Limestone rocky outcrops along the Madrasu basin, rarely in <i>Artemisia-Stipa</i> steppe, scrub of <i>Paliurus spina-christi</i>	
Dist.: Map 788	Alt.: 450-1200
Ch.: ES-IT-M	GF.: TGR
Th. (GNP): NOT (28)	Th. (IR): NOT

The subspecific status of subsp. *ludoviciana* adopted here following Dogan in Flora of Turkey 9: 306, 1985. Baum (1977) in his oat monography placed this merely as a synonym of *A. sterilis*.

Avena wiestii Steud., Syn. Pl. Glum. 1: 231 (1854).
Syn.: *A. barbata* Pott ex Link var. *wiestii* (Steud.) Hausskn.

Mat.: A-10556	
Hab.: <i>Artemisia-Stipa caucasica</i> steppe	
Dist.: Map 789	Alt.: 1000-1360
Ch.: IT-M-SS	GF.: TGR
Th. (GNP): END (2)	Th. (IR): NOT

Boissiera squarrosa (Banks & Sol.) Nevski, Trudy Sredne-Aziatsk. Gosud. Univ., Ser. 8b, Bot., 17: 30 (1934). Syn.: *Pappophorum squarrosus* Banks & Sol. in Russell, Nat. Hist. Aleppo 2: 244 (1794); *Bromus pumilio* (Trin.) P. M. Sm.

Mat.: AS-5983	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes, sandy soils, dry valley with <i>Haloxylon</i> shrubs, sandy soils, moderately saline soils in <i>Anabasis aphylla-Artemisia</i> steppe	
Dist.: Map 790	Alt.: 1150-1500
Ch.: IT	GF.: TGR
Th. (GNP): RAR (12)	Th. (IR): NOT

Bothriochloa bladhii (Retz.) S. T. Blake in Proc. Roy. Soc. Queensland. 80: 62 (1969).

Syn.: *Andropogon bladhii* Retz., Obs. Bot. 2: 27 (1781); *Bothriochloa caucasica* (Trin.) C. E. Hubb.

Mat.: A-9644-b, 9953, 12103, 12331	
Hab.: Open scrubs on rocky outcrops and steep slopes (usually in <i>Carpinus orientalis-Quercus castaneifolia</i> scrub)	
Dist.: Map 791	Alt.: 500-900
Ch.: PL ^(ES EH-tr. Afrasian, Australia)	GF.: HGR
Th. (GNP): ? RAR	Th. (IR): SUN

See Akhiani & Scholz (1999) for detailed notes on the ecology of *B. bladhii* and its associated species.

Bothriochloa ischaemum (L.) Keng, Contr. Biol. Lab. Sci. Soc. Chin., Assoc. Advancem. Sci., Sect. Bot. 10: 201 (1936). Syn.: *Andropogon ischaemum* L., Sp. Pl.: 1047 (1753); *Dichanthium ischaemum* (L.) Roberty.

Mat.: A-9644-a, 11801, 11844, 12104; E-708; R-52587	
Hab.: Frequent on steep rocky outcrops in open <i>Carpinus orientalis-Quercus castaneifolia</i> open scrub, thickets of <i>Crataegus pentagyna-Prunus divaricata</i>	
Dist.: Map 792*	Alt.: 450-1660
Ch.: PL ^(Mainly ES-IT-M-SS-tr. Asia)	GF.: HGR
Th. (GNP): NOT (50)	Th. (IR): NOT

* As most of the records are based on the phytosociological relevés, some dots in Map 792 may refer to *B. bladhii*.

Brachypodium sylvaticum (Huds.) P. Beauv., Ess. Agrost. 101, 155 (1812). Syn.: *Festuca sylvatica* Huds., Fl. Angl. 38. (1762).

Mat.: A-4352, 9277, 9275, 9298, 9344, 9665, 9665, 9682, 9714, 9809, 11378, 11838; R-52580*, 52479*; W&C-14286*, 14316*; WF-12798*	
Hab.: Various types of lowland and montane forests, rarely in thickets of <i>Acer monspessulanum</i> and <i>Crataegus</i> and rocky outcrops (in shady or moist places)	
Dist.: Map 793	Alt.: 450-2230
Ch.: ES-M ^(also in tr. Asia)	GF.: HGR
Th. (GNP): NOT (164)	Th. (IR): NOT

* Det.: H. Scholz

Bromus

The species of the Sect. *Bromus* (*B. intermedius*, *B. gedrosianus*, *B. japonicus*, *B. danthoniae* and *B. scoparius*) are named or revised by Prof. Dr H. Scholz (Berlin) and those of the Sect. *Genea* by Prof. Dr F. Sales (Coimbra), respectively.

Bromus benekenii (Lange) Trimen, J. Bot. 10: 333 (1872). Syn.: *Schedonorus benekenii* Lange, Fl. Danica 48: 5, t. 2826 (1871).

Mat.: A-9276, 9345, 9600, 9602, 9666, 9792, 9793, 11321, 11294, 11262, 11501, 11777, 12077; WF-12778*	
Hab.: Closed montane forest and rarely lowland forest	
Dist.: Map 794	Alt.: 500-2230
Ch.: ES [M-IT]	GF.: HGR
Th. (GNP): NOT (93)	Th. (IR): NOT

* Treated by Fraile under *B. ramosus* subsp. *benekenii* (Lange) Hayek.

Bromus briziformis Fisch. & C. A. Mey., Ind., Sem. Hort. Petrop. 3: 30 (1837).

Mat.: A-4552; AS-6130	
Hab.: Steep rocky outcrops in <i>Carpinus orientalis</i> open scrub, montane open woodland, montane meadow, <i>Juniperus excelsa</i> woodland, <i>Stipa steppe</i>	
Dist.: Map 795	Alt.: 890-2050
Ch.: ES ^{EH}	GF.: TGR
Th. (GNP): RAR (15)	Th. (IR): NOT

Bromus danthoniae Trin. in C. A. Mey. Verz. Pfl. Cauc. 24. 1831.

Mat.: A-10517, 10713, 10879; AS-5982; F-1020; R-52811, 52874, 53200, 52811, 52874	
Hab.: <i>Artemisia</i> , <i>Artemisia-Stipa</i> and <i>Stipa</i> steppes; <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> scrubs, dry valley with <i>Haloxylon</i> shrubs, <i>Juniperus excelsa</i> woodland	
Dist.: Map 796	Alt.: 900-1900
Ch.: IT	GF.: TGR
Th. (GNP): NOT (41)	Th. (IR): NOT

Bromus gedrosianus Pénzes in Bot. Közlem. 33: 11 (1936). Syn.: *B. japonicus* "Bor in Fl. Iranica 70: 112 (1970) p. p." non Thun. ex Murray.

Mat.: A-9573, 10761, 10491, 11108, 11458, 11433; R-52498; Z-83/1381	
Hab.: Common in open scrubs on rocky outcrops, also in clefts of steep and vertical cliffs, ruderal habitats around the station, <i>Paliurus spina-christi</i> thicket, <i>Stipa steppe</i>	
Dist.: Map 797*	Alt.: 450-1400 (-1950)
Ch.: ? IT	GF.: TGR
Th. (GNP): NOT (40)	Th. (IR): NOT

* Probably some dots refer to *B. japonicus*. Therefore this map and map 799 exhibit the distribution of *B. japonicus* s. l.

Bromus intermedius Guss., Fl. Sic. Prodr. 1: 114 (1827).

Mat.: A-11631	
Hab.: Rocky outcrops in open montane scrub (<i>Carpinus orientalis</i> , <i>Juniperus communis</i> , <i>Quercus macranthera</i>)	
Dist.: Map 798	Alt.: 1880
Ch.: M [? ES ^{EH} -IT]	GF.: TGR
Th. (GNP): END (1)	Th. (IR): ? END (probably under collection)

The only one known locality for *B. intermedius* in Iran by Bor in Fl. Iranica 70: 119, 1970, is from Azerbaijan: Dasht-e Moghan, Mirzayan 9056-E, 9057-E (n.v.).

Bromus japonicus Thunb. ex Murray in Syst. Veg. ed. 14: 119 (1784).

Mat.: A-10551; TM-34829	
Hab.: In ledges, margin of a small valley (transition between <i>Artemisia-Stipa</i> steppe and <i>Juniperus excelsa</i> woodland; ? ruderal habitats in Tangerang)	
Dist.: Map 799	Alt.: 530-1100
Ch.: PL (Eurasia, N Africa)	GF.: TGR
Th. (GNP): IND	Th. (IR): NOT

Bromus madritensis L., Cent. Plant. 1: 5 (1755). s. l. (see Sales 1994).

Mat.: A-10546, F-1030 (?)	
Hab.: In ledges, margin of a small valley (transition between <i>Artemisia-Stipa</i> steppe and <i>Juniperus excelsa</i> woodland in Nekarbandi and open scrub (?) in Tangegol)	
Dist.: Map 800	Alt.: ? 650-1100 ?
Ch.: PL (M-IT-? ES-? SS- introduced into America)	GF.: TGR
Th. (GNP): SUN	Th. (IR): SUN

Both cited specimens were doubtfully identified by Ms. Sales as *B. madritensis* s. l. Further collections are necessary for a reliable identification.

Bromus scoparius L., Amoen. Acad. 4: 266 (1759).

Mat.: A-10368	
Hab.: As a weed in garden of Tangerang office building	
Dist.: W	Alt.: 450
Ch.: ES-IT-M	GF.: TGR
Th. (GNP): END (1)	Th. (IR): NOT

Bromus sterilis L., Sp. Pl.: 77 (1753).

Mat.: A-10371, 10372, 10669, 11425; Z-83/1387 (det.: F. Sales); R-52475 (det.: H. Scholz)	
Hab.: Common on steep limestone rocky outcrops and vertical cliffs (in ledges and crevices), <i>Paliurus spina-christi</i> scrub, forest margin	
Dist.: Map 801	Alt.: 450-1620
Ch.: ES-IT-M	GF.: TGR
Th. (GNP): NOT (15)	Th. (IR): NOT

Termeh (1987: 10 "Persian text" & 5 "French text") reported *B. diandrus* from our area: Golestan forest, 80-110 km E Gonbad-e-Kavus, 15.5.1966, Furse 7327 (K, n.v.). Several specimens from the area which I tentatively identified as belonging to *B. diandrus* were sent to Dr Sales. She has identified all of them as *B. sterilis* and mentioned (in litt.) that she has never seen any material of *B. diandrus* in Iran nor expected its occurrence in such inland places (see also Sales 1993). The material cited by Termeh may be a misidentification of *B. sterilis*.

Bromus tectorum L., Sp. Pl.: 77 (1753).
subsp. **tectorum**

Mat.: A. 6171, 10209; AS-5972	
Hab.: Common in <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes and dry valleys with <i>Haloxylon</i> shrubs; mountain steppe with grasses and thorn-cushions, <i>Juniperus</i> woodland, limestone rocky outcrops and vertical cliffs, <i>Paliurus spina-christi</i> scrub, scrub valley dominated by <i>Acer monspessulanum</i>	
Dist.: Map 802	Alt.: 780-1820
Ch.: ES-IT-M	GF.: TGR
Th. (GNP): NOT (27)	Th. (IR): NOT

Bromus tomentellus Boiss., Diagn. Pl. Orient. Nov. Sér. 1 (7): 126 (1846). s. l.

Type: Iran: Inter saxa in m. Kuh-Barfi prope u. Schiraz, D.4. Maj 1842, Kotschy 344 (W).

Mat.: A-10524, 10909, 10703; AS-5946	
Hab.: <i>Juniperus</i> woodland, <i>Acer monspessulanum</i> scrub, valley scrub with <i>Haloxylon</i> shrubs, mountain meadow, mountain steppe with grasses and thorn-cushions, <i>Artemisia-Stipa</i> steppe	
Dist.: Map 803	Alt.: 1250-2200
Ch.: IT	GF.: HGR
Th. (GNP): NOT (50)	Th. (IR): NOT

Bromus tomentellus Boiss. s.l. (incl. *B. cappadocicus* Boiss. & Bal. and *B. kopetdaghensis* Drobov) are characterized by the persistent, reticulate fibres in the dead and decaying sheaths. The above cited material is dissimilar with regard to the length of awns, glumes and indumentum. I have seen only the type of *B. tomentellus* (Kotschy 344, W) and provisionally prefer to apply its name as the oldest name of this complex.

Calamagrostis epigejos (L.) Roth, Tent. Fl. Germ. 1: 34 (1788). Syn.: *Arundo epigejos* L., Sp. Pl.: 81 (1753).

Mat.: A-4347, 9685, 9763, 9885, 11962, 11555, 11724, 12017, 12018; R-52564; W&C-14277; Z-85/200, 82/208	
Hab.: Frequent in forest openings, often on steep limestone slopes, very often with <i>Pteridium aquilinum</i> or as rather pure stands of its own community; scrub of <i>Crataegus pentagyna-Prunus divaricata</i> , forest margin or open woodland with dense stands of grasses; streamside with <i>Phragmites australis</i> , moist soils around Sulukli lake, alpine meadows	
Dist.: Map 804	Alt.: 450-2060
Ch.: PL ^(N Temperate Eurasia, introduced elsewhere)	GF.: HGR
Th. (GNP): NOT (30)	Th. (IR): NOT

Catapodium rigidum (L.) C. E. Hubb. ex Dony, Fl. Bedfordshire 437 (1953). Syn.: *Poa rigida* L., Cent. Pl. 1: 5 (1755).

Mat.: A-11444	
Hab.: In clefts of steep rocky outcrops and vertical cliffs	
Dist.: Map 805	Alt.: 700-1050
Ch.: ? ES-M-IT	GF.: TGR
Th. (GNP): RAR (11)	Th. (IR): RAR

Cleistogenes serotina (L.) Keng in Sinensia 5: 149 (1934). Syn.: *Festuca serotina* L., Systema, ed. 10, 2: 876 (1759).

Mat.: A-11842, 11477, 12233, 12101, 12106, 11582, 9826 (the two latter only leaves)	
Hab.: Steep rocky outcrops, usually in <i>Carpinus orientalis</i> and <i>Paliurus spina-christi</i> scrubs	
Dist.: Map 806	Alt.: 560-1350
Ch.: ? ES ^{EH} -N China	GF.: HGR
Th. (GNP): NOT (44)	Th. (IR): SUN

New record for Iran (Akhani & Scholz 1999).

Crypsis schoenoides (L.) Lam., Illustr. Gen. 1: 166, tab. 42, fig. 1 (1791). Syn.: *Phleum schoenoides* L., Sp. Pl.: 60 (1753).

Mat.: A-9870	
Hab.: Sandy wet soils, margin of a brook in Qez-Qaleh Dasht	
Dist.: Map 807	Alt.: 1080
Ch.: PL ^(ES-M-IT, tr. Africa, N, India, Tibet)	GF.: TGR
Th. (GNP): END (1)	Th. (IR): RAR

Cynodon dactylon (L.) Pers., Syn. Pl. 1: 85 (1805).

Mat.: A-12163; W&C-14206	
Hab.: Margin of streams and springs, over-grazed open <i>Crataegus</i> woodland	
Dist.: Map 808	Alt.: 1200-1700
Ch.: PL	GF.: HGR
Th. (GNP): VUL (4)	Th. (IR): NOT

Cynosurus echinatus L., Sp. Pl.: 72 (1753).

Mat.: A-4431, 11828; WF-12794 (Det.: H. Scholz); Z-83/1384*	
Hab.: Sandy gravelly moist soils along the river, lowland and montane forest	
Dist.: Map 809*	Alt.: 500-1500
Ch.: M-ES ^{EH}	GF.: TGR
Th. (GNP): VUL (4)	Th. (IR): RAR

* Zehzad's collection from Darre-ye Gareh-Giagh may have been collected from NW parts/borders of the Park. This cannot be localized to show in the map.

Dactylis glomerata L., Sp. Pl.: 71 (1753).

Mat.: A. 9450*, 9296*, 9297* 4350**, 9407**, 9481**, AS-6146**, F-1027**, R-52413, WF-12645	
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Hab.: Very common in open scrubs, open woodlands, various rocky and mountainous vegetation types, *Quercus macranthera* forest; rare or absent in closed forest and dry *Artemisia* and *Artemisia-Stipa* steppes

Dist.: Map 810	Alt.: 450-2230
Ch.: PL ^(Temperate Eurasia, N Africa)	GF.: HGR
Th. (GNP): NOT (156)	Th. (IR): NOT

* subsp. *glomerata*

** subsp. *hispanica* (Roth) Nyman

Echinaria capitata (L.) Desf., Fl. Atlant. 2: 385 (1799). Syn.: *Cenchrus capitatus* L., Sp. Pl.: 1049 (1753).

Mat.: A-10415, 11150	
Hab.: <i>Stipa</i> , <i>Artemisia-Stipa</i> and <i>Stipa</i> steppes	
Dist.: Map 811	Alt.: 1000-1250
Ch.: IT-M	GF.: TGR
Th. (GNP): VUL (7)	Th. (IR): RAR

Elymus elongatiformis (Drobov) Assadi, Willdenovia 26: 268 (1996). Syn.: *Agropyron elongatiforme* Drobov in Vvedenskii & al. Opredelitel' Rast. Taškenta 1: 42 (1923); *E. repens* subsp. *elongatiformis* (Drobov) Melderis.

Mat.: A-4351, 4475, 9854, 11187, 11983	
Hab.: Moist mountain meadows, spring and streamside and around Sulukli Lake	
Dist.: Map 812	Alt.: 850-2060
Ch.: IT	GF.: HGR
Th. (GNP): NOT	Th. (IR): NOT

Elymus elongatus (Host) Runemark in Hereditas (Lund) 70: 156 (1972)

According to Assadi (1996a: 261) only subsp. *ponticus* (Podp.) Melderis in J. Linn. Soc. 76: 377 (1978) is found in Iran either wild or in cultivation.

Mat.: A-9837	
Hab.: Cultivated and naturalized in Agricultural station near Dasht village	
Dist.: S	Alt.: 1050
Ch.: M-ES ^{EH}	GF.: HGR
Th. (GNP): -	Th. (IR): ? END

Elymus hispidus (Opiz) Melderis, Bot. J. Linn. Soc. 76: 380 (1978). Syn.: *Agropyron hispidum* Opiz in Bercht. & Seidl, Ökon.-Tech. Fl. Böhm. 1: 413 (1836)

Mat.: A. 9546*, 9381**, 9382**, 9457**, 4546**, 11382**, 10981**, 11284**, 11130**	
Hab.: Mountain steppes with grasses and thorn-cushions, mountain meadows, <i>Stipa</i> steppe, open <i>Paliurus-Rhamnus</i> and <i>Crataegus</i> scrubs with dense patches of grasses (mainly <i>Stipa</i>)	
Dist.: Map 813	Alt.: 1500-1850
Ch.: ES-IT-M	GF.: HGR
Th. (GNP): NOT	Th. (IR): NOT

* var. *hispidus*

** var. *podperae* (Nábelek) Assadi

Elymus longearistatus (Boiss.) Tzvelev, Novosti Sist. Vyssh. Rast. 9: 62. 1972. Syn.: *Brachypodium longearistatum* Boiss., Diagn. ser. 1 (7): 127 (1846). *Agropyron longearistatum* (Boiss.) Boiss.

Mat.: A-12032	
Hab.: On clefts of vertical limestone cliffs, highest elevation of Qorqon escarpment with <i>Juniperus sabina</i> , <i>Laser rechingeri</i> , <i>Crucianella platyphylla</i> , <i>Silene odontopetala</i> , <i>Dianthus orientalis</i> and <i>Tanacetum coccineum</i>	
Dist.: Map 814	Alt.: 2000
Ch.: IT ^c	GF.: HGR
Th. (GNP): END (1)	Th. (IR): NOT

Elymus transhyrcanus (Nevski) Tzvelev, Novosti Sist. Vyssh. Rast. 9: 61 (1972). Syn.: *Roegneria transhyrcana* Nevski, Trudy Sredne-Aziatsk. Gosud. Univ., Ser. 8b, Bot., 17: 70 (1934); *R. leptoura* Nevski; *Agropyron leptorum* (Nevski) Grossh.

Mat.: A-11755	
Hab.: At margin and in <i>Quercus macranthera</i> forest	
Dist.: Map 815	Alt.: 2100-2230
Ch.: IT	GF.: HGR
Th. (GNP): END (3)	Th. (IR): NOT

Elymus aff. panormitanus (Parl.) Tzvelev

Mat.: A-9597.	
Hab.: <i>Zelkova carpinifolia-Carpinus betulus</i> forest	
Dist.: C	Alt.: 800-950
Ch.: ?	GF.: HGR
Th. (GNP): END (1)	Th. (IR): ? END

Above cited specimen differs from *E. caninus* (L.) L. by the much longer glumes (c. 13-14 mm long) and from *E. panormitanus* (Parl.) Tzvelev by the shorter glumes which are awnless and not prominently veined on the back and by broader leaf blades up to 10 mm wide. A specimen of the latter

species was cited by Bor in Fl. Iranica, 70: 177, 1970: Gorgan: 100 km NE Gorgan, Stutz 625 (n.v.). As this locality is very close to our area, they may belong to the same taxon.

Eragrostis minor Host, Gram. Austr. 4: 15 (1809). Syn.: *E. poaoides* P. Beauv.

Mat.: A-12236	
Hab.: Rocky outcrops, weed in Tangerang garden and margin of road	
Dist.: Map 816	Alt.: 450-900
Ch.: PL ^(ES-IT-M, tr. Africa)	GF.: TGR
Th. (GNP): END (2)	Th. (IR): NOT

Eremopyrum

All four species of *Eremopyrum* are found within the Park (cf. Frederiksen 1991).

Eremopyrum bonaepartis (Spreng.) Nevski, Trudy Sredne-Aziatsk. Gosud. Univ., Ser. 8b, Bot., 17: 52 (1934). Syn.: *Triticum bonaepartis* Spreng., Erst. Nachtr. Bot. Gart. Halle: 40. (1801).

Mat.: A-10882, 10945; AS-5940; F-1021 (?)	
Hab.: Moderately saline soils in <i>Anabasis aphylla-Artemisia</i> steppe and dry gravelly soils in <i>Artemisia</i> steppe	
Dist.: Map 817	Alt.: 1150-1280
Ch.: IT [M]	GF.: TGR
Th. (GNP): VUL (8)	Th. (IR): NOT

Eremopyrum distans (K. Koch) Nevski, in Komarov, Fl. URSS 2: 665 (1934). Syn.: *Agropyron distans* K. Koch, Linnaea 21: 426. (1848).

Mat.: A-6240, 10943	
Hab.: <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes, moderately saline soils in <i>Anabasis aphylla-Artemisia</i> steppe, dry valley with <i>Haloxylon</i> shrubs	
Dist.: Map 818	Alt.: 1150-1400
Ch.: IT ^{omni}	GF.: TGR
Th. (GNP): RAR (9)	Th. (IR): NOT

Eremopyrum orientale (L.) Jaub. & Spach, Ill. Pl. Or. 4: 27, tab. 319 (1851). Syn.: *Secale orientale* L., Sp. Pl.: 84 (1753); *Triticum orientale* (L.) M. Bieb.

Mat.: A-10532, 10944; AS-5941	
Hab.: <i>Artemisia</i> steppe, moderately saline soils in <i>Anabasis aphylla-Artemisia</i> steppe, very open <i>Juniperus excelsa</i> woodland	

Dist.: Map 819	Alt.: 1200-1400
Ch.: IT [M]	GF.: TGR
Th. (GNP): VUL (6)	Th. (IR): NOT

Eremopyrum triticeum (Gaertn.) Nevski, Trudy Sredne-Aziatsk. Gosud. Univ., Ser. 8b, Bot., 17: 52 (1934). Syn.: *Agropyron triticeum* Gaertn., Novi. Comment. Acad. Sci. Imp. Petrop. 14, 1: 540 (1770).

Mat.: A-10481	
Hab.: Moist and ruderal places around Soolegerd station with <i>Conium maculatum</i>	
Dist.: Map 820	Alt.: 1200
Ch.: IT	GF.: TGR
Th. (GNP): END (1)	Th. (IR): END

The only already known locality of *E. triticeum* from Iran is in Azerbaijan: Ad ripam austro-orientalem lacus Rezaiyeh inter Bonab et Khanian, Rech. 14785 (cf. Bor in Fl. Iranica 70: 186, 1977, and distribution map of the species by Frederiksen, 1991: 276).

Festuca akhaniae Tzvelev, Bot. Zhurn. 82 (4): 118 (1997).

Type: c. 2 km W of Almehr towards Sharleq, 37°20'N, 56°6'E, 22.v.1995, Akhani 10806 (Holo. LE; iso. MSB, Hb. Akh.).

Mat.: A-10806	
Hab.: Mountain steppe with grasses, thorn-cushions and scattered shrubs	
Dist.: Map 821	Alt.: 1600
Ch.: IT ^{KK}	GF.: HGC
Th. (GNP): END (1)	Th. (IR): END

Although the species is known only from one locality, it is well distinguished from the common *F. valesiaca* s. l. Further field studies are required for a better knowledge on the distribution and status of the species.

Festuca arundinacea Schreb., Spicil. Fl. Lips. 57 (1771).

Mat.: A-12078	
Hab.: Margin of Janlar stream in <i>Salix aegyptiaca</i> scrub valley with <i>Juncus inflexus</i> and <i>Agrostis gigantea</i>	
Dist.: Map 822	Alt.: 1700
Ch.: ES	GF.: HGC
Th. (GNP): END (1)	Th. (IR): RAR

Festuca drymeia Mert. & Koch in Roehling, Detuschl. Fl. 1: 670 (1823). Syn.: *F. silvatica* Host, non Vill.; *F. montana* M. Bieb., non Savi.

Mat.: A-9272, 9884, 11261, 11222, 11502; WF-12782	
Hab.: Closed montane and submontane forest, with or without rocky outcrops; rarely lowland forest	
Dist.: Map 823	Alt.: 600-2000
Ch.: ES	GF.: HGR
Th. (GNP): NOT (75)	Th. (IR): NOT

Festuca gigantea (L.) Vill., Hist. Pl. Dauph. 2: 110 (1787). Syn.: *Bromus giganteus* L., Sp. Pl.: 77 (1753).

Mat.: A-9806, 11464, 11585, 11520, 11776	
Hab.: Closed lowland and montane forest, particularly well represented in <i>Quercus macranthera</i> forest	
Dist.: Map 824	Alt.: 500-2230
Ch.: ES	GF.: HGR
Th. (GNP): NOT (46)	Th. (IR): NOT

F. gigantea has been known only from one locality in Iran both in Flora Iranica, 70: 87, 1970 and Alexeev's revision (1979: 13), viz: Gil: Rasht, Lipsky. It is a rather common species in shady forests.

Festuca valesiaca Gaudin, Agrost. Helv. 1: 242 (1811). s. l.

Mat.: A-4471, 9584, 10505, 10506, 10732, 10733, 6144, 10791*, 10807*, 10461, 11135*, 11136*, 10655; R-52813**, 53063**, 53064**	
Hab.: Common in mountain steppes with grasses (often <i>Poa densa</i> and <i>Stipa</i> spp.) and thorn-cushions (<i>Onobrychis cornuta</i> and <i>Acantholimon</i> spp.), <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes, mountain meadows, various types of open scrubs (<i>Crataegus</i> , <i>Acer monspessulanum</i> , <i>Paliurus spina-christi</i>), <i>Juniperus</i> woodland, open montane forest, alpine meadows, very rare in lowland rocky outcrops, absent in closed forest and <i>Artemisia</i> flats in Mirza-Baylu plain	
Dist.: Map 825	Alt.: 700-2400
Ch.: ES-IT	GF.: HGC
Th. (GNP): NOT (166)	Th. (IR): NOT

* Det. N. Tzvelev under *F. glaucoidea* (Vetter) E. Alexeev

** Det.: E. B. Alexeev under *F. valesiaca*.

The author has been confronted to different identifications regarding "*F. valesiaca* complex" by the two most competent Russian grass specialists. Rechinger's collections from the area (see above) have been revised by the late Alexeev who had revised the Flora Iranica species (1979). Prof. Tzvelev has kindly identified most of my collections of this complex and named them under *F. glaucoidea* and described a new species (*F. akhaniai*). I was unable to distinguish the material named by Alexeev as *F. valesiaca* from the one identified as *F. glaucoidea* by Tzvelev (from the same localities). I tried to solve this discrepancy with Prof. Tzvelev, but until now did not receive any answer. As the species (or complex of species) belongs to the most common grasses in our area (166 records!), I prefer for practical reasons (particularly for phytosociological purposes) to use the name of *F. valesiaca* s. l. as a widely distributed species and not *F. glaucoidea* which was only known from a few localities on Alborz mountain (Alexeev 1979: 34).

Glyceria arundinacea (M. Bieb.) Kunth, Rév. Gram. 1: 118 (1829). Syn.: *Poa arundinacea* M. Bieb., Fl. Taur.-Caucas. 1: 60 (1808).

Mat.: A-11968	
Hab.: Wet places around Sulukli Lake	
Dist.: Map 784	Alt.: 1380
Ch.: ? ES ^{EH}	GF.: HGR
Th. (GNP): END (1)	Th. (IR): END

G. arundinacea has previously been known only from one locality in Bor, Flora Iranica, 70: 101, 1970: Azerbaijan: Kuhha-ye Sabalan E Tabriz, 3000 m, Harrington 136 (n.v.). Assadi (1988: 43) reported it from Arasbaran Protected Area, also in Azerbaijan.

Glyceria plicata (Fries) Fries, Nov. Fl. Suec. Mant. 3: 176 (1842). Syn.: *G. fluitans* (L.) R. Br. subsp. *plicata* Fries, Nov. Fl. Suec. Mant. 2: 6 (1839).

Mat.: A-10808	
Hab.: Margin of a mountain spring with <i>Barbarea plantaginea</i> and <i>Iris spuria</i>	
Dist.: Map 826	Alt.: 1600
Ch.: ES-IT [M]	GF.: HGR
Th. (GNP): END (1)	Th. (IR): NOT

Henrardia persica (Boiss.) C. E. Hubb., Blumea, suppl. 3: 17 (1946). Syn.: *Lepturus persicus* Boiss., Diagn. Pl. Orient. Nov. sér. 1, 13: 71 (1853).

Mat.: A-10737, 10859; DRD Leaders 1309	
Hab.: Usually sandy-gravelly soils, margin and bottom of dry or permanent streams in <i>Artemisia</i> steppe or <i>Juniperus</i> woodland	
Dist.: Map 827	Alt.: 1150-1630
Ch.: IT ^{W&C}	GF.: TGR
Th. (GNP): VUL (7)	Th. (IR): NOT

DRD, unit Leaders 1309 corresponds to the var. *glaberrima* (Hausskn. ex Bornm.) C. E. Hubb. and A-10859, 10737 to var. *persica*, respectively.

Heteropogon contortus (L.) P. Beauv. ex Roem. & Schult., Syst. Veg. 2: 836 (1817). Syn.: *Andropogon contortus* L., Sp. Pl. 1045 (1753).

Mat.: A-12105, 12372, 12328	
Hab.: Steep rocky outcrops	
Dist.: Map 828	Alt.: 600-800
Ch.: PL ^(tr. & warm temperate region of the World)	GF.: HGC
Th. (GNP): VUL (4)	Th. (IR): VUL

A new genus record for Iran. See Akhiani & Scholz (1999) for detailed information on the ecology of the species.

Hordelymus europaeus (L.) Jess. in Harz, Samenkunde 2: 1148, f. 135 (1885). Syn.: *Elymus europaeus* L., Mant. 35 (1767).

Mat.: A-11594, 11876	
Hab.: Closed montane forest	
Dist.: Map 829	Alt.: 1700-2130
Ch.: ES	GF.: HGR
Th. (GNP): RAR (14)	Th. (IR): VUL

A new genus record for the Flora Iranica area (Akhiani & Scholz 1999).

Hordeum bulbosum L., Amoen. Acad. 4: 304 (1759).

Mat.: AS-5952, 9452, 9676; R-52632, 52558	
Hab.: Thickets of <i>Paliurus spina-christi</i> and <i>Crataegus</i> , rocky outcrops, open <i>Quercus macranthera</i> or open <i>Q. castaneifolia</i> - <i>Q. macranthera</i> forests, mountain steppes with grasses and scattered shrubs and thorn-cushions; at bottom of Qortoy valley and open woodland in Koilar develops very dense and rather pure patches	

Dist.: Map 830	Alt.: 450-2000
Ch.: IT-M	GF.: HGR (bulbous)
Th. (GNP): NOT (42)	Th. (IR): NOT

Hordeum murinum L., Sp. Pl.: 85 (1753). subsp. **leporinum** (Link) Arcang. Comp. Fl. Ital. 805 (1882). Syn.: *H. leporinum* Link in Linnaea 9: 133 (1835).

Mat.: A-10483; F-1029	
Hab.: Weed in wet and ruderal places	
Dist.: Map 831	Alt.: 670-1200
Ch.: IT-M	GF.: TGR
Th. (GNP): END (2)	Th. (IR): NOT

The occurrence of subsp. *glaucum* (Steud.) Tzvelev is also expected in the Park.

Imperata cylindrica (L.) Raeusch., Nom. Bot. ed. 3: 10 (1797). Syn.: *Lagurus cylindricus* L., Systema ed. 10: 878 (1759).

Mat.: A-10878, 11567; F-1023	
Hab.: Clay alluvial soils in <i>Crataegus pentagyna-Prunus divaricata</i> scrub, saline soils, margin of a brackish spring (with <i>Phragmites australis</i>), probably margin of a montane forest (Firuznia 1023)	
Dist.: Map 832	Alt.: 450-1600
Ch.: PL ^(M-IT; tr. Old World, S America)	GF.: HGR
Th. (GNP): VUL (6)	Th. (IR): NOT

Koeleria macrantha (Ledeb.) Schult., Mant. 2: 345 (1824). Syn.: *Aira macrantha* Ledeb., Mém. Acad. Imp. Sci. St. Pétersbourg 5: 515. (1812). *Koeleria cristata* Pers.

Mat.: A-9451, 10724, 11374, 12070, 10992, 11318, 11029, 11076	
Hab.: Mountain steppes with thorn-cushions, with or without shrubs, mountain meadows, higher altitude mountain rocky outcrops, <i>Juniperus</i> woodlands (<i>J. excelsa</i> , <i>J. communis</i> , <i>J. sabina</i>), open montane oak forest, thickets of <i>Acer monspessulanum</i>	
Dist.: Map 833	Alt.: 1050-2400
Ch.: PL ^(N Temperates)	GF.: HGC
Th. (GNP): NOT (72)	Th. (IR): NOT

Koeleria nitidula Velen., Fl. Bulg. 611 (1891).

Mat.: A-11076 (determination doubtful)	
Hab.: Open <i>Paliurus spina-christi</i> scrub with dense patches of grasses	
Dist.: Map 834	Alt.: 1350-1400
Ch.: ? ES	GF.: HGR
Th. (GNP): END (2)	Th. (IR): RAR

Lolium subulatum (Banks & Sol.) Eig., J. Bot. 75: 189 (1937). Syn.: *Triticum subulatum* Banks & Sol. in Russell, Aleppo ed. 2: 2: 244 (1794); *Nardurus subulatus* (Banks & Sol.) Bor.

Mat.: A-10267	
Hab.: Dry <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppe, sandy soils	
Dist.: Map 835	Alt.: 1000-1500
Ch.: IT	GF.: TGR
Th. (GNP): RAR (11)	Th. (IR): NOT

Lolium loliaceum (Bory & Chaub.) Hand.-Mazz., Ann. K. K. Naturhist. Hofmus. 28: 32 (1914). Syn.: *Rotboellia loliacea* Bory & Chaub., Expéd. Sci. Morée 3: 46 (1832).

Mat.: A-11424	
Hab.: Steep limestone rocky outcrops and vertical cliffs	
Dist.: Map 836	Alt.: 700-1000
Ch.: M-ES ^{EH}	GF.: TGR
Th. (GNP): VUL (5)	Th. (IR): VUL

Lolium rigidum Gaudin, Agrost. Helv. 1: 334 (1811).

Mat.: F-1024; R-52495	
Hab.: <i>Paliurus spina-christi</i> and as weed in Tangerang and Tangegol	
Dist.: Map 837	Alt.: 450-1000
Ch.: ES-IT-M	GF.: TGR
Th. (GNP): END (3)	Th. (IR): NOT

Lolium temulentum L., Sp. Pl.: 83. 1753.

Mat.: R-52556 (Det.: H. Scholz)	
Hab.: In forest margin between Tangerang and Tangegol	
Dist.: C	Alt.: 450-600
Ch.: ES-IT-M ^(introduced elsewhere)	GF.: TGR
Th. (GNP): END (1)	Th. (IR): NOT

Melica altissima L., Sp. Pl.: 66 (1753).

Mat.: A-11899	
Hab.: Top of Alu-Baq mountain under the shades of <i>Rhamnus cathartica</i>	
Dist.: Map 838	Alt.: 2100
Ch.: ES ^{EH}	GF.: HGR
Th. (GNP): END (1)	Th. (IR): END

A very interesting species which was known in Flora Iranica 70: 253, 1970, only from one locality in Azerbaijan: Ali Bolaghi, leg. Knapp. The specimen may not have been seen by Bor. Very recently Assadi (1996b) reported the rediscovery of this species from Azerbaijan: 15 km from main road of Makou-Bazargan towards Kelisa-kandi, 1800 m, 16.8.1991, Assadi 70827 (TARI, n.v.), a locality which is in a distance of ca. 1000 km W of our area!

***Melica ciliata* L., Sp. Pl.: 66 (1753). s. l.**

Mat.: A. 4523, 9531, 9574, 9629, 11466, 11886, 11577; WF-12834	
Hab.: Thickets of <i>Acer monspessulanum</i> , <i>Paliurus spina-christi</i> and <i>Crataegus</i> , <i>Juniperus</i> woodland, steep rocky outcrops and vertical cliffs, <i>Stipa</i> steppe	
Dist.: Map 839	Alt.: 700-2000
Ch.: ES-IT-M	GF.: HGR
Th. (GNP): NOT (46)	Th. (IR): NOT

A-9505 is characterized by the very short, c. 3 mm long spikelets. Further studies may reveal that this is merely an ecological form or a genetical race.

***Melica persica* Kunth, Rev. Gram. 1: 122, t. 89 (1830).**

Mat.: A-11162*, 10912**, 12029**, WF-12644**	
Hab.: Dry valley with <i>Haloxylon</i> shrubs, vertical cliffs, <i>Juniperus excelsa</i> woodland	
Dist.: Map 840	Alt.: 1300-2000
Ch.: IT	GF.: HGR
Th. (GNP): IND	Th. (IR): NOT

* *M. jacquemontii* Decne. ex Jacquem. subsp. *hohenackeri* (Boiss.) Bor

** *M. jacquemontii* Decne. ex Jacquem. subsp. *jacquemontii*

M. persica s. l. includes several species and subspecies, widely distributed in SW and C Asia. The complex has been treated differently in the accounts of Flora Iranica, 70, 1970 (by Bor), Flora of Pakistan, 143, 1982 (by Cope) and Flora of Turkey, 9, 1985 (by Davis). All authors agree, however, that

their treatments is far from complete, before any biosystematic study becomes available. As mentioned above, two variants of this complex (according to Bor's treatment) occur in our area.

***Melica transsilvanica* Schur, Enum. Pl. Transs.: 764 (1866).**

Mat.: A-11624, 11913, 11760, 12012, 11258	
Hab.: Open montane forest and scrub (with <i>Acer monspessulanum</i> , <i>Quercus macranthera</i> , <i>Carpinus orientalis</i>), mountain meadows, mountain steppes with grasses and thorn-cushions	
Dist.: Map 841	Alt.: 1880-2150
Ch.: ES	GF.: HGR
Th. (GNP): RAR (9)	Th. (IR): NOT

P. H. Davis in Flora of Turkey, 9: 531-533, 1985, placed *M. transsilvanica* as a subspecies of *M. persica* (subsp. *transsilvanica* (Schur) Husnot). Following Bor in Flora Iranica, 70: 260, 1970, I prefer to maintain this as an independent species, not only on the basis of the easily distinguishable morphological characters (such as silvery colour of the spikelets, dense panicle and clearly unequal glumes), but also because of their habitat in mountain meadows in elevations over 1880 m. A-11258 is a young plant and has been collected from the same locality as A-12012. Its name is uncertain.

***Melica uniflora* Retz., Obs. Bot. 1: 10 (1779).**

Mat.: A 9308-b, 9603; WF-12793	
Hab.: Closed lowland and montane forest	
Dist.: Map 842	Alt.: 480-1900
Ch.: ES	GF.: HGR
Th. (GNP): NOT (32)	Th. (IR): RAR

Only one locality was mentioned from Iran in Bor's treatment of Flora Iranica, 70: 251, 1970, viz. Gilan: Ladjim rope Zirab, Tregubov 6. The species is not rare in the forest zone of the Park.

***Milium vernale* M. Bieb., Fl. Taur.-Caucas. 1: 53 (1808).**

Mat.: A-10485, 11134, 10351, 10455	
Hab.: <i>Paliurus spina-christi</i> and <i>Acer monspessulanum</i> scrubs, open woodland with dense stands of grasses, <i>Stipa</i> steppe, transition between <i>Artemisia</i> steppe and <i>Juniperus</i> woodland	
Dist.: Map 843	Alt.: 1000-1450
Ch.: ES-IT-M	GF.: TGR
Th. (GNP): RAR (9)	Th. (IR): NOT

Oplismenus undulatifolius (Ard.) Roem. & Schult., Ess. Agrost. 54 (1812). Syn.: *Panicum undulatifolium* Ard., Animadv. Bot. Spec. Alt. 14, t. 4 (1764).

Mat.: A-9242, 9331; W&C-14308	
Hab.: Alluvial lowland forest (<i>Diospyrus lotus</i> - <i>Acer velutinum</i>) and wet soils around Madrasu river	
Dist.: Map 844	Alt.: 450-1000
Ch.: ES	GF.: HGR
Th. (GNP): RAR (15)	Th. (IR): RAR

Pennisetum orientale Rich., in Pers., Syn. Plant. 1: 72 (1805).

Mat.: A-11802; R-52975	
Hab.: In clefts of steep limestone rocks or vertical cliffs, usually with <i>Bothriochloa</i> spp. and <i>Cleistogenes serotina</i>	
Dist.: Map 845	Alt.: 600-1300
Ch.: IT-SS-? SM	GF.: HGR
Th. (GNP): VUL (5)	Th. (IR): NOT

Phalaris minor Retz., Obs. Bot.: 8 (1783).

Mat.: R-52499-a (det.: Rechinger)	
Hab.: Weed in garden of Tangerang office building	
Dist.: W	Alt.: 450
Ch.: COS (probably native in IT-M)	GF.: TGR
Th. (GNP): END (1)	Th. (IR): NOT

Phalaris paradoxa L., Sp. Pl.: 1665 (1753).

Mat.: R-52499-b (det.: Rechinger)	
Hab.: Weed in garden of Tangerang office building	
Dist.: W	Alt.: 450
Ch.: M-IT	GF.: TGR
Th. (GNP): END (1)	Th. (IR): RAR

Phleum paniculatum Huds., Fl. Angl. ed. 1: 23 (1762).

Mat.: A-10583, 11144, 11459-b; R-52410	
Hab.: <i>Paliurus spina-christi</i> scrub, steep rocky outcrops, <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes, <i>Juniperus excelsa</i> woodland	
Dist.: Map 846	Alt.: 450-1680
Ch.: IT ^{W&C}	GF.: TGR
Th. (GNP): NOT (34)	Th. (IR): NOT

Phleum pratense L. Sp. Pl.: 1: 59 (1753). s. l. Incl. *Ph. bertolonii* DC.

Mat.: A-4349, 4374, 11190, 11568; Z-82/213	
Hab.: Usually open flat woodland with <i>Crataegus</i> , <i>Prunus divaricata</i> and <i>Acer monspessulanum</i>	
Dist.: Map 847	Alt.: 450-1530
Ch.: ES-IT-M	GF.: HGR
Th. (GNP): RAR (10)	Th. (IR): RAR

The status of the above cited material is doubtful. It is characterized by the very short, ca. 0.2-0.8 mm long awn which matches with subsp. *bertolonii* (DC.) Bormm. However, with regard to the length and width of the panicle some of these match with subsp. *pratense*. A-11568 has a very long to 12 cm long, 7 mm broad panicle and its height reaches to over 1 m. These specimens are evidently dissimilar with many European plants which I have compared. A detailed survey of this group in our area is desirable.

Phragmites australis (Cav.) Trin. ex Steud., Nomencl. Bot. ed. 2, 2: 324 (1841). Syn.: *Arundo australis* Cav., Anaes Hist. Nat. 1: 100 (1799); *Phragmites communis* Trin.

Mat.: A-9851, 12130	
Hab.: Along rivers and streams, and around springs, particularly in steppe and mountain zone of the Park	
Dist.: Map 848	Alt.: 1000-2000
Ch.: COS	GF.: HGR
Th. (GNP): NOT (10)	Th. (IR): NOT

Piptatherum holciforme (M. Bieb.) Roem. & Schult., Syst. Veg. 2: 238 (1817). Syn.: *Agrostis holciformis* M. Bieb., Fl. Taur. Cauc. 1: 54 (1808); *Oryzopsis holciformis* (M. Bieb.) Hack.; *O. kopetdaghensis* Roshev.

Mat.: A-9488, 10259, 11789, 10822, 12066; AS-6068; R-53012 (det.: H. Freitag)	
Hab.: Montane open woodland and scrub (<i>Carpinus orientalis</i> , <i>Quercus castaneifolia</i> , <i>Q. macranthera</i> and <i>Juniperus excelsa</i> , <i>Acer monspessulanum</i>), <i>Artemisia-Stipa</i> steppe	
Dist.: Map 849	Alt.: 1000-2300
Ch.: IT	GF.: HGR
Th. (GNP): NOT (16)	Th. (IR): NOT

Piptatherum virescens (Trin.) Boiss., Fl. Orient. 5: 507 (1884). Syn.: *Urachne virescens* Trin., Gram. uniflor. 173 (1824); *Oryzopsis virescens* (Trin.) Beck.

Mat.: A-9308-a, 9621, 9781, 10388, 10682, 11866; AS-6012; R-52563 (det.: H. Freitag)	
Hab.: Steep rocky outcrops in <i>Carpinus orientalis-Quercus castaneifolia</i> open scrub, lowland forest with <i>Carpinus betulus</i> , <i>Quercus castaneifolia</i> and <i>Zelkova carpinifolia</i>	
Dist.: Map 850	Alt.: 450-1450
Ch.: ES-M	GF.: HGR
Th. (GNP): VUL (8)	Th. (IR): RAR

Poa

All determined or revised by H. Scholz (Berlin).

Poa bulbosa L., Sp. Pl.: 70 (1753). s. l.

Mat.: A-9519, 10446; AS-5915, 5937, 5977, 9578, 6059, 6156, 6231, 10484, 10386; F-1018, 1028, 1022, 1031, 1026	
Hab.: Common in mountain steppes with grasses (<i>Poa densa</i> , <i>Stipa</i> spp., <i>Festuca valesiaca</i>), thorn-cushions, <i>Stipa</i> and <i>Artemisia-Stipa</i> steppes, montane and valley scrubs (<i>Acer monspessulanum</i> , <i>Crataegus</i> , <i>Paliurus spina-christi</i> , <i>Haloxylon ammodendron</i> , <i>Quercus macranthera</i> and <i>Q. castaneifolia</i>), <i>Juniperus excelsa</i> woodland	
Dist.: Map 851	Alt.: 700-2400
Ch.: ES-IT-M	GF.: HGC
Th. (GNP): NOT (115)	Th. (IR): NOT

Poa compressa L., Sp. Pl. 69 (1753).

Mat.: A-11547	
Hab.: Forest clearing dominated by <i>Pteridium aquilinum</i> & <i>Thalictrum minus</i>	
Dist.: Map 852	Alt.: 1060
Ch.: PL (Eurasia, N America)	GF.: HGR
Th. (GNP): END (1)	Th. (IR): END

A rare species in Iran. See Akhani & Scholz (1999) for further details on the species.

Poa densa Troitsky, in Trudy Glavn. Bot. Sada 27: 619 (1928).

Mat.: A-9453, 11010, 10774, 11078	
Hab.: Mountain steppes with grasses (<i>Festuca valesiaca</i> , <i>Poa bulbosa</i> , <i>Stipa</i> spp.) and thorn-cushions (<i>Onobrychis cornuta</i> , <i>Acantholimon raddeanum</i> , <i>Astragalus verus</i>), mountain meadows, open scrubs (<i>Crataegus</i> , <i>Acer monspessulanum</i> , <i>Rhamnus pallasii</i> , <i>Lonicera iberica</i>), <i>Juniperus excelsa</i> woodland	

Dist.: Map 853	Alt.: 1320-2170
Ch.: IT ^{Cauc.-Turk.}	GF.: HGC
Th. (GNP): NOT (70)	Th. (IR): NOT

See Akhani & Scholz (1999) for further details on the species.

Poa golestanensis H. Scholz & Akhani (in press in Edinburgh J. Bot. 56 (1), 1999).

Holotypus: ca. 11 km ENE of Tangegol, summit of Divar Kaji Mountain, 2200-2370m, 37°24'20"N, 56°3'E, 18.6.1995, H. Akhani 11329 (MMTT, isotypes: B, M, Hb. Akh.).

Mat.: A-11259, 11329, 11989-b, 11757, 11781, 12068	
Hab.: <i>Quercus macranthera</i> and <i>Q. castaneifolia-Q. macranthera</i> montane forests, montane scrub with <i>Juniperus sabina</i> and <i>J. communis</i> , mountain meadows and montane forest openings	
Dist.: Map 854	Alt.: 1380-2380
Ch.: ES ^{HY}	GF.: HGR
Th. (GNP): RAR (14)	Th. (IR): RAR

Poa masenderana Freyn & Sint., Bull. Herb. Boissier, sér. 2, 2: 915 (1902).

Mat.: A-9236, 9326, 10659, 10670, 10402, 11912, 11459-a, 11485; AS-6014	
Hab.: Closed lowland and montane forests, river and stream forest	
Dist.: Map 855	Alt.: 450-2130
Ch.: ES ^{EH}	GF.: HGR/TGR
Th. (GNP): NOT (44)	Th. (IR): NOT

Poa nemoralis L., Sp. Pl.: 69 (1753).

Mat.: A-9622, 9727, 9785, 10658, 11087, 11634, 11390-a, 11390-b*	
Hab.: Closed montane and submontane forest (frequent in altitudes over 1600 m), rarely lowland forest and rocky outcrops and vertical cliffs	
Dist.: Map 856	Alt.: 480-2200
Ch.: PL (Europe, temperate Asia, N. America)	GF.: HGR
Th. (GNP): NOT (85)	Th. (IR): NOT

* Doubtfully named by H. Scholz under subsp. *korshuensis* (Golosk.) Tzvelev.

Poa pratensis L., Sp. Pl. 67 (1753).

subsp. *angustifolia* (L.) Lindb. f. in Sched. Pl. Finl. Exsicc. 1, 8: 20 (1906). Syn.: *P. angustifolia* L., Sp. Pl.: 67 (1753).

Mat.: A-6035, 10661, 10683, 11636, 11782, 12082, 12081, 11370, 11394, 11432, 11133, 11336, 11211, 11132, 12009; WF-12642	
Hab.: Open montane woodlands with dense patches of grasses (often in scrubs with <i>Crataegus</i> , <i>Acer monspessulanum</i> , <i>Carpinus orientalis</i> , <i>Quercus macranthera</i> , <i>Paliurus spina-christi</i>), rarely in clearings of lowland forest	
Dist.: Map 857	Alt.: 850-2230
Ch.: PL	GF.: HGR
Th. (GNP): NOT (28)	Th. (IR): NOT

Poa trivialis L., Sp. Pl.: 67 (1753).

Mat.: A-10805, R-52476	
Hab.: Wet places, margin of a mountain spring and as weed in garden of Tangerang station	
Dist.: Map 858	Alt.: 450-1600
Ch.: PL (mostly ES-M-IT, introduced elsewhere)	GF.: HGR
Th. (GNP): END (2)	Th. (IR): NOT

Polypogon fugax Nees ex Steud., Syn. Pl. Glum. 1: 184 (1854).

Mat.: A-12165, 11829; R-52496, 52562	
Hab.: Streamside in forest and steppe	
Dist.: Map 859	Alt.: 500-1200
Ch.: PL (Temperate Asia)	GF.: TGR
Th. (GNP): VUL (5)	Th. (IR): NOT

Polypogon viridis (Gouan) Breistr., Bull. Soc. Bot. France 110: 56 (1963). Syn.: *Agrostis viridis* Gouan, Hort. Monsp.: 546 (1762); *Polypogon semi-verticillatus* (Forssk.) Hyl.

Mat.: A-11827	
Hab.: Riparian forest (<i>Acer velutinum</i> , <i>Alnus subcordata</i>) along Khan Doushan river	
Dist.: W	Alt.: 500
Ch.: ES-M (Introduced elsewhere)	GF.: TGR
Th. (GNP): END (1)	Th. (IR): NOT

Puccinellia bulbosa (Grossh.) Grossh., Fl. Kawk. ed. 1, 1: 114. 1928.

Mat.: A-10486 (uncertain)	
Hab.: Around a spring together with <i>Sclerochloa dura</i> in Soolegerd station	
Dist.: Map 860	Alt.: 1200
Ch.: IT ^{W&C}	GF.: HGR
Th. (GNP): END (1)	Th. (IR): RAR

Puccinellia grossheimiana (V. I. Krecz.) V. I. Krecz. in Fl. URSS 2: 761 (1934).

Mat.: A-10885 (uncertain)	
Hab.: Margin of a saline spring with <i>Phragmites australis</i>	
Dist.: Map 861	Alt.: 1290
Ch.: IT ^{Cauc.-Turk.}	GF.: HGR
Th. (GNP): END (1)	Th. (IR): END

Rhizocephalus orientalis Boiss., Diagn. Pl. Orient. Nov., sér. 1. 5: 69 (1844).

Mat.: No voucher	
Hab.: Dry steppe dominated by <i>Artemisia</i> sp., <i>Salsola arbusculiformis</i> and <i>S. gemmascens</i>	
Dist.: Map 862	Alt.: 1150
Ch.: IT ^{W&C}	GF.: TGR ^{DW}
Th. (GNP): END (1)	Th. (IR): VUL

No herbarium specimen of this characteristic therophytic dwarf plant (to 2 cm tall) has been provided. But it has been recorded in phytosociological relevés along the northern border of the Park, between Soolegerd and Lohondor. The species has been known by Bor in Flora Iranica, 70: 312, 1970, only from two localities in Fars. I have collected this species in the N of Tehran (Darrakeh). It is easily overlooked due to its very small size and short living period in spring.

Sclerochloa dura (L.) P. Beauv., Agrost. 98, 177 (1812). Syn.: *Cynosurus durus* L., Sp. Pl.: 72 (1753).

Mat.: A-10490	
Hab.: Around a spring together with <i>Puccinellia bulbosa</i> in Soolegerd station	
Dist.: Map 860	Alt.: 1200
Ch.: ES-IT-M	GF.: TGR
Th. (GNP): END (1)	Th. (IR): NOT

Secale montanum Guss., Fl. Sic. Prodr. 1: 145. 1827.

Mat.: A-11762, 11785	
Hab.: Limestone rocky mountain summits	
Dist.: Map 863	Alt.: 2100-2230
Ch.: IT ^{W&C} -M	GF.: HGR
Th. (GNP): END (2)	Th. (IR): RAR

Setaria viridis (L.) P. Beauv., Ess. Agrost.: 51, 171 (1812). Syn.: *Panicum viride* L., Syst. Nat. ed. 10: 870 (1759).

Mat.: A-9303, 11580; E-706; GA-4956; W&C-14309	
Hab.: Lowland forest and scrub (in rather disturbed places either by humans or by wild boars)	
Dist.: Map 864	Alt.: 450-1050
Ch.: PL	GF.: TGR
Th. (GNP): RAR (8)	Th. (IR): NOT

Sorghum halepense (L.) Pers., Syn. Pl. 1: 101 (1805). Syn.: *Holcus halepense* L., Sp. Pl.: 1047 (1753).

Mat.: A-11851*; A-11808**; R-52494*	
Hab.: As weed in garden, road margin; clearings in pioneer forest (probably remnant of previously cultivated lands)	
Dist.: Map 865	Alt.: 450-800
Ch.: PL	GF.: HGR
Th. (GNP): END (2)	Th. (IR): NOT

* var. *halepense*

** var. *muticum* (Hackel) Grossh.

Stipa arabica Trin. & Rupr., Spec. Gram. Stip.: 77 (1842). Syn.: *St. szovitsiana* Trin.; *St. caspica* K. Koch.

Mat.: A-10578, 11244, 10866, 10921, 11806 AS-5997; R-52814*; WF-12727*	
Hab.: In <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppe, crevices and clefts of vertical cliffs, dry valley with <i>Haloxylon ammodendron</i> , sandy soils in <i>Artemisia</i> steppe, rarely in <i>Juniperus excelsa</i> woodland and <i>Acer monspessulanum</i> scrub and mountain steppe with thorn-cushions	
Dist.: Map 866	Alt.: 800-1400 (-1700)
Ch.: IT ^{omni}	GF.: HGR
Th. (GNP): NOT (20)	Th. (IR): NOT

* Det.: H. Freitag

Stipa bromoides (L.) Dörf., Herb. Norm 34: 129 (1897). Syn.: *Agrostis bromoides* L., Mant. 1: 30 (1767);

Mat.: A-9599, 9606, 9652, 9945, 11467, 11435, 11494; R-52578 (det.: H. Freitag); W&C-14264 (det.: H. Scholz)	
Hab.: Steep rocky outcrops and vertical cliffs with shrubs (often <i>Carpinus orientalis</i>), forest margin and forest clearing	
Dist.: Map 867	Alt.: 550-1950
Ch.: M-ES ^{EH}	GF.: HGR
Th. (GNP): NOT (54)	Th. (IR): NOT

Stipa caragana Trin., Mém. Acad. Imp. Sci. St. Pétersbourg, Sér. 6, Sci. Math. 1 (1): 74 (1830).

Mat.: R-53013 (Det.: H. Freitag)	
Hab.: Flat plains E of the Park	
Dist.: E	Alt.: 1200
Ch.: IT ^{omni}	GF.: HGR
Th. (GNP): END (1)	Th. (IR): RAR

Above cited material is likely from a locality just outside the present boundaries of the Park. Its occurrence along the border of the Park is very likely.

Stipa caucasica Schmalh., Ber. Deutsch. Bot. Ges. 10: 293 (1892). s. l.

Mat.: A-9508**, 10511*, 10928*, 10857**, 10858*, 10753*, 10894, 10555*; F-1017; R-52843***	
Hab.: Common in <i>Artemisia</i> steppes in S, E, NE and N parts of the Park; also in <i>Juniperus excelsa</i> woodland, mountain steppe with grasses and thorn-cushions, <i>Stipa</i> steppes (with other species like <i>St. lessingiana</i> and <i>St. pulcherrima</i>), dry valley with <i>Haloxylon</i> shrubs, rare in montane shrubby steppes	
Dist.: Map 868	Alt.: 1150-2180
Ch.: IT	GF.: HGR
Th. (GNP): NOT (56)	Th. (IR): NOT

* Det.: H. Scholz under subsp. *drobovii* Tzvelev

** Det.: H. Scholz without subspecies

***Det.: H. Freitag under subsp. *caucasica*

Stipa hohenackeriana Trin. & Rupr., Sp. Gram. Stip.: 80 (1842). *St. atriseta* Stapf ex Bor.

Mat.: WF-12641 (det.: H. Freitag); Z-82/255	
Hab.: Mountain steppes	
Dist.: S, C	Alt.: ? 1200-1800
Ch.: IT ^{omni}	GF.: HGR
Th. (GNP): END (3)	Th. (IR): NOT

Apparently rare in our area; in spite of my intensive field studies, it was not rediscovered by me.

Stipa holosericea Trin., Mém. Acad. Imp. Sci. Sain-Pétersbourg, Sér. 6, Sci. Math. 1: 81 (1830). Syn.: *St. kotschyana* Hochst. ex Steud.; *St. transcaucasica* Grossh.

Mat.: A-9558, 10995, 10958, 11008, 10740, 10718, 10327	
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Hab.: Mountain steppes with grasses and thorn-cushions, <i>Stipa</i> steppe (with <i>St. lessingiana</i> , <i>St. pulcherrima</i> and <i>St. zaleskii</i>) flat plains or gentle slopes with <i>Artemisia</i> and <i>Festuca valesiaca</i> , mountain meadows, <i>Juniperus excelsa</i> woodland, various open scrubs of <i>Acer monspessulanum</i> , <i>Paliurus spina-christi</i> , <i>Crataegus</i> , <i>Carpinus orientalis</i> and <i>Quercus castaneifolia</i>	
Dist.: Map 869	Alt.: 970-2060
Ch.: IT ^{W,C} [M ^E]	GF.: HGR
Th. (GNP): NOT (65)	Th. (IR): NOT

Stipa lessingiana Trin. & Rupr., Spec. Gram. Stip.: 79 (1842).

Mat.: A-9386, 11758, 10775, 11009, 11302, 10961, 11182, 11347; R-53065	
Hab.: Common in grassy mountain steppes with thorn-cushions, in many places as dense <i>Stipa</i> steppes (<i>St. pulcherrima</i> , <i>St. zaleskii</i> , <i>St. holosericea</i> and <i>St. lessingiana</i>), <i>Juniperus excelsa</i> woodland, scrubs of <i>Acer monspessulanum</i> , <i>Crataegus</i> , <i>Paliurus</i> and <i>Quercus macranthera</i>	
Dist.: Map 870	Alt.: 1160-2400
Ch.: IT ^{W&C} [ES ^{ponitic}]	GF.: HGR
Th. (GNP): NOT (82)	Th. (IR): NOT

Stipa pulcherrima K. Koch, Linnaea 21: 440 (1848). Syn.: *Stipa pennata* L. subsp. *pulcherrima* (K. Koch) Freitag.

Mat.: A-9482*, 9507*, 11034*, 11074*, 10777*, 11007*, 11181*, 11282, 11630*; F-1033**	
Hab.: As rather pure <i>Stipa</i> stands alone or with other species (like <i>St. lessingiana</i> , <i>St. holosericea</i> , <i>St. caucasica</i>), mountain steppes with grasses (<i>Poa densa</i> , <i>Festuca valesiaca</i> , <i>Stipa</i> spp.) and thorn-cushions, <i>Juniperus</i> woodland; <i>Acer monspessulanum</i> , <i>Paliurus spina-christi</i> , <i>Crataegus</i> and <i>Carpinus orientalis</i> scrubs (usually between shrubs), mountain meadows at forest margin	
Dist.: Map 871, 872	Alt.: 1000-2000
Ch.: M-ES ^{EH}	GF.: HGR
Th. (GNP): NOT	Th. (IR): NOT

* Revised by H. Scholz

** Determined by H. Scholz under subsp. *crassiculmis* (P. A. Smirn.) Tzvelev

Freitag (1985), in his revision of Southwest and South Asian *Stipa*, used a very broad species concept for the *St. pennata*-complex. Two of his subspecies, namely subsp. *pulcherrima* and subsp.

zaleskii, abundantly occur in our area. In our area his subspecies are well distinguishable from each other without intermediates and apparently produce no hybrids. I see no reason to consider these as subspecies, which usually demonstrate geographical races with overlapping and intermediates in sympatric populations. As the author, by following Freitag, recorded only *St. pennata* in his phytosociological relevés, used for ca. 30 records only *St. pennata* s. l. Map 871 includes all these records plus those of *St. pulcherrima* and *St. zaleskii*.

Stipa zaleskii Wilensky, Dnevn. Vserossiisk. S'ezda Russk. Bot. 1: 41 (1921). Syn.: *Stipa pennata* L. subsp. *pulcherrima* (K. Koch) Freitag

Mat.: A-9385 a, 10577, 10994; AS-6142 (all determined by H. Scholz under subsp. <i>turcomanica</i> (P. A. Smirn.) Tzvelev	
Hab.: Steppes with <i>Artemisia</i> , <i>Juniperus excelsa</i> , <i>Paliurus-Rhamnus</i> or other species of <i>Stipa</i> (<i>St. lessingiana</i> , <i>St. pulcherrima</i> and <i>St. holosericea</i>) and thorn-cushions	
Dist.: Map 871, 873	Alt.: 1000-2000
Ch.: ± ES ^{EH}	GF.: HGR
Th. (GNP): NOT	Th. (IR): RAR

Taeniatherum caput-medusae (L.) Nevski Acta Univ. Asia Med., ser 8b, Bot. 17: 38 (1934). Syn.: *Elymus caput-medusae* L., Sp. Pl.: 84 (1753). subsp. *crinitum* (Schreb.) Melderis in Notes Roy. Bot. Gard. Edinburgh 42: 81 (1984). Syn.: *Elymus crinitum* Schreb., Besch. Gräs. 2: 15 and t. 24, 1 (1772).

Mat.: A-10465; AS-5998; F-1019	
Hab.: <i>Paliurus spina-christi</i> scrub, <i>Juniperus excelsa</i> woodland, dry valley with <i>Haloxylon ammodendron</i> shrubs, <i>Artemisia</i> and <i>Artemisia-Stipa</i> steppes, sandy soils	
Dist.: Map 874	Alt.: 970-1840
Ch.: IT	GF.: TGR
Th. (GNP): NOT (27)	Th. (IR): NOT

Trachynia distachya (L.) Link, Hort. Bot. Berol. 1: 43 (1827). Syn.: *Bromus distachyos* L., Amoen. Acad. 4: 304 (1759); *Brachypodium distachyos* (L.) P. Beauv.

Mat.: A-10547; R-52408, 52581	
Hab.: In clefts of steep rocky outcrops and vertical cliffs, small valley between <i>Artemisia-Stipa</i> steppe and open <i>Juniperus</i> woodland	

Dist.: Map 875	Alt.: 450-1100
Ch.: IT-M	GF.: TGR
Th. (GNP): RAR (9)	Th. (IR): NOT

Trisetum flavescens (L.) P. Beauv., Ess. Agrost. 88, 153, 180 (1812). Syn.: *Avena flavescens* L., Sp. Pl.: 80 (1753).

Mat.: A-11126, 11200, 10778; Z&A-86/2947	
Hab.: Open scrubs and woodland with grass patches, forest clearing with <i>Pteridium aquilinum</i>	
Dist.: Map 876	Alt.: 560-1715
Ch.: ES-IT	GF.: HGR
Th. (GNP): RAR (12)	Th. (IR): RAR

Vulpia myuros (L.) C. C. Gmel., Fl. Bad. 1: (1805). Syn.: *Festuca myuros* L., Sp. Pl.: 74. (1753).

Mat.: A-10549	
Hab.: Small valley between <i>Artemisia-Stipa</i> steppe and open <i>Juniperus</i> woodland	
Dist.: N	Alt.: 1100
Ch.: IT-M	GF.: TGR
Th. (GNP): END (1)	Th. (IR): NOT

Vulpia persica (Boiss. & Buhse) V. I. Krecz. & Bobrov in Fl. URSS 2: 535 (1934). Syn.: *Nardurus persicus* Boiss. & Buhse, Aufz. Transk. Pers. 225 (1860); *Vulpia hitiglumis* Boiss. & Hausskn.

Mat.: A-10451	
Hab.: Transition between <i>Artemisia</i> steppe and <i>Juniperus</i> woodland, dry valley with <i>Haloxylon</i> shrubs	
Dist.: Map 877	Alt.: 1100-1300
Ch.: IT	GF.: TGR
Th. (GNP): END (2)	Th. (IR): RAR

Potamogetonaceae

Potamogeton natans L., Sp. Pl.: 126 (1753).

Mat.: A-11966	
Hab.: Shallow water in Sulukli lake	
Dist.: Map 878	Alt.: 1380
Ch.: PL	GF.: ARH/GRH
Th. (GNP): END (1)	Th. (IR): END

A new record for Iran (Akhani 1999).

Typhaceae

Typha domingensis Pers., Syn. Pl. 2: 532 (1807). Syn.: *T. australis* Schum. & Thonn.

Mat.: A-9853-a, 9853-b (uncertain)	
Hab.: Streamside	
Dist.: Map 879	Alt.: 1100
Ch.: PL	GF.: HGR
Th. (GNP): END (1)	Th. (IR): RAR

Typha laxmannii Lapach., Nova Acta Acad. Sci. Imp. Petrop. Hist. Acad. 10: 84 (1801).

Mat.: A-9875	
Hab.: Streamside along Qez-Qaleh Dasht	
Dist.: S	Alt.: 1080
Ch.: PL	GF.: HGR
Th. (GNP): END (1)	Th. (IR): NOT

Zanichelliaceae

Zannichellia palustris L., Sp. Pl.: 969 (1753).

Mat.: GA-4855	
Hab.: In Mirza-Baylu brooklet	
Dist.: Map 880	Alt.: 1200
Ch.: COS	GF.: ARH/GRH
Th. (GNP): END (1)	Th. (IR): NOT

4 STATISTICAL SCHEME OF PLANT BIODIVERSITY

4.1 Families, genera and species

According to this study a total of 1,302 species of native or naturalized vascular plants belonging to 107 families and 542 genera are known from Golestan National Park. This figure is more than twice of the already known species in the literature. Certainly more species remain to be found in the future because of the following reasons: (1) the dry conditions in 1995 and the years before reduced the growing capacity of several species, particularly some ephemerals and xerophytes in the steppe zone of the Park; (2) due to the time limit and the dry conditions in 1995, I have not fully investigated the steppe and *Juniperus excelsa* zones in the northern parts of the Park (see Fig. 11); (3) due to the diverse biotopes in the area and phenological differences of plants, it is impossible for one investigator to cover simultaneously such a vast area; (4) although the area has been visited by many botanists, almost all of the collectors have gathered in more or less accessible parts around the road between Tanagerah and Robat-e Qareh Bil and from Mirza-Baylu to Almeh. The northern, the north-central, the southern and southwestern parts of the Park were previously unexplored; (5) the author's field studies do not cover winter and early spring when certainly more geophytes and ephemerals are expected to be found. I would estimate the number of undiscovered species within the Park at around 200. This number will increase, if the flora of the neighbouring Qorkhod Protected Area in the east and Loveh forest in the west of the Park and weedy species growing in surrounding cultivated lands are included. Therefore, a total of ca. 2,000 species within the Park and mentioned the adjacent parts is not unrealistic. We do not know any other places in Iran and SW Asia with such a high plant diversity within a limited area (see Davis & al. 1994). For a comparison we have recent floristic figures from Touran and Arasbaran Protected Areas in Iran and the Turkmenistan parts of Kopetdagh. Freitag (1994) gives 800 species for Touran, located in north-east central Iran with a surface area 20 times larger than Golestan. Assadi (1987/1988) recorded the occurrence of 785 species from Arasbaran Protected Area, located in the westernmost sector of the hyrcanian forest with a surface area slightly smaller than the area of Golestan (724 km²). Kurbanov (1994) mentioned the occurrence of 1,942 species in the Turkmenistan parts of Kopetdagh which is over 20 times larger than our area. A comparison of the floral diversity in relation to surface sizes of Iran and Golestan gives a better impression of the plant diversity in the Park. In Fig. 28 the surface areas, and the numbers of families, genera and species in Iran and Golestan are presented by figures and percentages. The surface area of the Park is only 0.06% of the total surface of Iran, but 69% of the families, 45% of the genera and 19% of the Iranian vascular plant species occur in Golestan National Park. The proportion of large groups of vascular plants is shown in Fig. 29. Dicotyledones with 1,030 species (79%), monocotyledones with 246 species (19%), pteridophytes with 20 species (1.5%) and gymnosperms with only 6 species (0.5%) compose the floristic bulk of the Park. In Table 4 a list of all families with respective numbers of genera and species in the Park and in Iran is presented. The frequency distribution of families containing 1, 2, 3 etc species approximates to a logarithmic curve (see small diagram in upper right edge of Fig. 30). This diagram matches with the world-wide pattern of taxonomic assemblages (see Dial & Marzluff 1989). This is of great interest from a plant biodiversity point of view, because we encounter here a pattern of a well balanced plant diversity indicating a natural system. The size and number of the 39 largest families in Golestan National Park and Iran are demonstrated in Fig 30. They include 1,099 species and 386 genera which represent 84% of the flora of Golestan. The richest families are *Asteraceae* with 161 species, *Fabaceae* with 121 species and *Poaceae* with 111 species together comprising 30% of the flora. *Brassicaceae*, *Lamiaceae*, *Apiaceae*, *Liliaceae*, *Chenopodiaceae*, *Caryophyllaceae*, each with 41 to 68 species are also among the diverse families in the Park. Families which contain a high percentages of the Iranian flora are *Poaceae* (with 30% of the Iranian flora in the Park), *Liliaceae* (24%), *Chenopodiaceae* (31%), *Rosaceae* (28%), *Polygonaceae* (29%) and *Orchidaceae* (48%). Many species of *Orchidaceae* and *Liliaceae* are of a great conservation value, because many of these species are included in the world-wide IUCN Red Data Book. Although *Asteraceae* and *Fabaceae* have the highest number of species in the Park, their total percentages with regard to the Iranian flora is much less than average. This can be explained with the fact that *Cousinia* and *Astragalus*, as the two largest genera in Iran (Table 5), have many local endemics in the drier zones of Iran. Large parts of the Park are too mesic to allow the occupation of such xerophytes. This is also true for the genus *Acantholimon* of which only 5 of 82 known species in Iran are found in the Park. The flora of the Park is very

diverse on the generic level. As it is shown in Fig 28, 542 genera in the Park correspond to just under 50% of the known Iranian vascular plant genera. The most diverse genera with over 10 species in the Park and their respective number of species in Iran are listed in Table 5: *Astragalus* with 45 species followed by *Allium*, *Veronica*, *Silene*, *Vicia*, *Centaurea*, *Carex*, *Cousinia*, *Trifolium*, *Artemisia*, *Bromus*, *Alyssum*, *Polygonum* and *Rumex*.

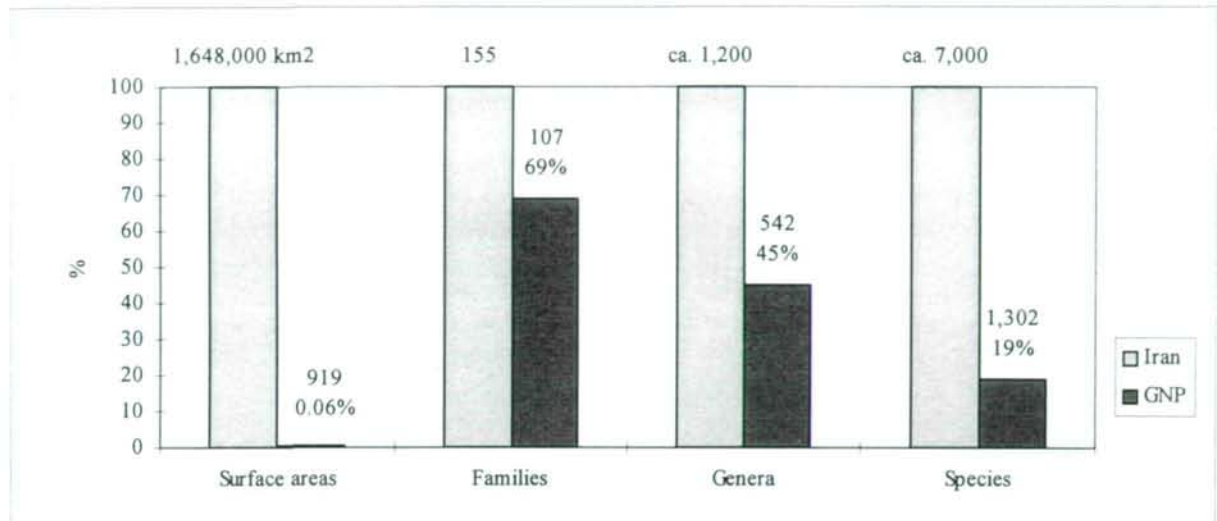


Fig. 28: Comparison of Iran and Golestan: Surface areas and percentages of families, genera and species of the vascular plants. The surface areas of Iran and GNP and the absolute numbers of families, genera and species are shown above the columns

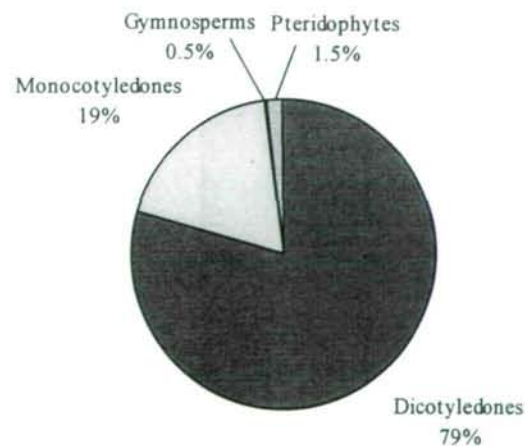


Fig. 29: Proportion of various groups of vascular plants in the flora of Golestan National Park

Table 4: List of plant families and their number of species and genera in Golestan National Park in comparison with the respective numbers and percentages in Iran. The figures for Iran are unpublished data of the author, extracted from Flora Iranica (Rechinger 1963-1997). The number for unpublished families are estimations according to other references. Recently published changes for some families after the publication of Flora Iranica are not considered in the table. Only the number of native and naturalized species are included or evaluated for statistical analyses

Families	Genera			Species		
	GNP	Iran	%	GNP	Iran	%
Pteridophytes						
<i>Adiantaceae</i> (Incl. <i>Sinopteridaceae</i>)	2	2	100	2	5	40
<i>Aspleniaceae</i>	3	3	100	5	8	62
<i>Dryopteridaceae</i> (Incl. <i>Aspidiaceae</i>)	2	2	100	4	6	67
<i>Equisetaceae</i>	1	1	100	2	c. 2	100
<i>Hypolepidaceae</i>	1	1	100	1	1	100
<i>Ophioglossaceae</i>	1	2	50	1	2	50
<i>Polypodiaceae</i>	1	1	100	2	2	100
<i>Woodsiaceae</i> (<i>Athyriaceae</i>)	3	4	75	3	4	75
Gymnosperms						
<i>Cupressaceae</i>	1	3	33	3	7	43
<i>Ephedraceae</i>	1	1	100	3	8	37.5
<i>Taxaceae</i>	1	1	100	1	2	50
Angiosperms						
Dicotyledones						
<i>Aceraceae</i>	1	1	100	6	6	100
<i>Amaranthaceae</i>	1	4	25	6	12	50
<i>Anacardiaceae</i>	1	3	33	1	5	20
<i>Apiaceae</i> (<i>Umbelliferae</i>)	39	112	35	57	316	18
<i>Apocynaceae</i>	2	4	50	2	5	40
<i>Aquifoliaceae</i>	1	1	100	1	1	100
<i>Asclepiadaceae</i>	3	10	30	5	16	31
<i>Asteraceae</i> (<i>Compositae</i>)	68	136	50	161	1021	16
<i>Berberidaceae</i>	1	1	100	3	5	60
<i>Betulaceae</i>	1	2	50	2	3	67
<i>Boraginaceae</i>	17	37	46	41	223	18
<i>Brassicaceae</i> (<i>Cruciferae</i>)	40	103	39	68	315	22
<i>Campanulaceae</i>	2	6	33	5	56	9
<i>Capparidaceae</i>	2	3	67	2	19	11
<i>Caprifoliaceae</i>	2	3	67	5	8	62.5
<i>Caryophyllaceae</i>	21	38	55	54	338	16
<i>Celasteraceae</i>	1	2	50	2	4	50
<i>Ceratophyllaceae</i>	1	1	100	1	1	100
<i>Chenopodiaceae</i>	22	37	59	54	177	31
<i>Cistaceae</i>	2	3	67	4	8	50
<i>Convolvulaceae</i>	3	3	100	7	44	16
<i>Cornaceae</i>	1	1	100	1	3	33
<i>Corylaceae</i>	1	2	50	2	4	50
<i>Crassulaceae</i>	4	6	67	9	29	31
<i>Cucurbitaceae</i>	1	5	20	1	8	12.5

Table 4 continued

Families	Genera			Species		
	GNP	Iran	%	GNP	Iran	%
<i>Cuscutaceae</i>	1	1	100	4	16	25
<i>Dipsacaceae</i>	4	5	80	7	40	17.5
<i>Ebenaceae</i>	1	1	100	1	1	100
<i>Elaeagnaceae</i>	1	2	50	1	2	50
<i>Euphorbiaceae</i>	3	5	60	13	79	16
<i>Fabaceae (Papilionaceae)</i>	20	56	36	121	c. 1000	12
<i>Fagaceae</i>	1	2	50	2	8	25
<i>Frankeniaceae</i>	1	2	50	1	3	33
<i>Fumariaceae</i>	2	2	100	5	15	33
<i>Gentianaceae</i>	1	4	25	1	20	5
<i>Geraniaceae</i>	3	5	60	12	39	31
<i>Grossulariaceae</i>	1	1	100	1	4	25
<i>Hammamelidaceae</i>	1	1	100	1	1	100
<i>Hypericaceae (Guttiferae)</i>	1	1	100	7	16	44
<i>Juglandaceae</i>	1	2	50	1	2	50
<i>Lamiaceae (Labiatae)</i>	28	46	61	65	346	19
<i>Linaceae</i>	1	1	100	4	16	25
<i>Loranthaceae</i>	1	3	33	1	4	25
<i>Lythraceae</i>	1	4	25	1	13	8
<i>Malvaceae</i>	3	12	25	5	76	7
<i>Monotropaceae</i>	1	1	100	1	1	100
<i>Moraceae</i>	2	3	67	2	8	25
<i>Oleaceae</i>	2	5	40	4	9	44
<i>Onagraceae</i>	2	4	50	5	22	23
<i>Orobanchaceae</i>	1	3	33	8	45	18
<i>Oxalidaceae</i>	1	1	100	1	1	100
<i>Paeoniaceae</i>	1	1	100	1	1	100
<i>Papaveraceae</i>	5	5	100	8	40	20
<i>Plantaginaceae</i>	1	1	100	3	23	13
<i>Platanaceae</i>	1	1	100	1	1	100
<i>Plumbaginaceae</i>	3	4	75	8	97	8
<i>Podophyllaceae</i>	2	3	67	2	4	50
<i>Polygalaceae</i>	1	1	100	1	7	14
<i>Polygonaceae</i>	4	8	50	23	78	29
<i>Portulacaceae</i>	1	1	100	1	1	100
<i>Primulaceae</i>	5	8	62.5	5	36	14
<i>Punicaceae</i>	1	1	100	1	1	100
<i>Ranunculaceae</i>	11	21	52	27	149	18
<i>Resedaceae</i>	1	3	33	2	14	14
<i>Rhamnaceae</i>	2	5	40	6	13	46
<i>Rosaceae</i>	19	27	70	44	157	28
<i>Rubiaceae</i>	6	16	37.5	20	c. 100	20
<i>Rutaceae</i>	2	2	100	3	20	15
<i>Salicaceae</i>	2	2	100	6	17	35
<i>Santalaceae</i>	1	1	100	2	6	33
<i>Scrophulariaceae</i>	9	30	30	38	c. 210	18
<i>Solanaceae</i>	5	9	56	13	44	30

Table 4 continued

Families	Genera			Species		
	GNP	Iran	%	GNP	Iran	%
<i>Tamaricaceae</i>	2	3	67	4	38	11
<i>Thymelaeaceae</i>	3	5	60	3	11	27
<i>Tiliaceae</i>	1	3	33	1	7	14
<i>Ulmaceae</i>	3	3	100	5	8	62.5
<i>Urticaceae</i>	2	3	67	3	9	33
<i>Valerianaceae</i>	2	2	100	9	29	31
<i>Verbenaceae</i>	1	3	33	1	5	20
<i>Violaceae</i>	1	1	100	6	14	43
<i>Vitaceae</i>	1	2	50	1	2	500
<i>Zygophyllaceae</i>	5	7	71	6	24	25
Monocotyledones						
<i>Alismataceae</i>	1	3	33	1	5	20
<i>Amaryllidaceae</i>	2	6	33	3	9	33
<i>Araceae</i>	2	4	50	2	11	18
<i>Cyperaceae</i>	6	c. 15	40	22	c. 150	15
<i>Dioscoreaceae</i>	1	1	100	1	1	100
<i>Iridaceae</i>	3	4	75	12	34	35
<i>Juncaceae</i>	2	2	100	8	22	36
<i>Lemnaceae</i>	2	3	67	4	5	80
<i>Liliaceae</i>	13	27	48	56	232	24
<i>Orchidaceae</i>	10	17	59	22	46	48
<i>Poaceae (Gramineae)</i>	53	108	49	111	367	30
<i>Potamogetonaceae</i>	1	2	50	1	10	10
<i>Typhaceae</i>	1	1	100	2	7	29
<i>Zanichelliaceae</i>	1	4	25	1	4	25
Total: 107 of the c. 155 families in Iran	542	c. 1200	45%	1302	c. 7000	19%

Table 5: Number of species in genera with more than 10 species with their respective number of species in Iran

Genus	GNP	Iran	Genus	GNP	Iran
<i>Astragalus</i>	45	ca. 600	<i>Trifolium</i>	13	49
<i>Allium</i>	18	80	<i>Artemisia</i>	12	31
<i>Veronica</i>	17	56	<i>Bromus</i>	11	35
<i>Silene</i>	16	97	<i>Euphorbia</i>	11	63
<i>Vicia</i>	16	46	<i>Alyssum</i>	10	30
<i>Centaurea</i>	15	74	<i>Polygonum</i>	10	32
<i>Carex</i>	15	50	<i>Rumex</i>	10	23
<i>Cousinia</i>	14	208			

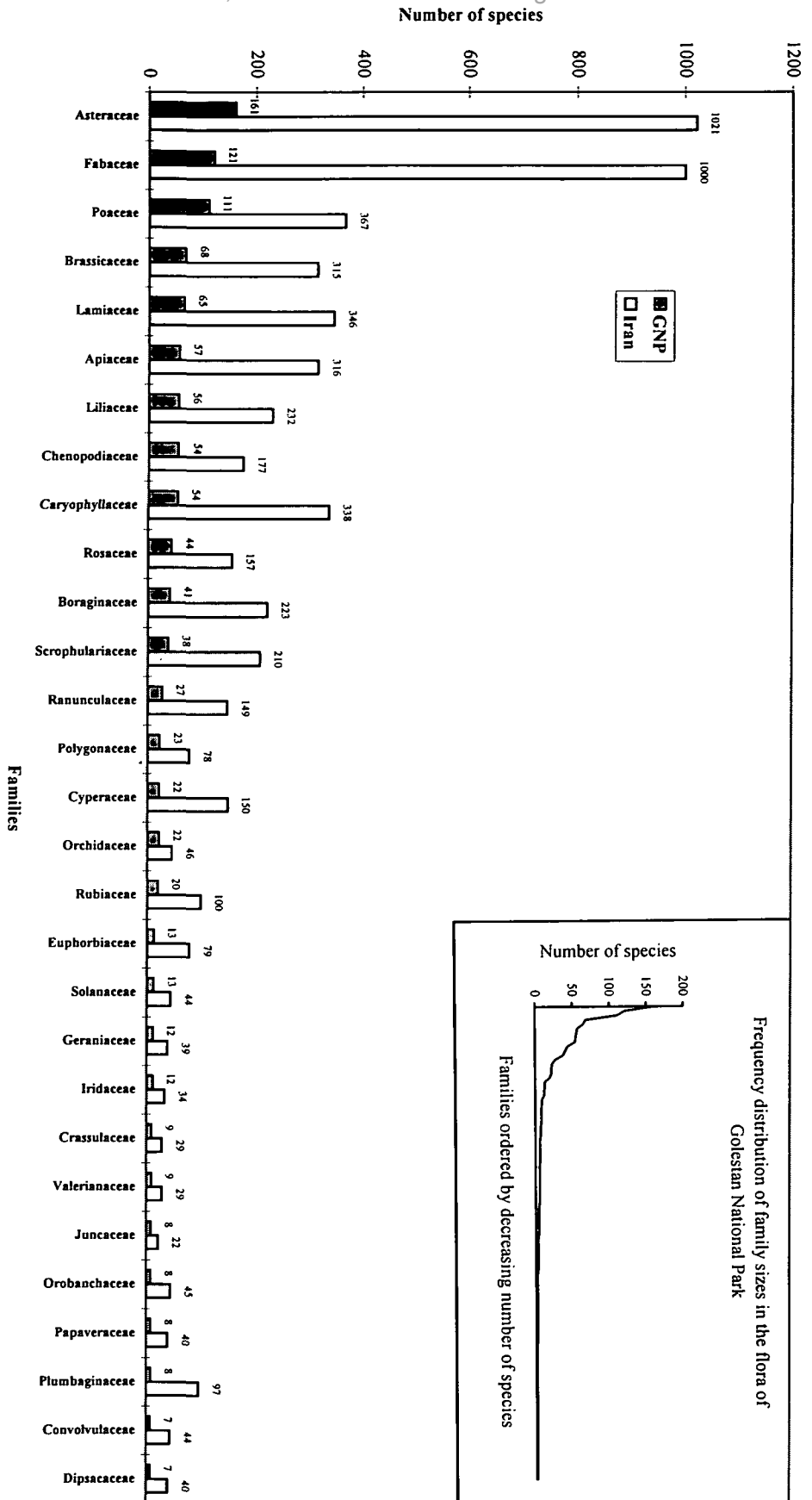


Fig. 30: Comparison of selected large families size in Golestan National Park and Iran. The frequency distribution of family sizes in GNP is shown in the upper right hand corner

4.2 Species diversity and altitude

The high altitudinal differences in the Park provide a good tool to study the diversity of species along altitude gradients. The altitude ranges for each species is provided in the main list of vascular plants, based on the phytosociological relevés and herbarium specimens (see chapter 3.1 "Material and methods"). In order to find the number of species in various altitudes, the species are classified into altitudinal ranges, 450-1000, 450-1500 etc (see vertical axis in Fig. 31). Note that the ranges are generalized to show only minimum and maximum values in which a group of species falls, although many species may have more restricted ranges than the 10 classified categories. In Fig. 31-A, the number of species in different altitude ranges is presented. Evidently a large number (335 species) are found in altitudes from 1000-1500 m. This is followed by species which grow in altitudes from 450 to 2000 m with 199 species. The number of species in altitudes from 450-1000, 450-1500 and 1000-2000 are rather similar with 134, 139 and 157 species, respectively. The number of species in altitudes from 1500-2400 and 2000-2400m decrease to 36 and 25 species, respectively. In Fig. 31-B, the surface area of each altitude range is given according to REC (1994). In order to see the correlation between altitudinal ranges and species diversity, the percentage of species and the percentage of surface areas in each altitude range are correlated using this formula:

$$\frac{\% \text{ species in a given altitudinal range}}{\% \text{ surface area in that altitudinal range}} \times 100$$

The results are shown in Fig. 31-C. It is difficult to interpret these astonishing results. Certainly many factors are responsible for such an altitudinal diversity pattern in the Park like anthropogenic factors, orographic structures, the interaction of macro- and microclimates, vegetation structure, faunal structure, etc. In order to determine the main factors influencing the plant diversity, some of these measurable factors may be analysed in the future by a powerful computer programme. Taking these complications in mind, a very generalized scheme of species diversity with regard to altitudinal gradients is given in the following paragraphs. The data need to be compared with the literature from other parts of the world. Some examples of the characteristic species in each altitude range with references to their distribution map (see chapter 7) are mentioned.

I. 450-1000 m: Includes a narrow zone along the Madrasu valley from Tangerang to Sharleq and the western border of the Park. Although the number of species restricted to this range is not very high (134 species), they show the highest richness in relation to available surface area. This zone has some special climatical and orographical characters which provide a wide range of habitats: Closed lowland forests, steep and vertical cliffs and riparian vegetation are among the wide range of biotopes in the lowland. More peculiar is the unique humid and warm climate in those parts which is characterized by a number of highly interesting C4-grasses, not previously known from Iran (*cf.* Akhani & Scholz 1999). Other important factors are anthropogenic influences and a wide range of man-made habitats. One outstanding kind of such habitats are the successional communities of previously destroyed forests which are usually rich in species (see chapter 2.3.2. "Successional scrub communities"). A last but not final reason for the high diversity value of this part is the fact that this part of the Park is the most accessible one and has continuously been explored by many botanists. Examples of species restricted to these altitude range are: *Atriplex patula* (Map 295), *Bothriochloa bladhii* (Map 791), *Catapodium rigidum* (Map 805), *Celtis australis* (Map 659), *Diospyrus lotus* (Map 346), *Froriepia subpinnatta* (Map 52), *Heteropogon contortus* (Map 828), *Oplismenus undulatifolius* (Map 844), *Oxalis corniculata* (Map 507) and *Populus caspica* (Map 621).

II. 450-1500 m: Includes those species with distributions overlapping with the first group but extending further to 1500 m. The number of this group (139 species) is rather high, but considering the fact that the available area is four times larger than the available area for the last group we see that the species richness correlated with surface area is low. One important reason for the lower correlation between species diversity and surface area in this group is the fact that only those species may occupy the potentially available surface area

which are primarily growing in forested zones. Many of these species are not able to occupy the vast surface area because of unsuitable dry climatic conditions in the southern and northern parts of the Park. Many species with an altitudinal range between 450-1500 m grow successfully in lower altitudes but penetrate into the surrounding slopes with lower frequency and dominance like *Parrotia persica* (Map 432), *Cleistogenes serotina* (Map 806) and *Zelkova carpinifolia* (Map 663). Other examples of species growing in altitudinal zone between 450 and 1500 m are: *Alnus subcordata* (Map 172), *Artemisia vulgaris* (Map 89), *Dictamnus albus* (Map 618), *Mentha aquatica* (Map 458); *Myriactis wallichii* (Map 142), *Orchis adenocheila* (Map 771), *Pennisetum orientale* (Map 845), *Sambucus ebulus* (Map 249) and *Sideritis montana* (Map 476).

III. 450-2000 m: Includes those species with an overlapping range with the first and second group which are also found in altitudes to 2000 m. The absolute number of this group with 199 species is higher than the second group but shows a similar correlation with the available surface area. Most of the species in this group are forest or forest adopted elements with high altitudinal ranges. Such forest elements are common in lowland, sub-montane and montane forests, dominated by *Quercus castaneifolia* and *Carpinus betulus*. A remarkable number of those species are pteridophytes which are usually cold-resistant plants like *Asplenium adiantum-nigrum* (Map 3), *A. ruta-muraria* (Map 4), *A. trichomanes* (Map 5), *Ceterach officinarum* (Map 6), *Phyllitis scolopendrium* (Map 7) and the hygrophilous horsetail *Equisetum ramosissimum* (Map 11). Common trees and shrubs in these ranges are *Quercus castaneifolia* (Map 417), *Tilia platyphyllos* subsp. *caucasica* (Map 658), *Acer velutinum* (Map 30), *Cornus sanguinea* subsp. *australis* (Map 331), *Colutea buhsea* (Map 374) and *Rubus dolichocarpus* (Map 593). Examples of herbal undergrowth or scrub associated species are: *Festuca drymeia* (Map 823), *Laser trilobum* (Map 58), *Lactuca georgica* (Map 137), *Clinopodium umbrosum* (Map 443), *Linosyris vulgaris* (Map 141), *Cerinthe minor* (Map 177), *Lithospermum purpureocaeruleum* (Map 185) and *Euphorbia amygdaloides* (Map 347).

IV. 450-2400 m: The species classified into this category have the highest altitudinal amplitude in the area. Naturally the number of species which can tolerate such a high altitudinal range is not remarkable. Therefore a very low correlation with the surface area can be expected. Like the preceding group many of those species are forest elements which grow from lowland to subalpine forests and often penetrate into *Quercus macranthera* forests. Two outstanding woody examples are *Carpinus betulus* (Map 333) and *Mespilus germanica* (583). Herbal species like *Viola alba* (762), *V. sieheana* (Map 676), *Festuca gigantea* (Map 824), *Lapsana communis* (Map 139), *Alliaria petiolata* (Map 201), *Geum urbanum* (Map 581), *Scutellaria tournefortii* (Map 475), *Poa nemoralis* (Map 856) and *Hesperis hyrcana* (Map 229) are undergrowth forest elements with high altitudinal amplitude. Some of the species like *Carpinus orientalis* (Map 333), *Acer monspessulanum* subsp. *turcomanicum* (Map 28) and *Prunus divaricata* (587) are important shrubby species common in lowlands, montane and subalpine scrubs and open woodlands. Further examples of this group are common species in scrub and montane steppes (with or without shrub) like *Onosma dichroantha* (Map 194, Fig. 18, C), *Teucrium chamaedrys* (Map 483), *Medicago sativa* (Map 389), *Hypericum elongatum* (Map 434), *Festuca valesiaca* (Map 824), *Allium rubellum* (Map 727) and *Dactylis glomerata* (Map 810).

V. 1000-1500 m: An outstanding group with the highest number of species. Evidently its high diversity is not due to the available surface area (Fig. 31-A, B, C). Most of the species belonging to this group are *Artemisia* steppe elements which are restricted to the Mirza-Baylu plains in the southern parts of the Park, the gentle slopes in the northeastern and large parts of the southern and northern border of the Park. Examples are several *Artemisia* species, *Neotorularia dentata* (Map 233), *Goldbachia laevigata* (Map 228), *Cousinia arctidifolia* (Map 110), *C. neurocentra* (Map 115), *Lappula sinaica* (Map 181), *Nonea turcomanica* (Map 193). A remarkable number of species are halophytes and xerohalophytes restricted to very small areas in the Mirza-Baylu plain and the southern border of the Park around Cheshmeh Khan like *Anabasis aphylla* (Map 291), *Atriplex verrucifera* (Map 297), *Halothamnus glaucus* (Map 304) and *Climacoptera brachiata* (Map 302, Fig. 19, D). Most of the species with such an altitudinal amplitude are very rare or even threatened within the Park. Due to the high number of species and the small surface area for such habitats, an expansion of the Park borders in order to include the neighbouring plains in the south and the north is strongly recommended. Such an expansion would

not only increase and protect the plant diversity but is also important for the faunal diversity. The isolated threatened population of gazelle (*Gazella subgutturosa*) in the Mirza-Baylu plain (Fig. 10, A) and the very small population of this species between Soolegerd and Lohondor support such an expansion. The limitation of grazing territory for these animals, particularly during dry years push them off the Park and is resulting in an drastical decrease of the population. On the other hand, in some years, an increase of the gazelle population may impact the natural vegetation. This problem can only be solved by the extension of the Park boundaries.

VI. 1000-2000 m: The number of species in this zone (157) is rich. This is due to various reasons. First, both in forest and steppe zones there are various naturally definable plant communities which have their own accompanying species. Second, the available surface area is also considerable. However, diversity correlated with surface area is low. In the forest zone the montane forest under the *Quercus macranthera* zone is more or less restricted from 1000-2000 m. *Acer platanoides* (Map 29) is one of the tree elements of this altitudinal range. Other forest and scrub examples are *Vicia crocea* (Map 410), *Petasites hybridus* (Map 144, Fig. 8, A) and *Vinca herbacea* (Map 71). The number of montane steppe elements is considerable. Particularly *Stipa* steppe or *Stipa* accompanying communities are very common in this altitudinal range, such as *Stipa pulcherrima* (Maps 871, 872) and *St. zaleskii* (Maps 871, 873). Other steppe and scrub elements are *Nonea mucronata* (Map 309), *Euphorbia humilis* (Map 351), *Astragalus retamocarpus* (Map 356), *Agropyron cristatum* (Map 781), *Thalictrum isopyroides* (Map 557), *Arabidopsis pumila* (Map 212), *Tulipa micheliana* (Map 753) and *Zosima absinthifolia* (Map 70).

VII. 1000-2400 m: The species colonizing this range are not considerable in number (58 species) and the diversity in relation to the vast available surface area shows the lowest proportion. However, there are very important woody species more or less limited to this range like *Juniperus excelsa* (Map 21), *Sorbus torminalis* (Map 598) and *Quercus macranthera* (Map 418). From the low number of species, we may conclude that the associated elements with these trees are not homogeneous. There are perhaps several sociologically separable units associated with these trees whose natural range is not matched with here artificially created altitudinal groups. There are some important mountain steppe elements which are also limited in altitudes from 1000-2400 m like *Onobrychis cornuta* (393), *Poa densa* (Map 853) and *Thymus kotschyanus* (Map 626) and *Cousinia decipiens* (Map 111), *Echinops ritrodes* (Map 122, Fig. 17, A) and *Piptatherum holciforme* (Map 849).

VIII. 1500-2000 m: The number of species restricted to this range is remarkable with 103 species, although the surface area is not very considerable. The reason for such a high diversity is perhaps a number of suitable habitats and a variation of biotopes in altitudes from 1500 to 2000 m. Some montane forest elements like *Salvia glutinosa* (Map 469, Fig. 22, B), *Fragaria vesca* (579), *Rhynchosocorys maxima* (Map 633, Fig. 25, D), *Chaerophyllum bulbosum* (Map 40, Fig. 13, D) and *Cynoglossum kandavanensis* (Map 178, 13, J-K) are examples of such species. Many montane steppe species and *Juniperus excelsa* accompanied elements prefer to colonize in this altitudinal range such as *Eremurus spectabilis* (Map 738), *Silene aucheriana* (Map 275), *Centaurea kotschyi* (Map 99, Fig. 16, E), *Clausia turkestanica* (Map 178) and *Pimpinella tragiium* (Map 62). One reason for the high number of known species in this zone may be the extensive collection activities in the Almeh area (c. 1700-1900 m), during the thirty years of visitation by many collectors.

IX. 1500-2400 m: This zone shows a very low number of species (36), this altitude range covers one-third of the surface area. This group contains common species with groups 8 and 10. It seems that these two latter groups are well separable from each other and therefore their common species are rather few. There are both mountain steppe elements and shrubs which fall in this group like *Juniperus sabina* (Map 22), *Lonicera bracteolaris* (Map 246), *Sorbus persica* (Map 597), *Cirsium bornmuelleri* (Map 107), *Silene vulgaris* (Map 284), *Astragalus kopetdaghi* (Map 359) and *Chenopodium foliosum* (Map 300, Fig. 19, F).

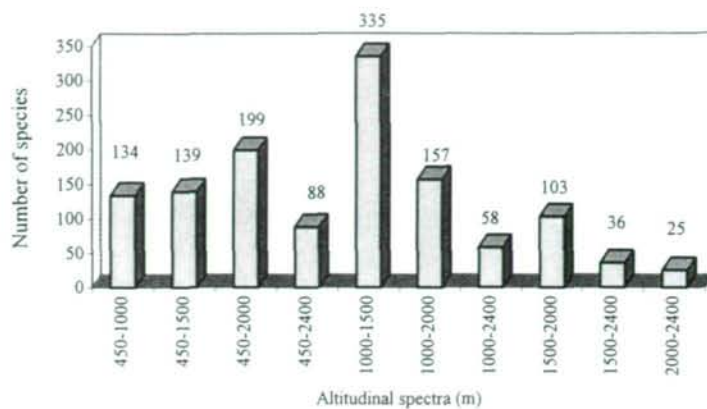


Fig. 31-A: The number of species in different altitude ranges in Golestan National Park

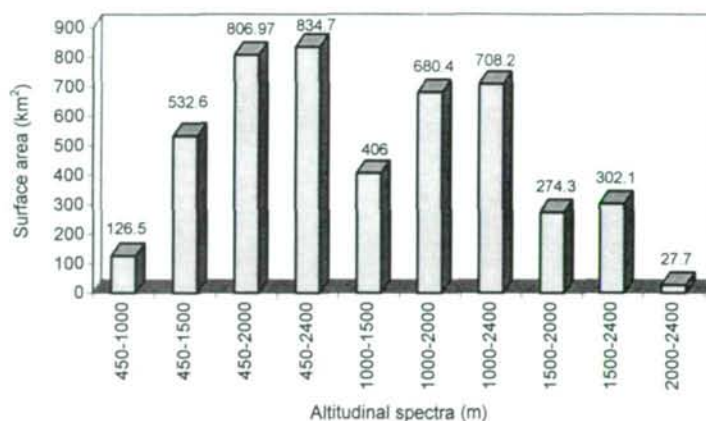


Fig. 31-B: Surface areas of various altitude ranges in Golestan National Park

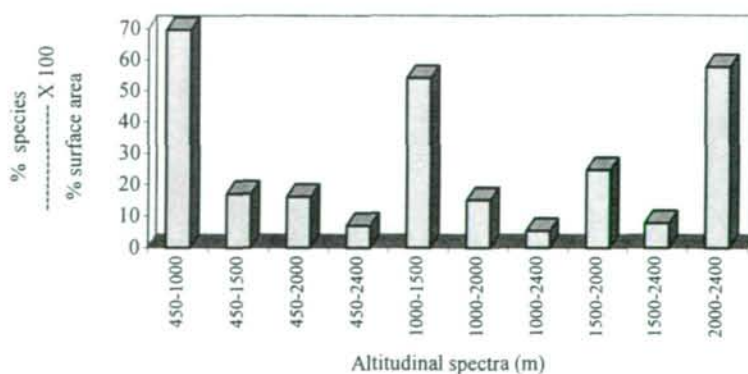


Fig. 31-C: Correlation between species diversity and surface areas in various altitude ranges in Golestan National Park

X. 2000-2400m: This last group are subalpine species with a very low species number (25 species). However, due to the small available area (2700 hectares), its diversity in relation to the surface area is high. Most of the species are restricted to the top of Divar-Kaji and a few to the Alu-Baq Mountains. Examples are *Acer hyrcanicum* (Map 22), *Cousinia smirnowii* (Map 116, Fig. 16, K), *Erigeron acer* (Map 123, Fig. 17, D), *Tragopogon kotschyi* (Map 163, Fig. 17, K), *Asyneuma amplexicaule* (Map 241, Fig. 18, F), *Silene viscosa* (Map 283, Fig. 19, C), *Secale montanum* (Map 860), *Sempervivum iranicum* (Map 338, Fig. 20, B-C), *Ribes melanathum* (Map 431), *Alopecurus textilis* (Map 786) and *Elymus transhyrcanus* (Map 815). The expansion of the Park into the neighbouring Qorkhod Protected Area would increase the altitudinal amplitude of the Park and therefore certainly would increase the number of subalpine and alpine species. The highest peak of Qorkhod Mountain is 2811 m high.

From the data presented above we can conclude that (1) the diversity of species is negatively correlated with the increase of the altitude amplitude; (2) based on the available data the highest absolute plant diversity in our area is on an altitude between 1000 m and 1500 m; and (3) most of the species show an altitudinal amplitude of 500 m.

4.3 Growth form spectra

Growth form spectra sometimes reveal interesting and unsuspected ecological relations (Braun-Blanquet 1964). The wide range of the growth forms of the vascular flora of Golestan National Park is one of the most interesting subjects and it is important to determine the prevailing life forms and adaptation strategies along climatical and altitudinal gradients. For the purpose of this research I present only a rough and cumulative draft of the various growth forms in our area. In a detailed survey the distribution of growth forms will be studied comparatively in various vegetation types and along physical and ecological gradients. In the general list of plants the growth form is provided for each species, according to Dierschke (1994) which is the enlarged system of Raunkiaer by Ellenberg & Mueller-Dombois (1967). The system adopted by Dierschke for Central European plants is simplified and slightly changed for our area (see chapter 3.3.1. II "Growth forms"). In Fig 32 the frequency distribution of each form is given together with the proportion of main life forms (pie chart). For a comparison, the number and percentage of main life forms for Kavire Meyghan (a salt pan in Central Iran) according to Akhani (1989) and Central Europe according to Ellenberg (1996) is given in Table 6. Leafy erect hemicryptophytes (scapose hemicryptophytes according to Dierschke 1994) with 265 species (20.4%) and leafy erect therophytes (scapose therophytes according to Dierschke 1994) with 258 species (19.8%) are the largest growth forms in our area. These are followed by graminoid hemicryptophytes with 90 species (7%), bulbous and tuberous geophytes, and rhizomatous geophytes each with 75 species (5.8%) of the flora. The total number of hemicryptophytes (undivided) with 463 species (35.6%) and the total number of therophytes (undivided) with 390 species (30%) compose the majority of the flora. The high percentage of hemicryptophytes has already been seen in many other parts of the world, particularly in the European flora (Ellenberg 1996, Dierschke 1994, Braun-Blanquet 1964). The percentage of therophytes (30%) falls between the Central European and N African flora, with 18.9% and 50%, respectively. The *Artemisia* steppe and scrub zones of the Park are rich in annuals. A high percentage of geophytes (15% or 195 species) is of great ecological and conservational importance. The majority of them are bulb, tuber, root tuber and rhizomatous geophytes. These bulb, tuber and root tuber geophytes are well represented in several vegetation types, but rarely occurs in closed forests. They occur usually as remote individuals with low cover abundance and often with different phenology compared to the majority of species. The presence of 3.1% or 40 tree species in our area is astonishing. The trees contribute only to 1.8% of the Central European flora. This probably is due to the fact that the Caspian forests, as tertiary relic forests, are richer than the Central European forests in their tree elements. Shrubs with 60 species (4.7%) are also well represented in our area. The number of ever-green trees and shrubs is very low in the area. However, these species play a great role in the vegetation, like *Juniperus* species, *Ilex spinigera* and *Danaë racemosa*. Cushion-form chamaephytes (herbal and woody) with 69 species (5.3%) also belong to the remarkable growth forms. Only a few of the cushion-forms (10 species) are thorny. This figure is untypical for the Iranian flora. In other parts of

Iran, particularly in Zagros and the southern slopes of the Alborz Ranges the percentage of thorn-cushions is certainly much higher. A few truly aquatic plants occur in the area (c. 1%), although this number will increase when the subaquatic and hygrophilous plants are included. Many of these species are included into the other groups like rhizophytes, graminoid hemicryptophytes etc. Among the rare growth forms are liana, with only 4 species (*Periploca gracea*, *Jasminum officinale*, *Vitis sylvestris* and \pm *Malacocarpus crithmifolius*). There are only 9 species of root parasite geophytes, belonging to the genera *Monotropa* and *Orobanche*. There are about 38 rosette species of which the majority (27 species) are hemicryptophytes and only 11 species annual. The number of semi-rosette hemicryptophytes with 36 species is also remarkable. The number of succulents (without considering the nature of succulency) is 48 (c. 4%). Most of the succulents belong to the *Crassulaceae* and *Chenopodiaceae*. The number of species which produce thorns (every kind of thorn) is 75 species (6%). Many members of *Asteraceae* (tribe *Cynarea*) and some *Rosaceae* genera (*Rosa*, *Rubus*), the genera *Acanthophyllum*, *Acantholimon*, *Berberis*, *Ilex*, *Lycium*, *Capparis*, *Noaea*, *Eryngium* and some species of *Astragalus*, *Onobrychis* and *Ononis* belong to thorny plants in our area.

Table 6: The number and percentage of growth forms in Golestan National Park in comparison with Kavire-Meyghan (a salty pan located in C Iran, near Arak) (Akhani 1989) and Central Europe (Ellenberg 1996)

Growth forms	No in Golestan	% Golestan	% Kavire Meyghan	% C Europe
Phanerophytes (tree)	40	3.1	-	1.8
Nanophanerophytes (shrub)	60	4.7	1	8.4
Chamaephytes	131	10.2	8.6	10.8
Hemicryptophytes	463	35.9	40.6	45.0
Geophytes	195	15.1	2.4	10.4
Therophytes	390	30.2	45.3	18.9
Hygrophytes	10	0.8	2.4	4.6

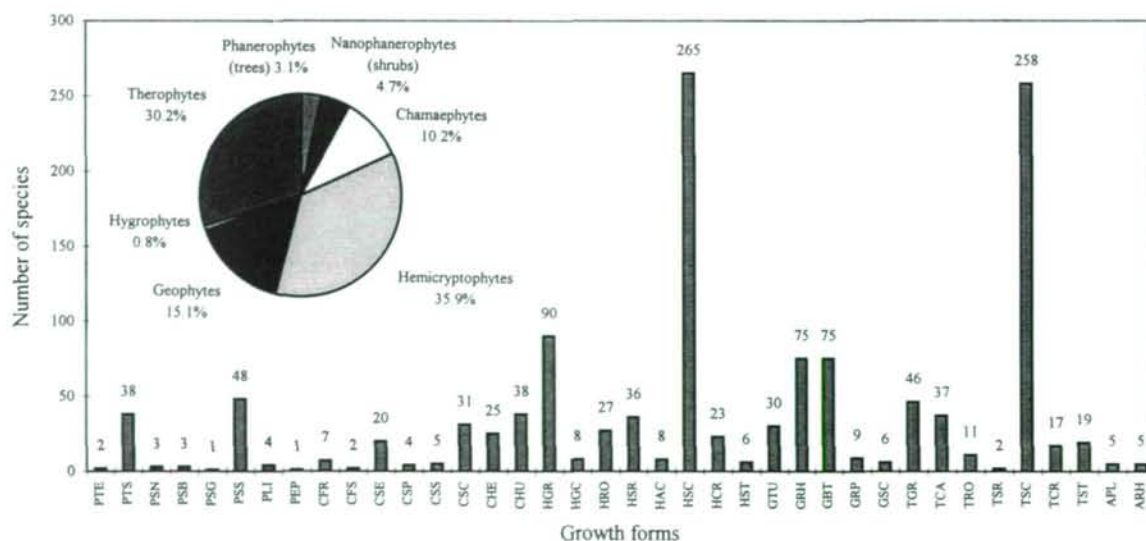


Fig. 32: Growth form spectra and proportion of main growth forms (pie chart) of the vascular flora of Golestan National Park. For abbreviations see page 37.

4.4 Rarity and threat categories

In the annotated list of species the frequencies and threat categories in the Park are provided, based on the number of records. The number of records are based on 570 phytosociological relevés and ca. 5,200 herbarium specimens (see chapter 3.1 "Material and methods"). The total number of records in all relevés is 14,648 (an average of 25.7 species in each relevé). Therefore, including those from herbarium specimens and literature, a total of ca. 20,000 records are used to determine the number of records on which the rarities and threat categories are based. In Fig. 33 the frequency of species containing 1, 2, 3 etc. records is shown. This matches well a logarithmic curve (compare with frequency distribution of families in Fig. 30, page 236). In one extreme *Viola alba* s. l. with 170, *Festuca valesiaca* with 166, *Brachypodium sylvaticum* with 164, *Quercus castaneifolia* with 162 and *Dactylis glomerata* with 156 records, respectively, belong to the most frequent species in the Park. In another extreme are 245 species which are only known from one record, 140 species from 2 records, 98 species from 3 records. Based on the number of records, the threat categories are provided for the species within the Park: The species with 1 to 3 records are considered as endangered (END), species with 4 to 8 records as vulnerable (VUL), species with 9 to 15 records as rare (RAR) and the remaining species over 15 records are regarded as safe or non-threatened. In a few cases indeterminable (IND) and species with unknown status (SUN) are also provided (see Table 7). It should be noted that these categories do not essentially reflect the condition of species according to IUCN criteria for a given area, but show the degree of rarity within the Park. These categories are important for monitoring, research, teaching and management programmes. No species is considered to be extinct, although several species have been known once from the Park and never be found again in spite of several attempts like *Silene sojakii*, *Cousinia qarehbilensis* and *Centaurea solstitialis*. Some may have been eliminated by competition, some grow only in particular years with enough precipitation and some may have a very special habitat or a very small range which may only accidentally be discovered. According to the data presented in Table 7, a large number of species are known only from 1-3 records (483 species or 37.6%) and are endangered within the Park. A further 297 species (23.1%) are known only from 4-8 records and therefore considered as vulnerable within the Park. 164 species (12.7%) are known only from 9-15 records and designated as rare species. We see that ca. two-third of the species in the Park are found only 1 to 15 times each, based on 20,000 records. Only 290 species (22.5%) are frequent in the Park with over 15 records each.

In order to give a better impression of the threats, the threat for species in Iran is provided as well (Table 8). This is a first attempt of this kind and therefore the suggested categories are in many cases provisional. They are based on the available records in the literature (mostly according to Flora Iranica), beside the author's experiences in many parts of Iran, particularly in desertic parts of the country. During these evaluations I found that in many cases the suggested threat categories within the Park matched with those of the species in Iran. This is true only for the species of which Golestan is part of the main range of their distribution, as most of the Hyrcanian and Khorasan-Kopetdagh elements. Therefore the suggested threat categories for these species are more or less reliable. The figures for threat categories in Iran are of course very different from those of the Park (cf. Table 8). Based on the 1,280 species which were evaluated according to IUCN threat categories, 153 species are endangered (END), 102 species vulnerable (VUL), 127 species rare (RAR) and 54 species are indeterminate (IND) in Iran. Therefore 436 species which belong to threatened species in Iran are found in Golestan National Park. A further 736 species are safe and 108 species are with unknown or insufficiently known status.

Table 7: Number and percentage of various threat categories of the flora of Golestan National Park. The figures under each category represent the number of records

Threat categories	END				VUL						RAR 9-15	IND ?	SUN ?	NOT <15
	1	2	3	all	4	5	6	7	8	all				
No of species	245	140	98	483	89	67	71	35	35	297	164	31	21	290
Percent	19.1	10.9	7.6	37.6	6.9	5.2	5.5	2.7	2.7	23.1	12.7	2.4	1.6	22.5

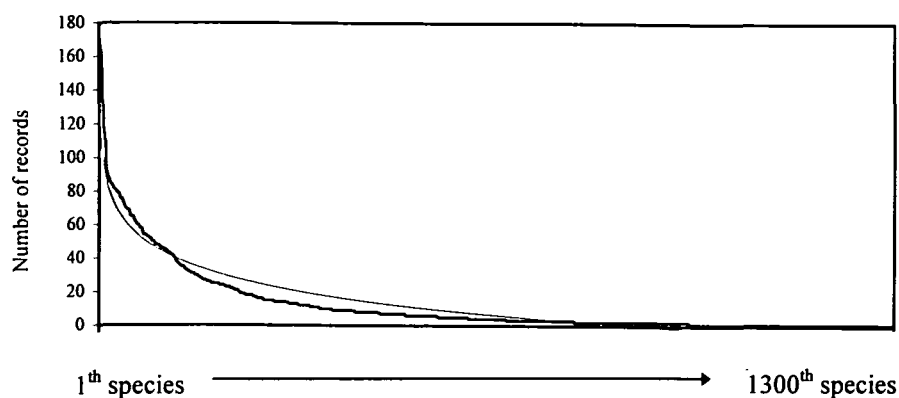


Fig. 33: Frequency distribution of species ordered by decreasing number of records, with fitted logarithmic curve

Table 8: Number and percentage of various threat categories of the Iranian flora that occur in Golestan National Park

Threat categories	END	VUL	RAR	IND	SUN	NOT
Absolute	153	102	127	54	108	736
% in Golestan	12	7.9	10	4.2	8.4	57.5
% in Iran	2.2	1.5	1.8	0.8	1.5	10.5

Among the threatened following species are of great interest. Some of them are endemic (E) within the Park, some subendemic (S) which means they are found in the Park and a few localities in adjacent parts, some have been known until now only within and around the Park in Iran (P), some have been known from one or a few localities outside the Park (F), some from a few localities with disjunction (D), and some have economic importance (EI) and are under human impact elsewhere:

Acantholimon edmondsonii [E]
Acantholimon embergeri [S]
Acer hyrcanicum [F]
Actaea spicata [F]
Allium dictyoscordum [P]
Allium subvineale [P]
Allium vavillovii [F]
Alopecurus aequalis [P]
Althaea armeniaca [F]
Anabasis jaxartica [F]
Asparagus griffithii [D]
Astragalus memoriosus [E]
A. stenocarpus [F]
A. testiculatus [F]
Atraphaxis seravschanica [F]
Atriplex ornata [P]
Berberis orthobotrys [F]
Bombacilaena erecta [F]

Botrychium lunaria [F]
Bromus intermedius [D]
Carex pseudocyperus [P]
Centaurea golestana [E]
Centaurea iljinii [F]
Cephalanthera damasonium [F]
Ceratophyllum submersum [P]
Chorisporea iberica [F]
Cirsium turkestanicum [F]
Colutea porphyrogramma [S]
Corydalis chionophila [F]
Cousinia qarehbilensis [E]
C. smirnowii [F]
Crocus almehensis [E]
C. michelsonii [F]
Crucianella platyphylla [S]
Cynoglossum kandavanensis [F]
Delphinium biternatum [F]

Diaphanoptera stenocalycina [E]
Dictamnus albus [D]
Echium amoenum [E1]
Eminium alberti [F]
Epipactis microphylla [F]
Eremopyrum triticeum [D]
Eriocycla ghafooriana [E]
Erysimum kerbabaevii [P]
Ferula badrakema [E1]
Festuca akhaniai [E]
Fritillaria raddeana [F]
Froriepiea subpinnata [F]
Gagea glacialis [P]
Gagea lutea [P]
Glyceria arundinacea [D]
Haplophyllum obtusifolium [F]
Hordelymus europaeus [P]
Hypericum linarioides [F]
Johrenia golestanica [E]
Lactuca georgica [P]
Lamium purpureum [D]
Laser rechingeri [E]
Leutea gracillima [E]
Linosyris vulgaris [P]
Malacocarpus crithmifolius [F]
Matteucia struthiopteris [F]
Matthiola alyssifolia [F]
Mattiastrum turcomanicum [F]
Melica altissima [D]
Monotropa hypopithys [F]
Myosotis alpestris [P]
M. arvensis [P]
M. minutiflora [P]
Myriactis wallichii [F]
Odontites verna [F]
Ononis pusilla [F]
Orchis coriophora [F]
Orobanche orientalis [D]
Plantago podlechii [E]
Poa golestanensis [E]
Polygonum minus [F]
Polygonum mite [F]
Populus caspica [F]
Potamogeton natans [P]
Ranunculus lingua [D]
Rheum turkestanicum [F]
Rubus procerus [D]
Rumex caucasicus [P]
Salsola gemmascens [D]
Saponaria bodeana [F]
Sempervivum iranicum [F]
Seseli tortuosum subsp. *kiabii* [E]
Silene indepressa [F]
S. tenella [F]
S. sojakii [E]
Solanum kieseritzkii [F]
Spiraea hypericifolia [D]
Stachys subaphylla [E]
Sternbergia fischeriana [F]
St. lutea [F]
Suaeda linifolia [D]
S. physophora [D]
Tragopogon capitatus [P]
Trifolium ochroleucum [F]
Tulipa hoogiana [F]
Valerianella amblyotis [D]
Veronica beccabunga [F]
V. verna [F]
Vicia cassubica [S]
V. grandiflora [P]
V. pannonica [P]
V. venulosa [S]
Viola jordanii [P]

5 PHYTOGEOGRAPHY AND ENDEMISM

Golestan National Park is perhaps one of the best places for phytogeographical studies. First, because several phytogeographical units meet here together. Second, it has a very rich and unique mesic and xeric flora which provide the best tools for statistical analysis, and third there are many endemics and subendemics which characterize some distribution patterns. Due to limitation of time and space, I am not going to evaluate the phytogeographical importance of the vascular flora in details (this will be dealt with in a separate publication). In the annotated list of plants (chapter 3.3) the respective chorotype for each taxa is given, according to the last available informations. The "Comparative Chorology of the Central European Flora" by Meusel & al. (1965-1992) and "Chorology of Trees and Shrubs in SW Asia and Adjacent Regions" by Browicz (1982-1996) have been consulted for many species. The ranges of many Mediterranean species have been checked in Med-checklist (Greuter & al. 1984-1989). The distribution of the remaining species are based on reviews, monographs and informations gained in the floras, particularly Flora Iranica (Rechinger 1962-1997), Flora of Turkey (Davis 1965-1988), Flora of Iraq (Townsend 1966-1985) and Flora Europaea (Tutin & al. 1964-1980 & 1993). The terminology and delimitation of the main phytochoria (Irano-Turanian, Mediterranean, Euro-Siberian and Saharo-Sindian) is based on the known classical works, particularly that of Zohary (1973). I did not use the phytogeographical subdivisions and provinces previously proposed for the area, but rather followed the concept of Léonard (1988). Therefore the subdivisions proposed by Zohary (1973) and Takhtajan (1986) are not followed here. Using my own experience from reviewing several genera and field studies in many parts of Iran, I distinguished several distributional pattern groups after evaluation of the distribution data for 1300 species. The preparation of local distribution maps for 880 species (see distribution maps 1-880 in chapter 7) was also very helpful to see how each group is distributed within the Park. The distributional groups were easily characterized either by the geographical directions (i.e. IT^{W, C, E}) or by the known geographical areas (i. e. IT^{Khorasan & Kopetdagh}, IT^{Alborz} etc.). In Table 9 the numbers and percentages of each group (or combinations) with approximate delimitation of the subdivisions are given. I have avoided to draw the boundaries for each unit, because they still need further studies. Therefore, only a general draft of the phytogeographical position of the Park is summarized below.

As mentioned above, the terminology and delimitation of the main phytochoria (Irano-Turanian, Mediterranean, Euro-Siberian and Saharo-Sindian) is based on the known classical works, particularly those of Zohary (1973) and Léonard (1988/1989). The latter author based his system on the desert flora in the center and the south of Iran and has critically improved or changed Zohary's delimitation and his concept of Saharo-Sindian and Sudanian areas in SW Asia. As our area is less influenced by the central and southern Iranian desert flora, we meet here only a few biregional Irano-Turanian/Saharo-Sindian or triregional Irano-Turanian/ Mediterranean/Saharo-Sindian species.

The informations in Table 9 are diagrammatically presented in Figs. 34, 35, 36. As it is evident, a large part of the flora of the Park (40.6 %) belongs to the Irano-Turanian area which is followed by 15% Euro-Siberian species and only 0.5% Mediterranean species. The biregional Irano-Turanian/Mediterranean with 8%, Euro-Siberian/Mediterranean with 7%, Euro-Siberian/Irano-Turanian with 3%, and Irano-Turanian/Saharo-Sindian with 1% comprise 19% the flora of the area. A remarkable percentage of the species are Euro-Siberian/Irano-Turanian/Mediterranean (9%) and only 1% percent are Irano-Turanian/Mediterranean/Saharo-Sindian. Pluri-regional species with 10%, and cosmopolitan and subcosmopolitan species together with 3% and other species (chorology not yet determined) with 3 % characterize the flora of the area. These figures clearly show that the area has an Irano-Turanian flora in xeric and an Euro-Siberian flora in mesic zones, respectively. The condition of the Mediterranean area is a matter of discussion. The majority of the Mediterranean species in our area are either common in Irano-Turanian or in Euro-Siberian territories, or in both of them. The statistical data support Zohary (1973) and Browicz (1989) who include the Euxinian and Hyrcanian flora into the Euro-Siberian area. Therefore the inclusion of the area into the Sub-Mediterranean subregion by Meusel & al (1965) or into the Irano-Turanian area by Takhtajan (1986) is not followed here. The data in Table 9, and Fig. 34 show unequivocally that a high percentage of the Irano-Turanian species of Golestan National Park are endemic in the

Table 9: Number and proportion of various phytogeographical groups and their delimitation (see notes under the table) among the 1302 species in Golestan National Park

Phytogeographical areas (or combinations)	Abbreviation	Absolute	%
Irano-Turanian (omni and unclassified)	IT ^{omni} & IT	168	12.9
Irano-Turanian ^{Khorasan & Kopetdagh}	IT ^{KK}	111	8.5
Irano-Turanian ^{Aralo-Caspian}	IT ^{Aralo-Caspian}	6	0.5
Irano-Turanian ^{W & C}	IT ^{W & C}	56	4.3
Irano-Turanian ^E	IT ^E (Incl. IT ^{KK} & E)	47	3.6
Irano-Turanian ^C	IT ^C	67	5.2
Irano-Turanian ^{C & E}	IT ^{C & E}	34	2.6
Irano-Turanian ^{Caucasus-Turkmenian} & Irano-Turanian ^{Caucasus-Alborz}	IT ^{Cauc-Turk} & IT ^{Cauc-Alborz}	15	1.2
Irano-Turanian ^{Alborz} & Irano-Turanian ^{Khorasan, Kopetdagh & Alborz}	IT ^{Alborz} & IT ^{KK-Alborz}	22	1.7
Irano-Turanian ^{W & Alborz} & Irano-Turanian ^{W & Caucasus-Turkmenian}	IT ^{W & Alborz} & IT ^{W & Cauc-Turk}	8	0.6
Euro-Siberian	ES	78	6
Euro-Siberian ^{Hyrcanian}	ES ^{HY}	58	4.5
Euro-Siberian ^{Euxine-Hyrcanian}	ES ^{EH}	59	4.5
Mediterranean	M	7	0.5
Euro-Siberian/Irano-Turanian	ES-IT	6	0.5
Euro-Siberian ^{Hyrcanian} / Irano-Turanian	ES ^{HY} -IT	7	0.5
Transition between Euro-Siberian ^{Hyrcanian} either with Irano-Turanian ^{Khorasan-Kopetdagh} or Irano-Turanian ^{Alborz}	ES ^{HY} /IT ^{KK} & ES ^{HY} -IT ^{Alborz}	14	1.1
Euro-Siberian ^{Euxine-Hyrcanian} / Irano-Turanian	ES ^{EH} /IT	9	0.7
Euro-Siberian ^{Hyrcanian} / Mediterranean	ES ^{HY} -M	5	0.4
Euro-Siberian ^{Euxine-Hyrcanian} / Mediterranean	ES ^{EH} -M	28	2.2
Euro-Siberian/Mediterranean	ES-M	56	4.3
Euro-Siberian ^{Euxine-Hyrcanian or Hyrcanian} /Himalaya	ES ^{EH} -HIM & ES ^{HY} -HIM	5	0.4
Irano-Turanian/Mediterranean	IT-M	104	8
Irano-Turanian/Saharo-Sindian	IT-SS	11	0.8
Euro-Siberian/ Irano-Turanian/ Mediterranean	ES-IT-M	113	8.7
Irano-Turanian/Mediterranean/ Saharo-Sindian	IT-M-SS	10	0.8
Pluriregional	PL	125	9.6
Subcosmopolitan	SCO	16	1.2
Cosmopolitan	COS	19	1.5
Others and indeterminable	-	36	2.7
Total	-	1302	100

IT^{omni} & IT: Those species which are distributed in the whole of the Irano-Turanian area or have a wide range which cannot be categorized within the subdivisions defined in this work.

IT^{KK} (Khorasan & Kopetdagh): It includes the mountainous areas in NE Iran and the Irano-Turkmenistan Kopetdagh Range. This area is delimited in the W by the E extension of the Alborz Range and the South-Caspian lowland, in the S by the Dasht-e Kavir, in the E by the steppes along the Irano-Afghanistan borders and in the N by the Turkmenistan deserts.

IT^{Aralo-Caspian}: It corresponds more or less with the area defined by Takhtadjan (1986: 152) as Turanian or Aralo-Caspian or by Léonard (1988/1989) as IT3. Although both authors excluded the Central Iranian deserts from this area, there is ample evidence support the inclusion of the Central Iranian desert flora into the Aralo-Caspian.

IT^W: This is preliminarily defined Anatolian and western Iranian montane and submontane flora. Most of the species of this unit which occur in our area are also found in IT^C (see below). Only a few of the IT^W species reach far eastwards to our area.

IT^C: It includes species whose distribution is confined to the montane and submontane areas and the steppes in Central Iran (southern slopes of the Alborz Range, eastern slopes of the Zagros

Range), mountains in NE Iran and S Turkmenistan (IT^{KK}) and most of the west and central parts of Afghanistan.

IT^E: All the species which are distributed in IT^{KK} in our area but occur further E in Central Asia are classified under IT^E. These species may have various origin but most of them belong to the Turkestanian province and the Central Asiatic subregion (in the sense of Takhtajan 1986: 152), or IT4 and south IT3 in the sense of Léonard (1988/1989).

IT^{Caucasus-Turkmenian}: The species with a distribution pattern in the mountainous areas from Caucasus through Alborz in Iran to Kopetdagh in Turkmenistan.

IT^{Caucasus-Alborz}: Similar to the preceding group, but their range do not reach further NE to Kopetdagh.

IT^{Alborz}: Those species which are exclusively distributed in the montane steppes along the Alborz Range.

ES^{Hyrcanian}: Those species which are restricted to the forested zone in the South Caspian lowlands and the northeastern slopes of the Alborz Mountain and incorporated habitats.

ES^{Euxine-Hyrcanian}: The species which are common in ES^{Hyrcanian} and Euxine area (forested zone around the black sea and Caucasus).

Khorasan & Kopetdagh sector of the Irano-Turanian area and that a remarkable percentage belongs to the Hyrcanian parts of the Euro-Siberian area. Therefore phytogeographical importance and endemism of the species of these groups are discussed here in more detail.

Khorasan & Kopetdagh: This area is delimited in the west by the eastern extension of the Alborz Range and the southeastern Caspian lowland, in the south by the Dasht-e Kavir, in the east by the steppes along the Irano-Afghanistan borders (Harir-Rud River) and in the north and northwest by the Karakum desert. The biogeographical position of the Turkmenistan parts of this area have recently been discussed in a compilation of papers (Fet & Atamuradov 1994). Kamelin (1970) indicated 18% endemism for the whole Kopetdagh flora in Turkmenistan and Kamakhina (1994) 16.6% for Central Kopetdagh, respectively. Our results show 8.5% endemism of the whole flora of the Park and 21% endemism of the Irano-Turanian species (see Fig. 35). For a better evaluation of endemism in this area, an analysis of the whole flora is advisable. Based on my experiences there are many common species in this area which have separately been described first by the former Russian and Turkmenian botanists and later by the authors working on the Iranian and Afghanistan flora or vice versa. This fact causes problems when analysing the data in the literature. In the following list the endemic species in Kopetdagh and Khorasan occurring in our area are presented.

- | | |
|---|--|
| <i>Acantholimon edmondsonii</i> | <i>Cotoneaster ovatus</i> |
| <i>A. embergeri</i> (Fig. 23, H) | <i>Cousinia arctotidifolia</i> |
| <i>A. pterostegium</i> (Fig. 23, D, G) | <i>C. freynii</i> |
| <i>Acer monspessulanum</i> subsp. <i>turcomanicum</i> | <i>C. leucantha</i> |
| <i>Allium cristophii</i> | <i>C. meshhedensis</i> |
| <i>A. dictyoscordum</i> | <i>C. neurocentra</i> |
| <i>A. helicophyllum</i> (Fig. 26, E) | <i>C. qarehbilensis</i> |
| <i>A. vavilovii</i> (Fig. 26, F) | <i>C. rechingerae</i> |
| <i>Alyssum lanceolatum</i> | <i>C. smirnowii</i> (Fig. 16, K) |
| <i>Artemisia kopetdaghensis</i> | <i>C. turcomanica</i> |
| <i>A. ciniformis</i> | <i>Crepis turcomanica</i> |
| <i>Astragalus basineri</i> | <i>Crocus almehensis</i> |
| <i>A. brevidens</i> | <i>C. michelsonii</i> |
| <i>A. cartilagineus</i> | <i>Crucianella sintenisii</i> (Fig. 24, K) |
| <i>A. citrinus</i> | <i>Delphinium turkmenum</i> |
| <i>A. curvipes</i> | <i>Dianthus crinitus</i> subsp. <i>turcomanicus</i> |
| <i>A. khoshyailensis</i> (Fig. 20, D) | <i>Diaphanoptera stenocalycina</i> |
| <i>A. kopetdaghi</i> | <i>Eremostachys labiosiformis</i> (Fig. 21, H) |
| <i>A. memoriosus</i> | <i>Eremurus spectabilis</i> subsp. <i>subalbiflorus</i> |
| <i>A. nephtonensis</i> (Fig. 20, G) | <i>Erysimum ischnostylum</i> |
| <i>A. pendulinus</i> | <i>E. kerbabaevii</i> |
| <i>A. pseudoindurascens</i> | <i>Ferula badrakema</i> (Fig. 15, F-G) |
| <i>A. rawlinsianus</i> (Fig. 20, I) | <i>Festuca akhanii</i> |
| <i>A. schahrudensis</i> | <i>Fritillaria raddeana</i> |
| <i>A. sumbari</i> | <i>Hedysarum kopetdaghi</i> |
| <i>A. ufraensis</i> | <i>Hyacinthus litwinowii</i> |
| <i>A. xiphidioides</i> | <i>Iris fosterana</i> |
| <i>Atropa komarovii</i> | <i>I. kopetdaghensis</i> (Fig. 26, D) |
| <i>Buffonia sintenisii</i> | <i>Jurinea antonowii</i> |
| <i>Centaurea iljinii</i> | <i>J. monocephala</i> (Fig. 17, F) |
| <i>C. sintenisiana</i> (Fig. 16, G) | <i>Korshinskya kopetdaghensis</i> |
| <i>Cephalorrhynchus kossinskyi</i> | <i>Leutea gracillima</i> |
| <i>Cerasus pseudoprostrata</i> | <i>Linaria pyramidalis</i> subsp. <i>kopetdaghensis</i> (Fig. 25, C) |
| <i>Chaerophyllum khorassanicum</i> (Fig. 15, H) | <i>Lycium kopetdaghi</i> |
| <i>Cirsium bornmuelleri</i> | <i>Mattiastrum crista-galli</i> |
| <i>Colutea porphyrogramma</i> (Fig. 21, A) | <i>M. turcomanicum</i> |
| <i>Corydalis chionophila</i> | |

Nonea turcomanica
Onobrychis sintenisii
O. transcaspica
Onosma longiloba
Oxytropis kopetdaghensis
O. suavis
Phlomis cancellata
Rubia rechingeri
Scutellaria litwinowii
Silene indepressa

Stachys subaphylla
St. turcomanica
Stelleropsis antoninae
Sterigmostemum ramosissimum
Tulipa micheliana (Fig. 27, E)
T. wilsoniana (Fig. 27, I)
Veronica khorassanica
Vicia venulosa
Vincetoxicum pumilum

Genera with a remarkable number of endemics are *Acantholimon*, *Allium*, *Artemisia*, *Astragalus* (particularly sect. *Caprini*), and *Cousinia*. The Khorasan-Kopetdagh flora has a very strong relationship with the central Iranian and the Aralo-Caspian or Turanian flora. Nevertheless the high percentage of endemics with a more or less similar range support its separate biogeographic entity. This distinct status confirmed regarding both flora and fauna (Fet 1994). As mentioned by Kamelin (1970), the recent flora of Khorasan-Kopetdagh was formed as a result of mainly autochthonous development. Therefore our result, support the consideration of the area as a province of its own within the Irano-Turanian area.

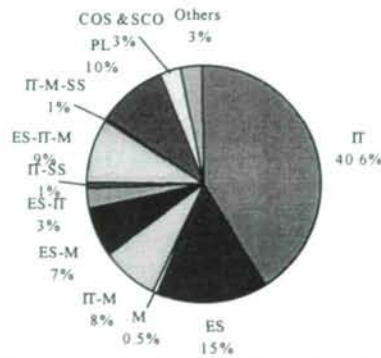


Fig. 34: Proportion of various phytogeographical areas in the flora of Golestan National Park

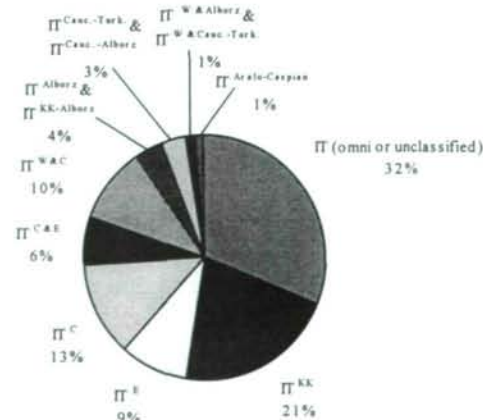


Fig. 35: Proportion of various subdivisions of the Irano-Turanian species in the flora of Golestan National Park

Hyrceanian: The hyrcanian forest zone is well delimited from the surrounding areas by its geographical isolation and unique flora and vegetation. It extends in an arc along the southern shore of the Caspian Sea from the Talysh region of Azerbaijan (at 48°E) to our area (at 56°E) and between 38°55'N in Azerbaijan and 35°05'N in Iran. There are several regional studies on the forests of this area (for example, Assadollahi & al.1982; Dorostkar 1974, Dorostkar & Noirfalise 1976; Rastin 1980, 1983; Probst 1972; Frey 1980; Hamzehee 1994). However, as it is shown in the present work and in another floristic study on the westernmost parts of the hyrcanian area in Arasbaran Protected Area (Assadi 1987/1988), our knowledge on the non-arboreal flora of this area is far from complete. There is still no estimation on the flora size (Miller 1994). This is because of two reasons. Firstly, most botanists tend to explore the Irano-Turanian parts of Iran, where they certainly may find more endemic and even undescribed species. Secondly, most authors investigate the forest vegetation and the economic importance of the woody species. Those botanists gave little attention to the taxonomically difficult non-arboreal flora. The relic nature of the hyrcanian flora is well known. Trees like *Parrotia persica* (endemic genus), *Quercus castaneifolia*, *Acer velutinum* and *Pyrus boissieriana* serve as classical examples for tertiary relic elements which are endemic to the Hyrcanian forest belt (Tralau 1963, Bunar-Tregubov 1972, Probst 1981, Browicz 1989, Sales & Hedge 1996). Although some hyrcanian elements like *Albizia julibrissim*, *Buxus hyrcanus*, *Gleditsia caspica* and *Ruscus hyrcanus* are absent in our area. There are other endemics with relic or isolated characters in our area. Most of them were discovered during this research, like *Laser rechingeri* (recent studies support its generic separation which will be validated in a future paper), *Eriocyclus ghafooriana*, *Plantago podlechii*, *Centaurea golestanica* and *Crucianella platyphylla* (Akhani 1996, 1999; Schönbeck-Temesy & Ehrendorfer 1989). However, the percentage of the hyrcanian species (4.5% or 58 species) is not very high in comparison with the whole flora, they consist of one-third of all Euro-Siberian species in our area, as shown in Fig. 36. The statistical data and the presence of many isolated endemics (particularly woody ones) support the opinion of Browicz (1989) to consider this area as a separate province of its own within the Euro-Siberian area. The most important Hyrcanian species occurring in our area are listed below:

<i>Acer velutinum</i>	<i>Hesperis hyrcana</i>
<i>Allium chelotum</i> (ES ^{HY} or IT ^{Alborz})	<i>Ilex spinigera</i> (Figs 7, D; 16 A)
<i>A. lenkoranicum</i>	<i>Johrenia golestanica</i> (Fig 14)
<i>Alnus subcordata</i>	<i>Laser rechingeri</i>
<i>Alyssopsis mollis</i>	<i>Orchis adenocheila</i> (Fig. 27, H)
<i>Anemone caucasica</i>	<i>Ornithogalum bungei</i>
<i>Asperula gorganica</i> (IT ^{E Alborz} /ES ^{HY})	<i>O. sintenisii</i>
<i>Asyneuma amplexicaule</i> (Fig. 18, F)	<i>Parrotia persica</i>
<i>Berberis orthobotrys</i>	<i>Plantago podlechii</i>
<i>Calycocosorus tuberosus</i>	<i>Poa golestanensis</i>
<i>Centaurea golestanica</i> (Fig. 16, D)	<i>Polygonum hyrcanicum</i>
<i>C. hyrcanica</i> (Fig. 16, F)	<i>Populus caspica</i>
<i>Cephalanthera caucasica</i>	<i>Primula heterochroma</i>
<i>Cervaria cervariifolia</i>	<i>Punica granatum</i> (? IT-ES ^{HY})
<i>Colutea buhsei</i>	<i>Pyrus boissieriana</i>
<i>Crucianella platyphylla</i> (Fig. 24, J)	<i>Quercus castaneifolia</i>
<i>Cydonia oblonga</i>	<i>Ranunculus cicutarius</i> (± ES ^{HY})
<i>Cynoglossum kandavanensis</i>	<i>Rhynchocorys maxima</i> (Fig. 25, D)
<i>Delphinium ursinum</i>	<i>Rubus raddeanus</i>
<i>Echinops koelzii</i>	<i>Saponaria bodeana</i> (Fig. 19, B)
<i>Echium amoenum</i> (Fig. 18, A-B)	<i>Satureja mutica</i>
<i>Epilobium rechingeri</i>	<i>Scilla gorganica</i>
<i>Epipactis rechingeri</i>	<i>Scrophularia gaubae</i>
<i>Eriocyclus ghafooriana</i> (Fig. 15, J)	<i>Scutellaria tournefortii</i>
<i>Euonymus velutina</i>	<i>Seseli tortuosum</i> subsp. <i>kiabii</i>
<i>Fritillaria kotschyana</i> (Fig. 27, A)	<i>Solanum kieseritzkii</i>
<i>Froriepia subpinnata</i>	<i>Stachys persica</i>
<i>Heracleum gorganicum</i>	<i>Teucrium hyrcanicum</i> (Fig. 22 J)

Tragopogon gongylorrhizus
T. maturatus (IT^{KK}/ES^{HY})
Trifolium radicosum

Verbascum sublobatum
Veronica siaretensis

Euxine-Hyrcanian: As it is shown in Fig 36 ca. one-third of the Euro-Siberian species in the flora of Golestan are common Euxine-Hyrcanian elements. Here a list of the most important Euxine-Hyrcanian species is given:

Acer cappadocicum
Allium paradoxum
Bromus briziformis
Bupleurum marschallianum
Cirsium osseticum
Colchicum speciosum (Fig. 26, G)
Cornus sanguinea subsp. *australis*
Corydalis angustifolia
C. marschalliana
Crataegus microphylla (Fig. 24, E)
C. pentagyna subsp. *pentagyna* (Fig. 24, F)
C. pseudoheterophylla subsp. *pseudoheterophylla*
Crocus speciosus
Cyclamen coum subsp. *caucasicum*
Dactylorhiza romana subsp. *georgica*
Danaë racemosa (27, C-D)
Digitalis nervosa (Fig. 25, A)
Diospyrus lotus (disjunctly occurs in the Himalaya)
Dipsacus strigosus
Dryopteris caucasica (Fig. 7, F)
Eleocharis mitracarpa
Eletherospermum cicutarium (Fig. 13, F)
Glyceria arundinacea
Hypericum linarioides
Inula thapsoides (Fig. 17, G)
Iranecio othonnae
Jasminum officinale (disjunctly occurs in the Himalaya)
Linum nervosum

Malus orientalis
Melica altissima
Mespilus germanica
Myosotis lithospermifolia
Orchis mascula subsp. *pinetorum*
Orobanche orientalis (disjunctly occurs in the Himalaya)
Paeonia wittmanniana (Fig. 23, B)
Poa masenderana
Polygonatum orientale
Prunus divaricata
Quercus macranthera
Rhamnus spathulifolia
Rubus dolichocarpus
R. procerus
Sedum spurium (ES^{EH}/IT^{Cauc.-Alborz})
S. stoloniferum
Senecio erucifolius subsp. *grandidentatus*
Serratula quinquefolia
Stachys byzantina (Fig. 22, G)
Steveniella satyrioides
Stipa zalesskii (± ES^{EH})
Tilia platyphyllos subsp. *caucasica*
Trifolium canescens
T. tumens
Trinia leiogona
Veronica crista-galli
Vicia crocea
Vincetoxicum scandens
Zelkova carpinifolia

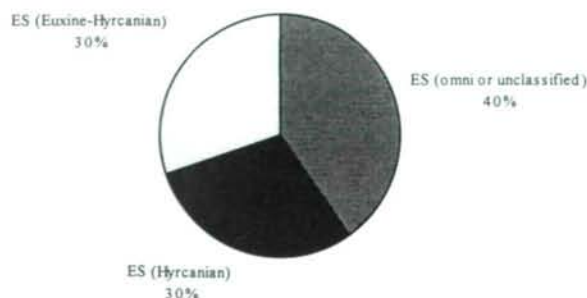


Fig. 36: Proportion of various Euro-Siberian species in the flora of Golestan National Park

6 MAN AND GOLESTAN NATIONAL PARK

Golestan National Park is not only a diverse transitional zone from a biogeographical point of view, but is also located in an area with high cultural and social variety. A look at the lingual map of Iran (see Ethnic and Language Map of Iran in Ehlers 1980: page 200/201, map 7) clearly shows that no other places in Iran are characterized by such a multilingual and multicultural diversity as in northeast Iran. The west of the area is mainly occupied by Turkmens, the North and East mainly by Kurds, the South by Turkish, Azeri, and Persian people. There are also a considerable number of Baluch immigrants in the area. In earlier times the conflicts between Kooklan Turkmens and Kurdish tribes made the settlement of the area risky. Today the relation of the people living around the Park is very different from the past. The foundation of the protected area and the evacuation of villages was certainly a difficult task carried out by using force. After the Iranian Revolution in 1979, the human activities increased in many parts of the Park and the area of the Park (126, 000 hectares) was reduced to 91,895 hectares. Thanks are due to some park rangers who fought during the anarchic situation of the revolution and protected the Park from severe damage. Fortunately, the increase of the public interest in the natural environment and the pressure of natural scientists have improved protection activities in recent years. However, it is still far from ideal. Here I summarize the most important threats to the Park, beside some suggestions to improve the conservation and management policies.

I. Asian road and uncontrolled visitors: Perhaps the largest impact on the Park is the passing of the so-called "Asian road" through the Park (Fig. 37, B). This is one of the busiest roads in Iran which connects central and north Iran to northeast Iran. Every year hundred thousands of visitors coming from the west to visit the holy city Mashhad (Center of Khorasan Province) or coming from the east to visit North and Central Iran travel on the road. Many of these people spend at least a few hours in the Park. De Vos (1976) mentioned that during peak use in 1972, on one single day 8,061 people were passing through the Park in 929 vehicles. In 1973 this figure had increased to 11, 858 people in 1, 482 vehicles per day. The number of people that stopped in the park on the same days was 749 in 1972 and 2,948 in 1973, and it had risen to 3,200 in 1974. As the population of Iran has approximately doubled since 1974, we can suppose that the number of visitors has also greatly increased. According to data from the Park managers, the present number of daily visitors of the Park during July and August is appr. 10,000-12,000 people. The primary activity of most of the visitors is picknicking (De Vos mentioned 63% in 1974). The present park facilities and the personnel cannot manage such a high number of uncontrolled visitors which enter the Park free of charge. Most of these visitors have no idea about the importance and the rules of a National Park. Ample problems are caused by such visitors like making fire, cutting branches, use of detergent in the water resources (particularly along Madrasu River), disturbance of wildlife, fishing along the river, littering etc. Unfortunately there are no teaching programmes and there is a lack of educated personnel to guide the visitors or distribute information sheets in order to increase public knowledge of environmental protection.

One great problem caused by the road is the killing or injury of a considerable number of wild animals due to vehicle collision. Although we have no statistics, based on my own observations the killing or injury of at least one animal (often mammals and birds) during days with high traffic is most likely.

As long as this road passes through the Park, it is not possible to charge the visitors which naturally could finance the conservation and management programmes. Furthermore the road provides easy access for illegal exploitation of the Park resources and a quick escape from the area using vehicle. Therefore it is absolutely necessary to detour this road. As far as the author knows, there has been a discussion about such a diversion for more than 20 years. The major parts of the road between Kalaleh to Garmab (north of the Park, see Fig. 6) are asphalt and could substitute the present road. Then it would be possible to charge visitors entering into the Park and provide a source of money. As Golestan National Park is well known to the Iranian people and possesses international importance, it can certainly attract many visitors from all parts of the country and eco-tourists from abroad. With the money collected from the visitors, it would not only be possible to retrieve the costs for building the new road, but also to finance parts of the conservation, management and research programmes.

II. Fire: Fires are known to occur frequently in Mediterranean types of ecosystems (cf. Naveh 1990), but we have very little data on the history, the causes and the biological consequences of fire in Iranian plant communities. The dense ground vegetation of the shrublands (see chapter 2.3 “Open woodlands and scrubs”) which become dry during the drought summer months, and strong winds caused by the interaction of high pressure air masses from the hyrcanian area in the west and low pressure air masses from the east, easily spread any small fire into an uncontrollable disaster. The existence of a high number of uncontrolled visitors and people who illegally enter into the Park, are potential sources for man-made fires. Natural fire seems to be unlikely in our area. As far as the author is aware, the oldest large fire which damaged large parts of the central parts of the Park happened sometimes between 1950-1953, before the area became protected. According to the informations gained from the local people, this fire was caused deliberately by a rebel named “Ashour Dorri-Zadeh” on the northeastern slopes of Divar-Kaji. It damaged large parts of *Juniperus excelsa* woodland and *Quercus macranthera* forests. The juniper woodland in this area has not yet regenerated after more than 45 years (Fig. 37, F). Many more small and large fires have burnt since the area came under protection. During my studies in 1995, ca. 6 fires burnt in the area one of which became a major catastrophe in the history of the Park. A fire during 29-31 August 1995 in the Yelaq flats has destroyed ca. 1000 hectares of the unique *Crataegus* scrubs (see Fig. 8-H, before the fire on 9.8.1995; Fig. 37-H, during the fire on 30.9.1995 and Fig. 37-I, after the fire on 4.9.1995). During 1996 six further fires have damaged further 1500 hectares of forest and scrubs in the Park, in Yelaq, Janlar and Divar Kaji. We do not know about the causes of these fires. But as some of them happened in the inaccessible parts arson is likely. It is highly necessary to investigate the causes and to find a way to prevent fires in the future.

III. Hunting: Perhaps one of the most serious conservation problems in the Park is hunting. Despite efforts to prevent hunting, it seems that the present conservation methods, rules and personnel are not efficient enough. The author avoids to discuss the problem in a dissertation concerning plants. But based on my field observations, I believe that the traditional conservation methods are not effective. The population of Iran has doubled since the seventies, when the Park was founded. The economic conditions have worsened and the salary of the Park personnel is very low. At the time being there are ca. 50 park rangers, of which one-third are usually off. It is imperative to increase training and education for the Park personnel, to pay appropriate salaries and to hire more and younger staff. Furthermore there are cultural and economic reasons for hunting. Turkmens have a tradition of hunting and there is a high number of poor people living in the area.

IV. Grazing: Fortunately large parts of the area are protected from grazing. Nevertheless some areas do have serious problems with regard to grazing like Daste- Shah (Fig. 37, G). In this part of the Park, there is an unsolved legal argument between the Department of Environment and the surrounding villages since ca. 20 years. Over-grazing has destroyed large parts of the *Crataegus* scrub which belongs to unique transitional ecosystems of the Park. Minor grazing problems are present in nearly all border parts of the area. Examples are Dasht, Yakhtikalan, Soolegerd, Koilar, Lohondor, Khan-Doushan and other areas.

V. Harvesting: As mentioned in the chapter “Vegetation”, the herbal vegetation in forest openings and open scrubs is very productive. Traditionally, harvesting of these places has been tolerated by the Park management, as a way of ensuring a better cooperation with the people living around the Park. However, harvesting prevents the succession of forest and scrubs and consequently damages the natural ecosystems. There are discussions that the development of forest in previously cultivated spots is a disadvantage for some grazing animals like maral (see Hasanzadeh-Kiabi 1978). However, there is no long-term ecological research to support this idea. Three important points should be mentioned: First, any kind of exploitation in a National Park is forbidden according to national and international rules. Second, even under the best management and conservation conditions, we cannot eliminate entirely the illegal disturbances and exploitation in the area. Therefore we should not allow such activities which unfortunately constitute a bad tradition. Third, Golestan National Park has a wide range of habitats with enough grazing territories for all grazing animals. Man-made grazing habitats for the profit of one or two mammals are not convincing. There are several thousands of other living organisms in the area, for which

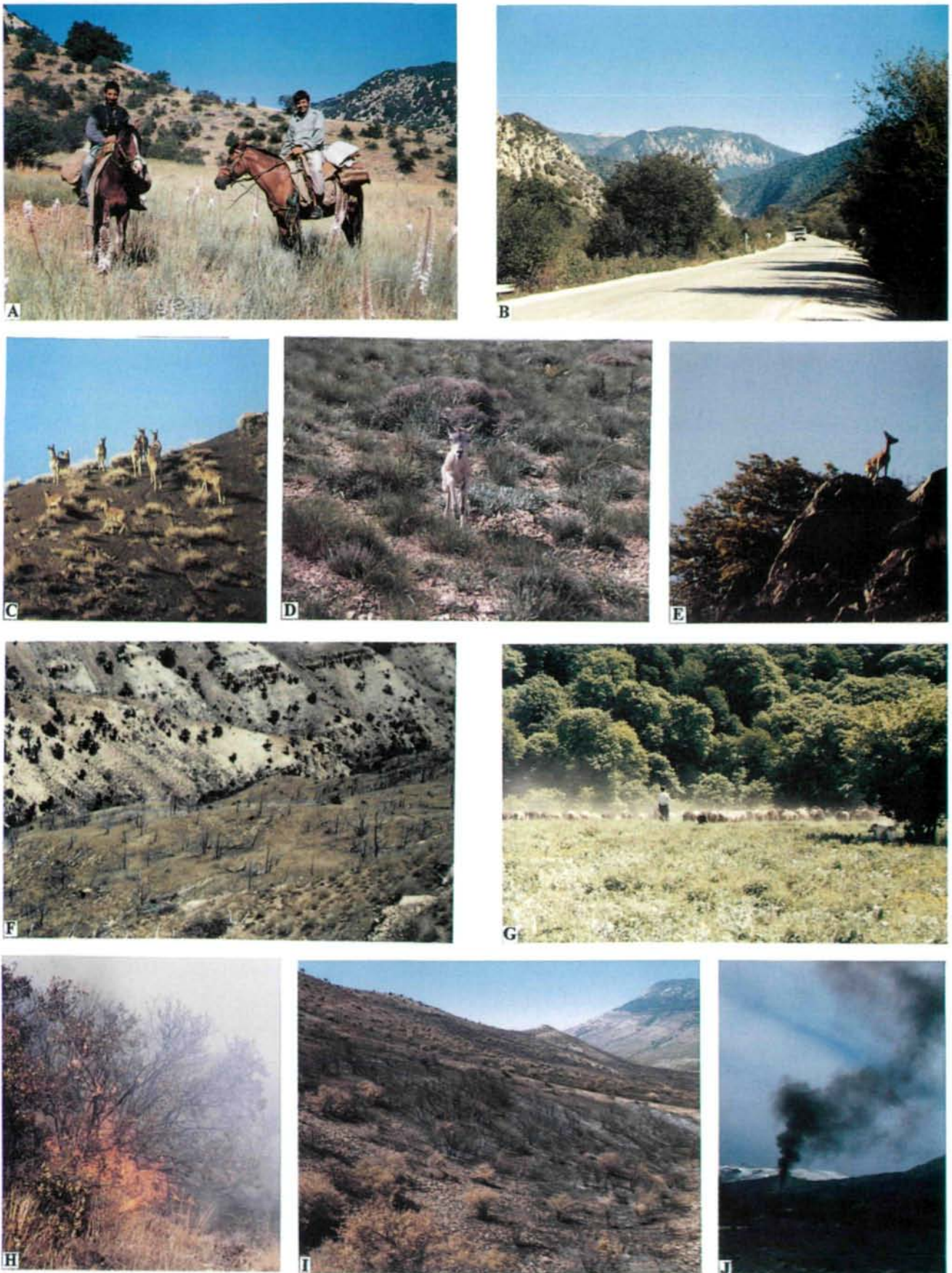


Fig. 37: **A**, Park rangers (Mr Abdolrahman-e Bargh-e Tajani and Mr Arab-Galu) during one of the excursions; **B**, “Asian road” through the Park; **C**, a small herd of wild sheep (photo from Mr R. Ghaemi); **D**, a lamb in mountain steppes, Yakhtikalan Pass; **E**, Persian ibex (photo from Mr R. Ghaemi); **F**, remnants of a fire ca. 45 years ago on the northeastern slopes of Divar Kaji Mountain; **G**, illegal grazing in Dast-e Shah; **H**, fire in Yelaq plain (29-31.8.1995); **I**, Yelaq plain after fire (4.9.1995); **J**, asphalt factory at the southern border of the Park, near Dasht.

we have little or no information. In a National Park, we should not be allowed to discriminate between different kinds of species. Exceptions are local endemics.

VI. Asphalt factory: Appr. five years ago an asphalt factory was built at the southern border of the Park, near Dasht. This caused extensive air pollution and soil erosion in the area (Fig. 37, I). The authorities of the Iranian Department of the Environment have promised to stop the activity of this factory during a seminar in Golestan National Park on 4.9.1995. Unfortunately this factory still was in operation in December 1996, when the author visited the Park.

VI. Other threats: There are several other minor threats to the Park:

a) Tree cutting: This process is substantially controlled in the area. However, there are still some places at the border of the Park, where their trees are cut now and then.

b) Collection of maral horns or other mammal skulls: Maral horns are used to provide kniveshafts. Every year several horn collectors illegally enter the Park and collect the horns. Therefore, there exists no more horn in the area to be searched by ecologists (for estimation of populations, etc.). For example, during my long term excursions, I have encountered maral horns only twice. This is also more or less true for the skulls of dead wild sheep, goats and gazelles which are collected for decoration.

c) Collection of *Prunus* and *Rubus* fruits: The *Prunus* fruits are usually collected during June and July by the local people for the production of "Lavashak" (لواشک), a special bread-like sour sweet. The *Rubus* fruits are also collected by the local people and tourists for eating. These people damage many shrubs in the area. We are not aware of other ecological disadvantages caused by the collection of *Prunus* and *Rubus* fruits by man. We know that *Prunus* fruits are important food sources for brown bear and birds.

d) Collecting archaeological objects: Some parts of the area have illegally been searched for archaeological objects. Fortunately there are strong rules and high penalties against such perpetrators.

e) Collection of fungi, wild vegetables and medicinal plants: Although in limited amount, I have seen that many people enter the Park to collect fungi and medicinal plants. There are several edible fungi, wild vegetables and medicinal plants which are favoured by the local people. The author does not know the fungal species, but the flowers of *Echium amoenum* and the leaves of *Allium paradoxum* and *Ziziphora clinopoides* are usually collected by the local people.

f) Collection of plants for scientific purposes and over-visiting of the area by students: Due to the reputation of the Park, there are many students and amateur biologists who legally use the Park for teaching and scientific purposes and a considerable number visit the Park for scientific collections. Certainly, such activities should be encouraged. Unfortunately the Park lacks research personnel who control sampling activities, particularly with regard to the endangered species. Furthermore, such collectors and scientists visiting the Park are not obligated to submit duplicates of their identified samples or copies of their publications to the Park or to the Department of the Environment. As a botanist, I should admit that the threat of plant collectors must not be ignored, particularly when they are looking for rare and local endemics.

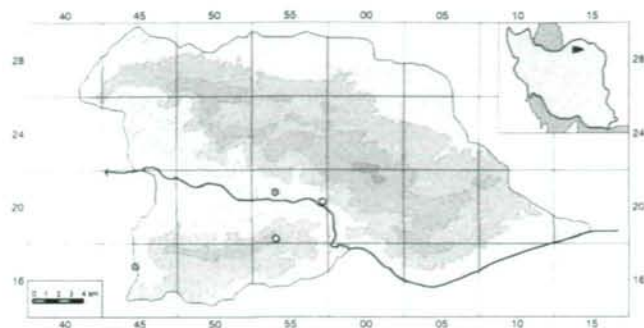
In spite of the problems mentioned above, in comparison with the other protected areas in Iran and other SW Asian countries (see Makhdoum & al. 1993, Davis & al. 1994), the Park is in a good condition and an improvement in management will ensure the protection of this unique area.

7 DISTRIBUTION MAPS

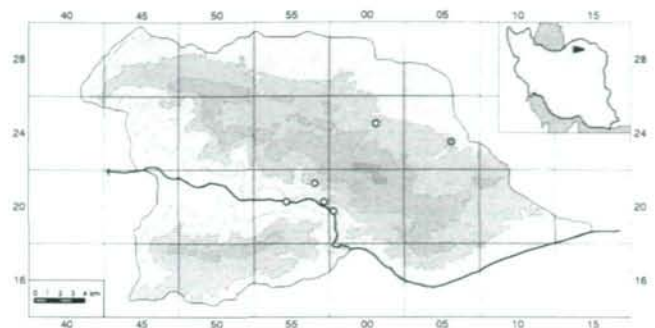
Legend: (see chapter 3.1. "Material and methods")

Sign	Cover abundance	Covering (cf. Braun-Blanquet 1964, Dierschke 1994)
⊙	r	less than 1% (1 small individual)
⊕	+	less than 1% (1 – 5 small individuals)
○	1	less than 5% (plentiful: 6-50 individuals for small plants or 1 – 5 individuals for large plants)
◐	2	5 – 25%
◑	3	25 – 50%
◒	4	50 – 75%
◓	5	75 – 100%
⊗	-	Herbarium record
U	-	Determination uncertain

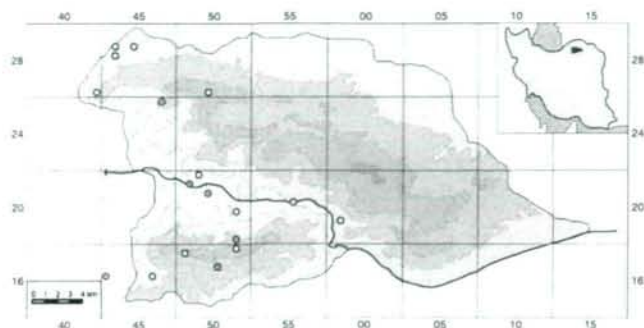
7.2 Maps (1-880)



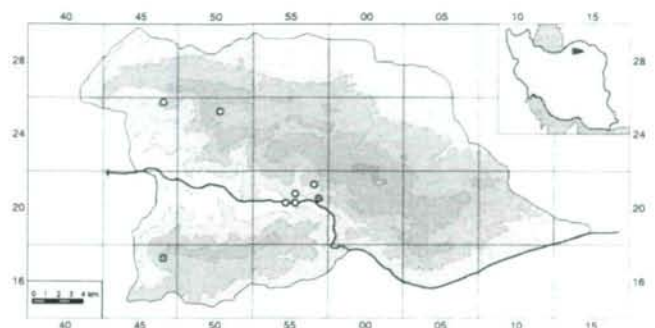
Map 1. *Adiantum capillus-veneris* L.



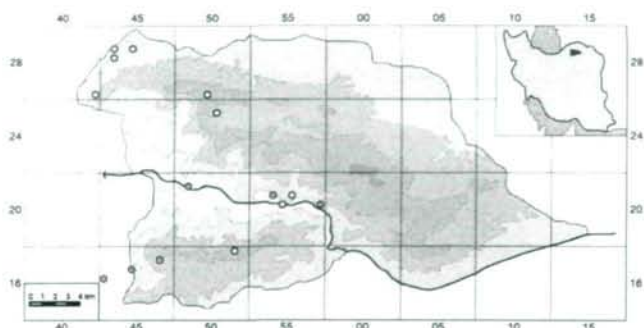
Map 2. *Cheilanthes persica* (Bory) Mett. ex Kuhn



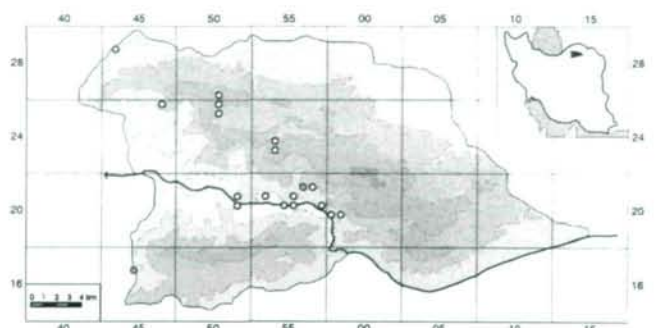
Map 3. *Asplenium adiantum-nigrum* L.



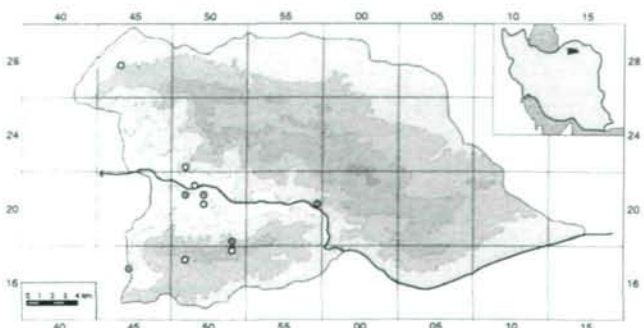
Map 4. *Asplenium ruta-muraria* L.



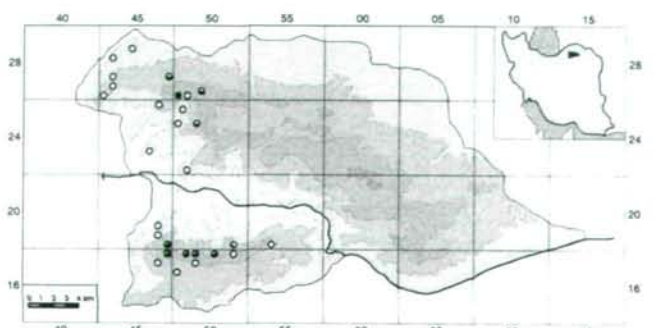
Map 5. *Asplenium trichomanes* L.



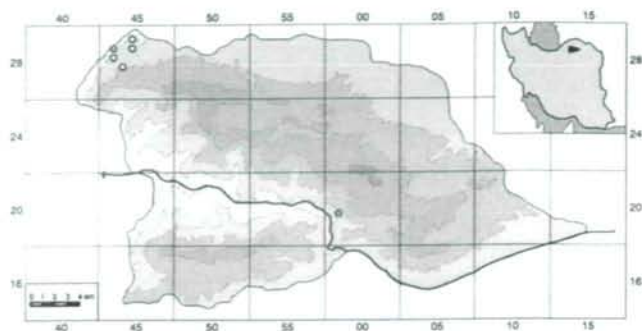
Map 6. *Ceterach officinarum* DC.



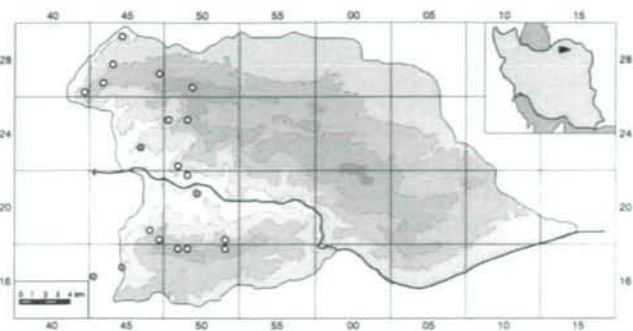
Map 7. *Phyllitis scolopendrium* (L.) Newman



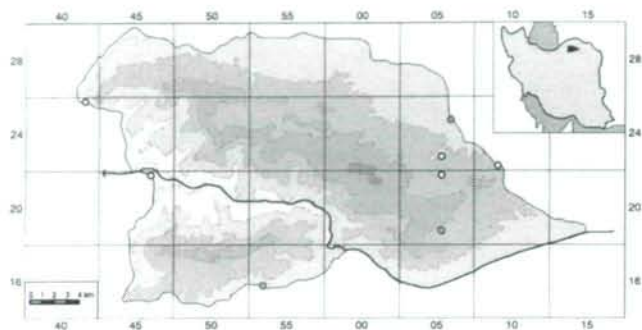
Map 8. *Dryopteris caucasica* (A. Braun) Fraser-Jenkins & Corley



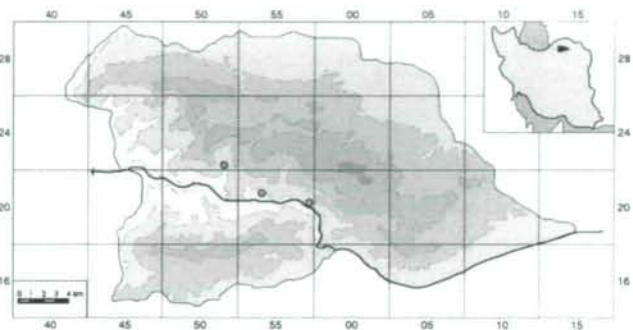
Map 9. *Dryopteris pallida* (Bory) C. Chr. ex Maire & Petit, s. l.



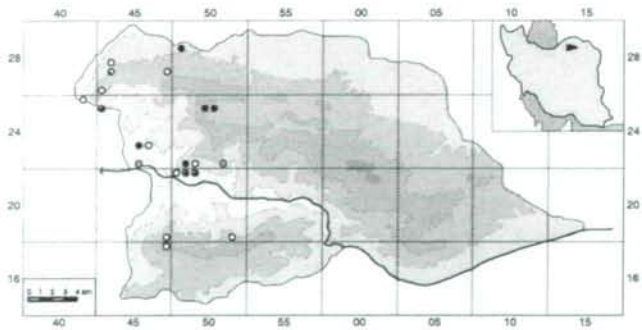
Map 10. *Polystichum aculeatum* (L.) Roth



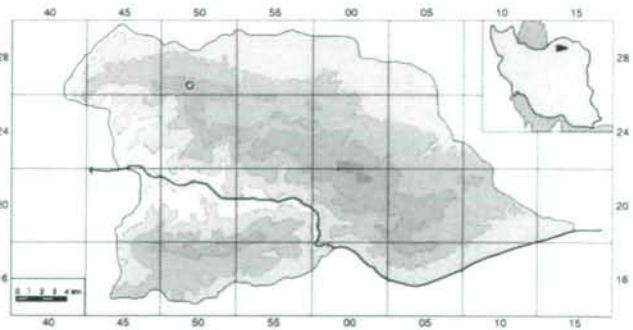
Map 11. *Equisetum ramosissimum* Desf.



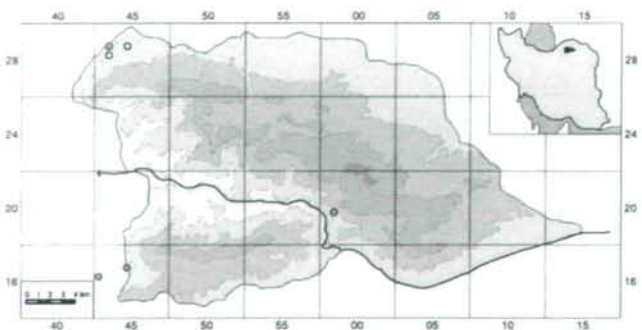
Map 12. *Equisetum telmateia* Ehrh.



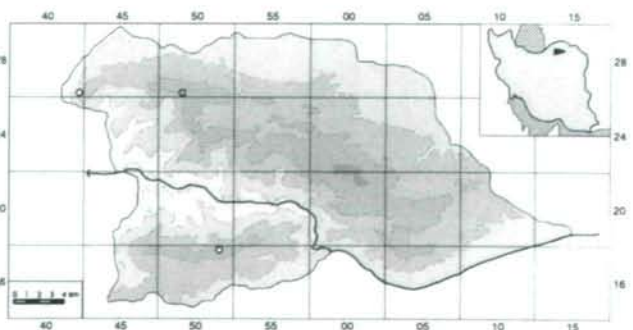
Map 13. *Pteridium aquilinum* (L.) Kuhn



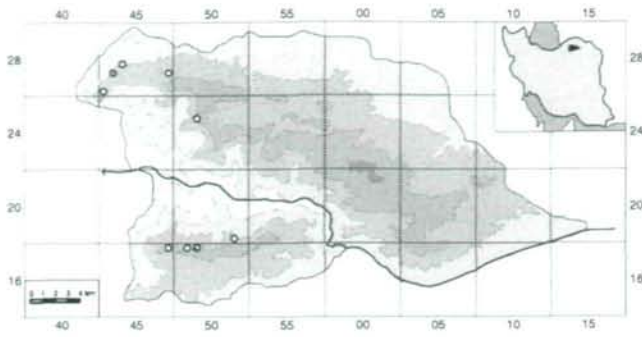
Map 14. *Botrychium lunaria* (L.) Sw.



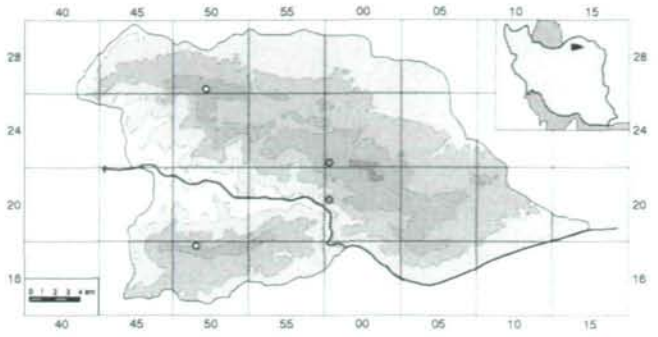
Map 15. *Polypodium interjectum* Shivas



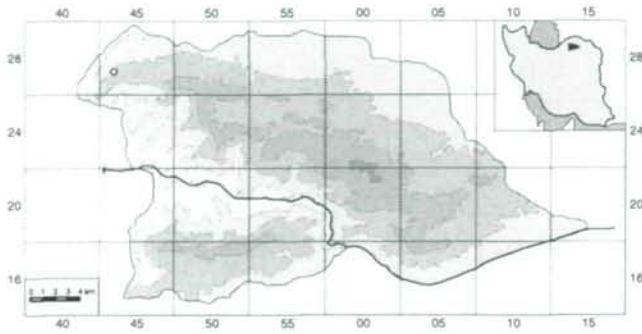
Map 16. *Polypodium vulgare* L.



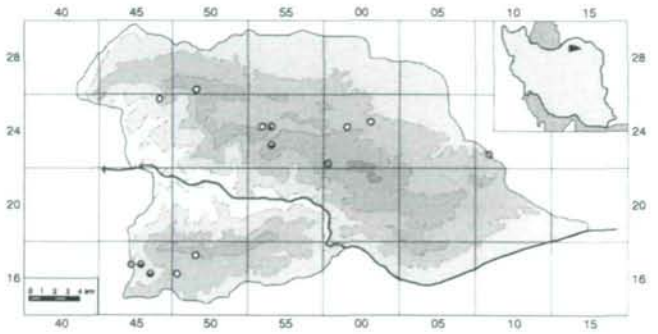
Map 17. *Athyrium filix-femina* (L.) Roth



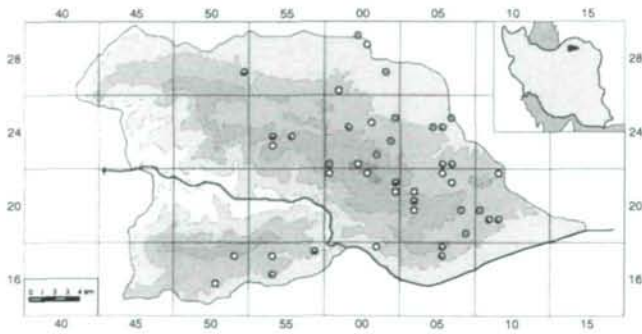
Map 18. *Cystopteris fragilis* (L.) Bernh.



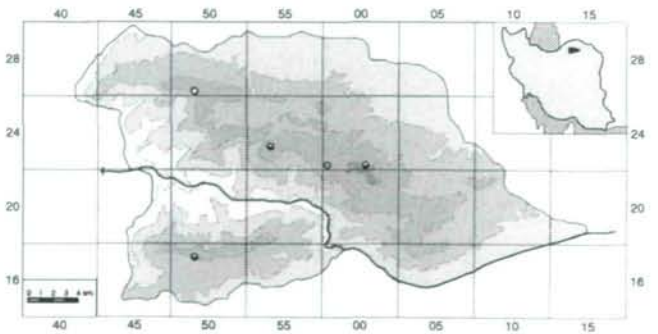
Map 19. *Matteucia struthiopteris* (L.) Tod.



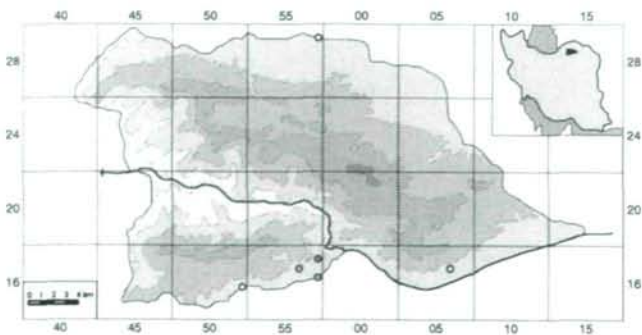
Map 20. *Juniperus communis* L., s. l.



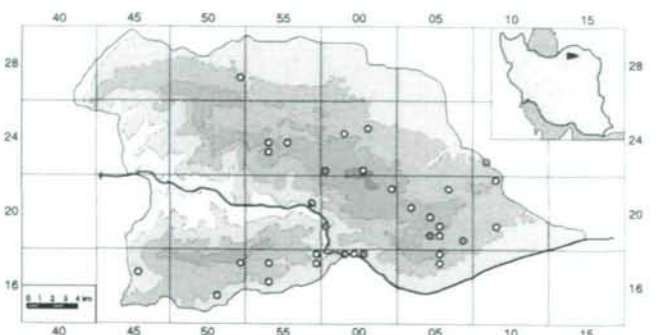
Map 21. *Juniperus excelsa* M. Bieb.



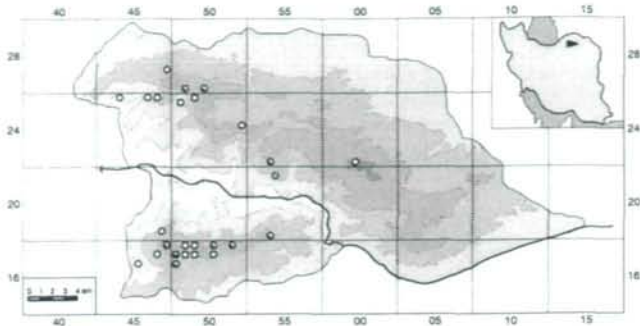
Map 22. *Juniperus sabina* L.



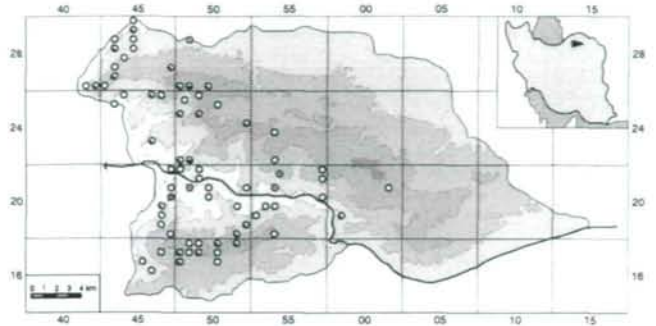
Map 23. *Ephedra intermedia* Schrenk & C. A. Mey.



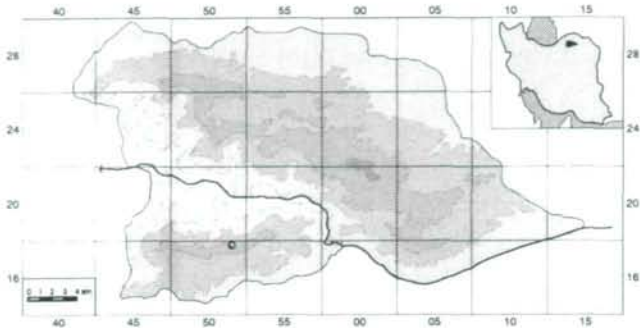
Map 24. *Ephedra major* Host subsp. *procera* (Fisch. & C. A. Mey.) Bormm.



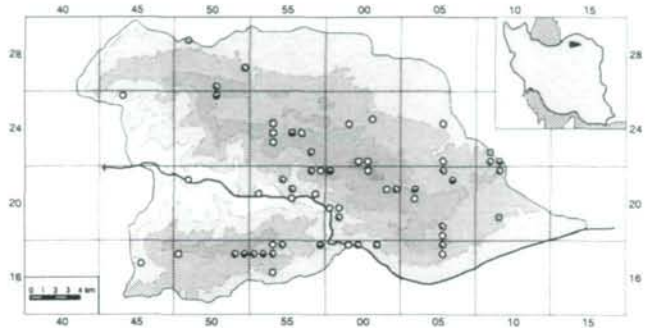
Map 25. *Acer campestre* L.



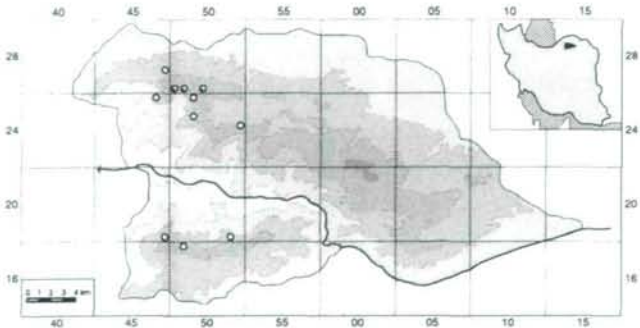
Map 26. *Acer cappadocicum* Gled.



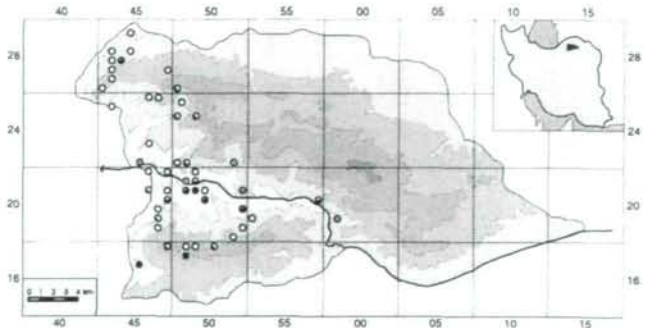
Map 27. *Acer hyrcanicum* Fisch. & C. A. Mey.



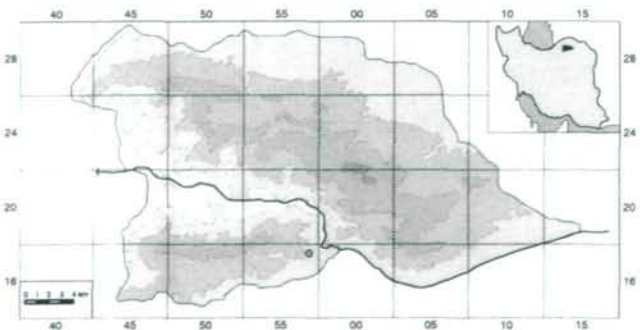
Map 28. *Acer monspessulanum* L. subsp. *turcomanicum* (Pojark.) E. Murray



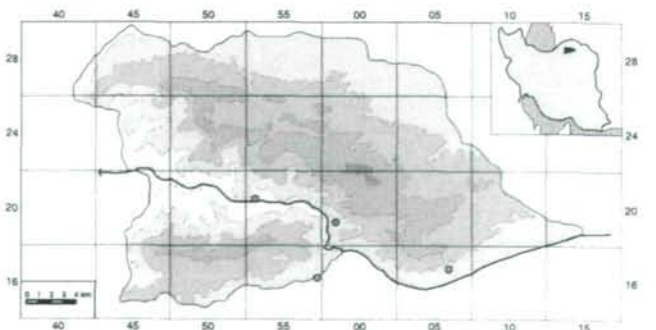
Map 29. *Acer platanoides* L.



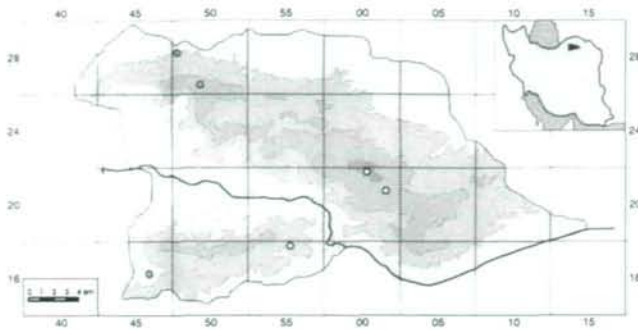
Map 30. *Acer velutinum* Boiss.



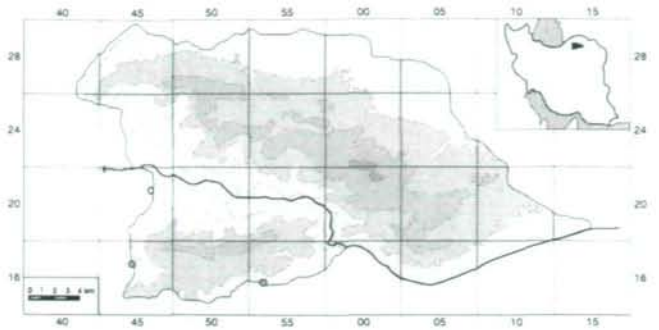
Map 31. *Pistacia atlantica* Desf.



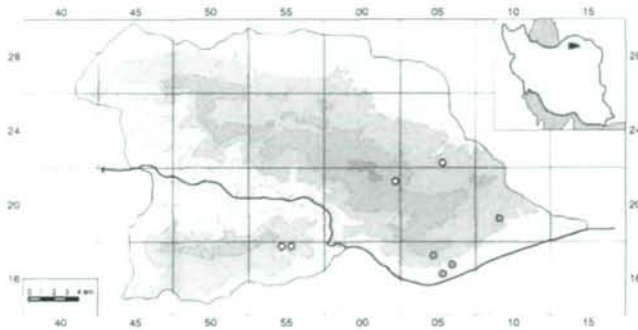
Map 32. *Anthriscus cerefolium* (L.) Hoffm.



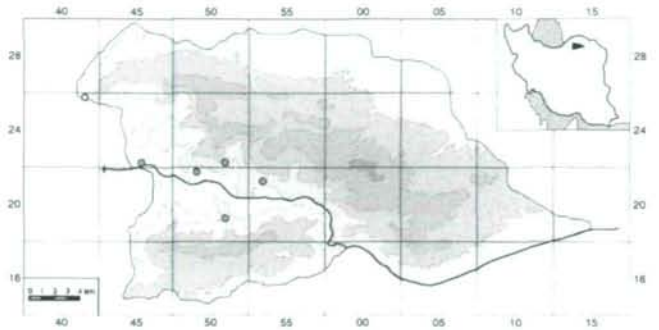
Map 33. *Anthriscus nemorosus* (M. Bieb.) Spreng.



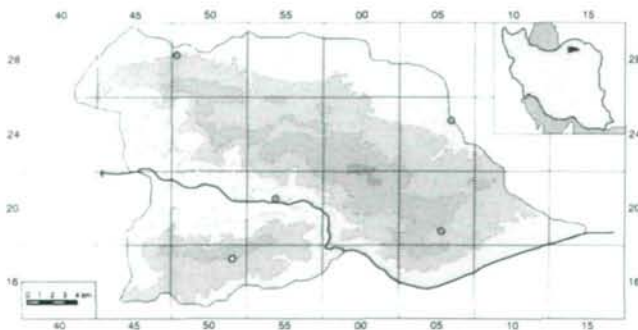
Map 34. *Berula angustifolia* (L.) Mert. & W. D. Koch.



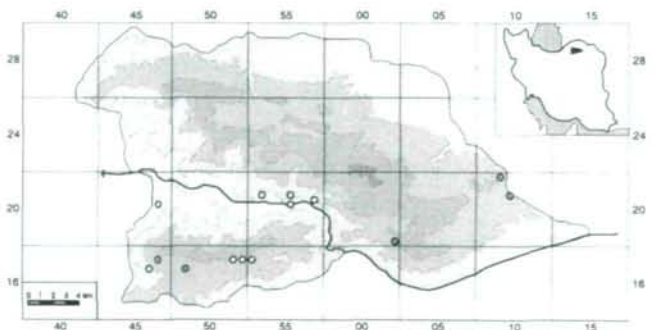
Map 35. *Bupleurum exaltatum* M. Bieb.



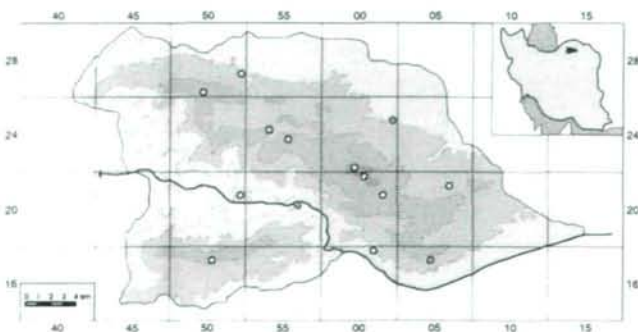
Map 36. *Bupleurum marschallianum* C. A. Mey.



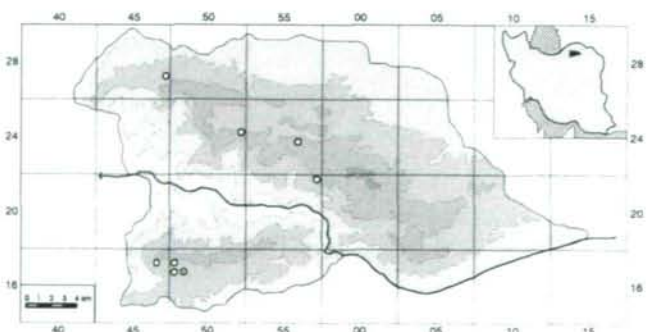
Map 37. *Bupleurum rotundifolium* L.



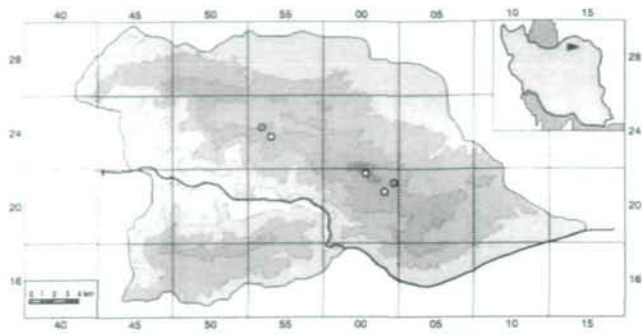
Map 38. *Caulis platycarpus* L.



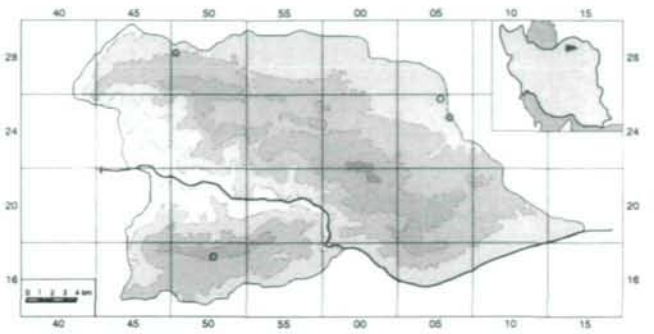
Map 39. *Cervaria cervarifolia* (C. A. Mey.) Pimenov



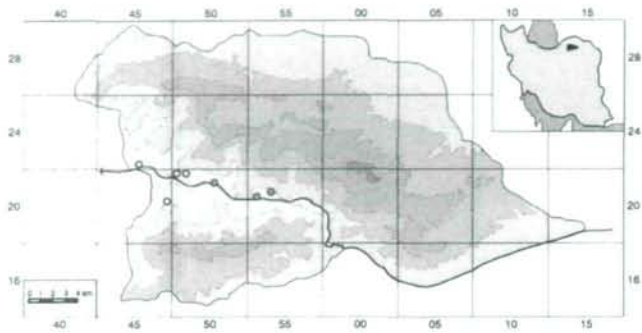
Map 40. *Chaerophyllum bulbosum* L.



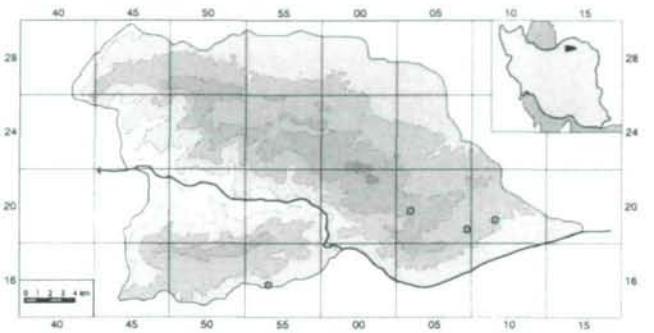
Map 41. *Chaerophyllum khorassanicum* Czerniak. ex Schischk.



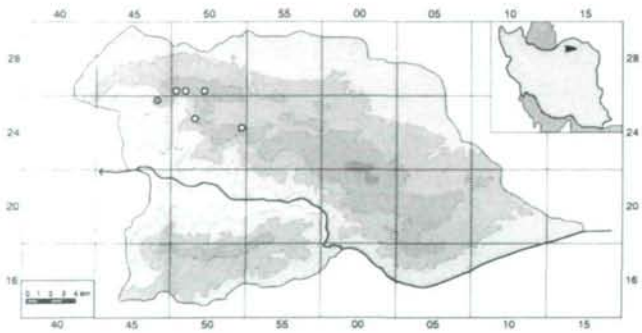
Map 42. *Conium maculatum* L.



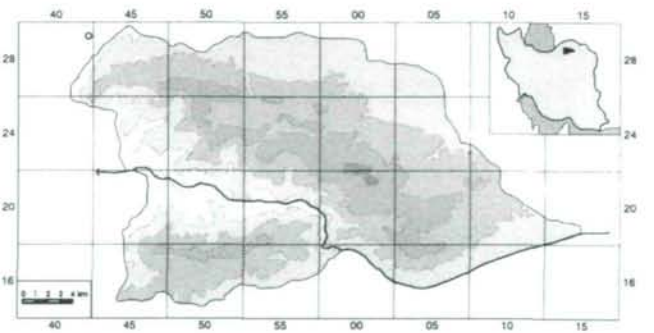
Map 43. *Daucus carota* L., s. l.



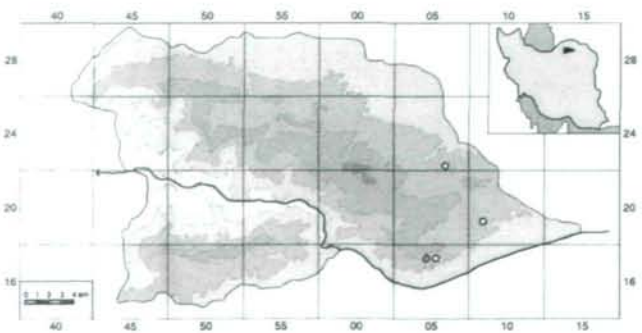
Map 44. *Dorema hyrcanum* Koso.-Pol.



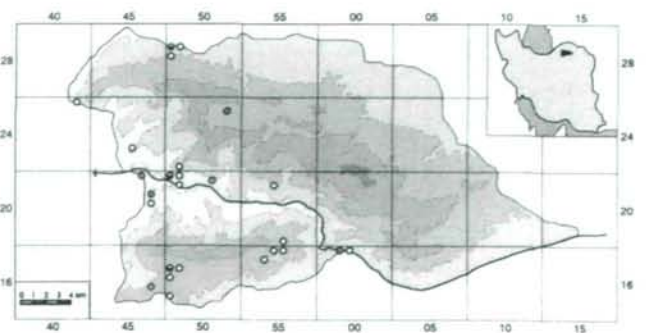
Map 45. *Eleutherospermum cicutarium* (M. Bieb.) Boiss.



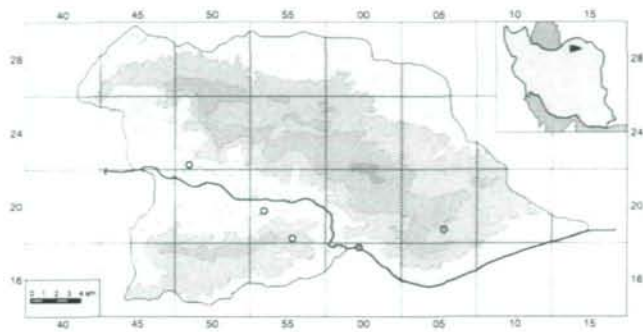
Map 46. *Eriocycla ghafooriana* Akhani



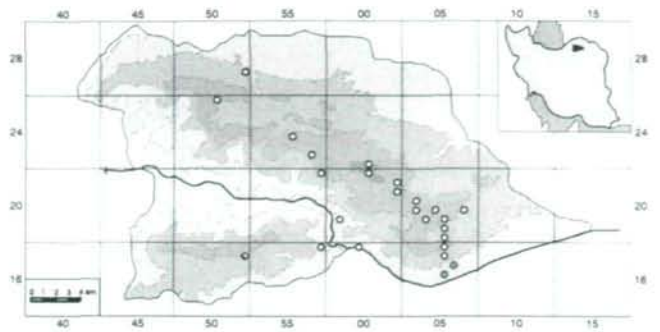
Map 47. *Eryngium bungei* Boiss.



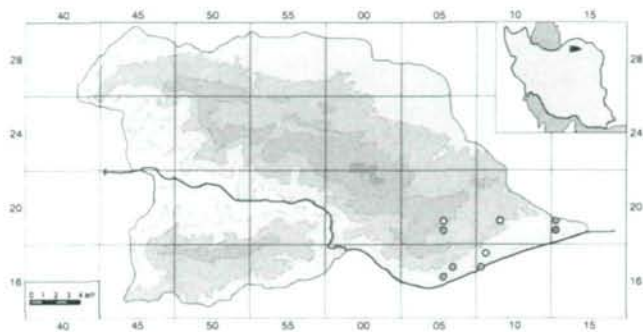
Map 48. *Eryngium caucasicum* Trautv.



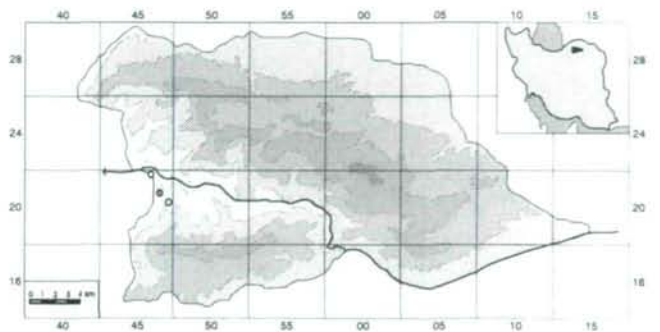
Map 49. *Falcaria vulgaris* Benth.



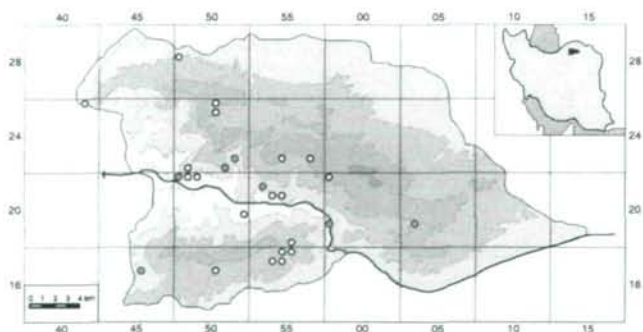
Map 50. *Ferula ovina* (Boiss.) Boiss.



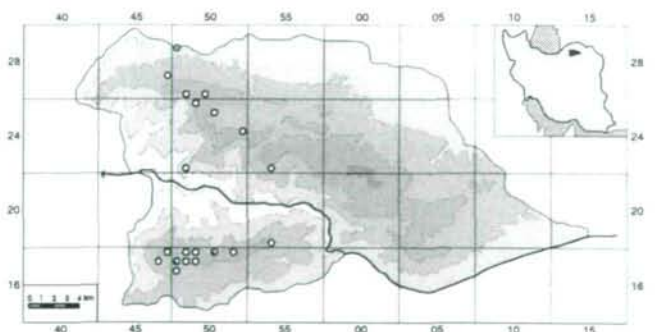
Map 51. *Ferula szowitsiana* DC.



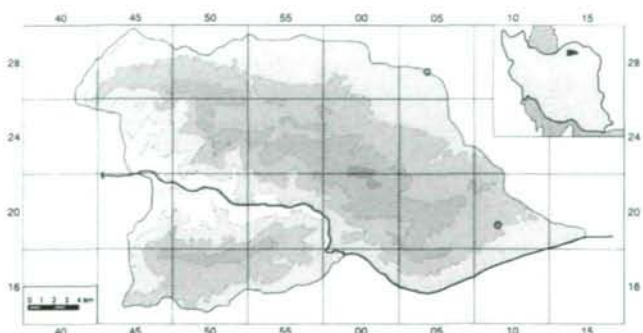
Map 52. *Froriepia subpinnata* (Ledeb.) Ball



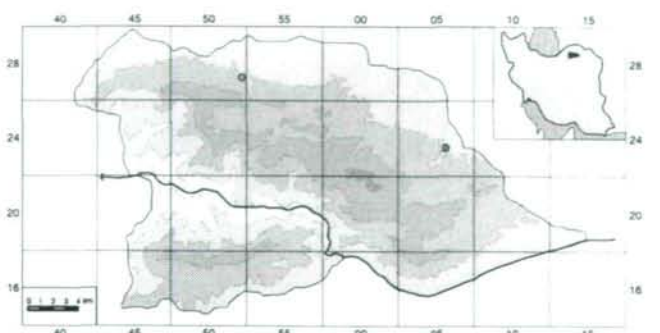
Map 53. *Johrenia golestanica* Rech. f.



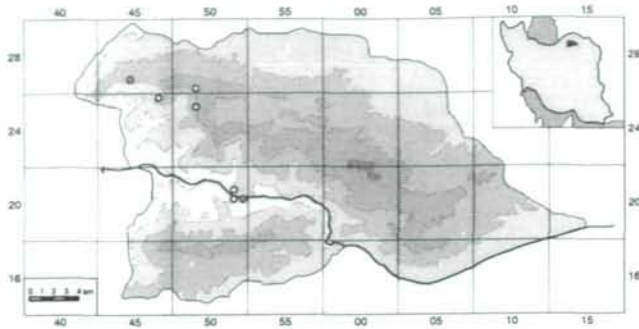
Map 54. *Heracleum gorganicum* Rech. f.



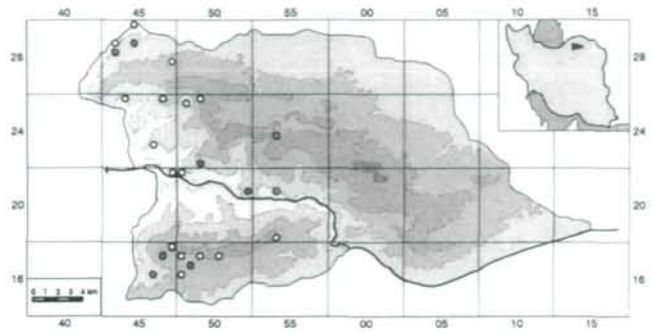
Map 55. *Korovinia tenuisecta* (Regel & Schmalh.) Nevski & Vved.



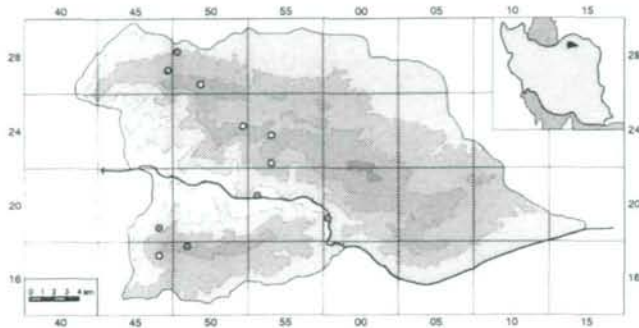
Map 56. *Korshinskya kopetdaghensis* (Korovin) Pimenov & Kljuykov



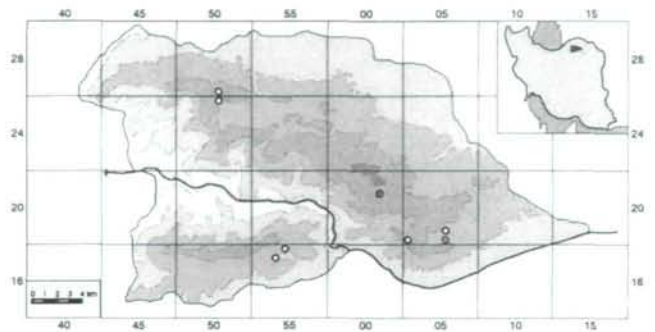
Map 57. *Laser rechingeri* Akhani



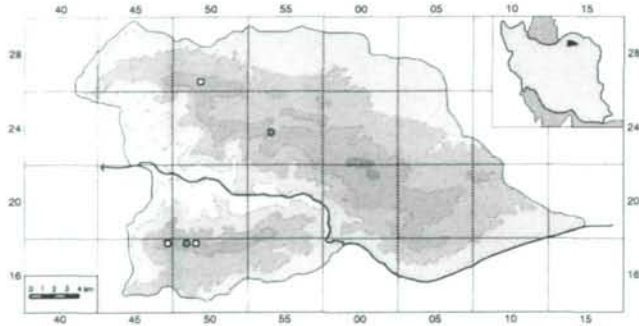
Map 58. *Laser trilobum* (L.) Borkh.



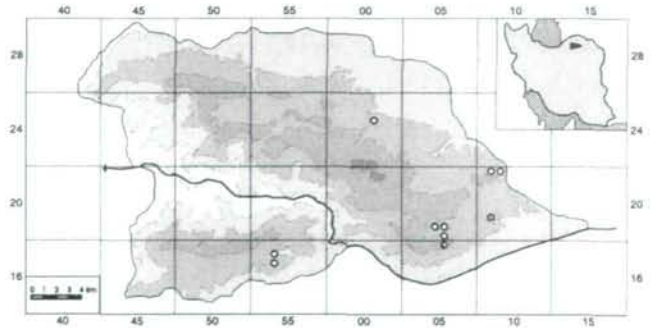
Map 59. *Lecokia cretica* (Lam.) DC.



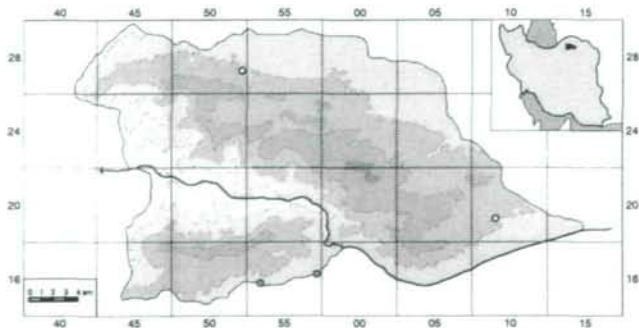
Map 60. *Opopanax hispidus* (Friv.) Griseb.



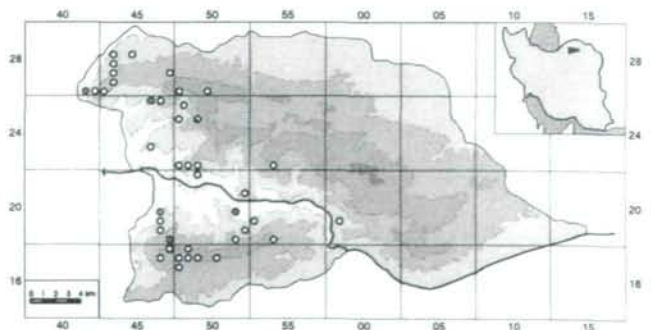
Map 61. *Pimpinella anthriscoides* Boiss.



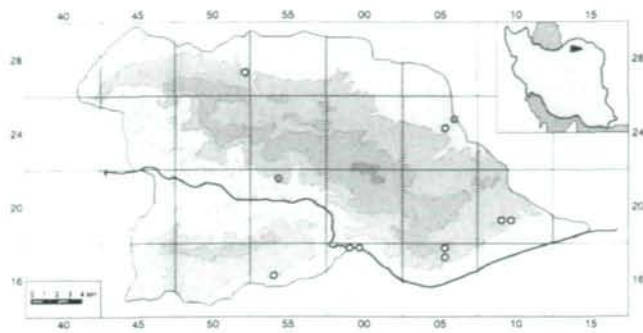
Map 62. *Pimpinella tragiium* Vill., s. l.



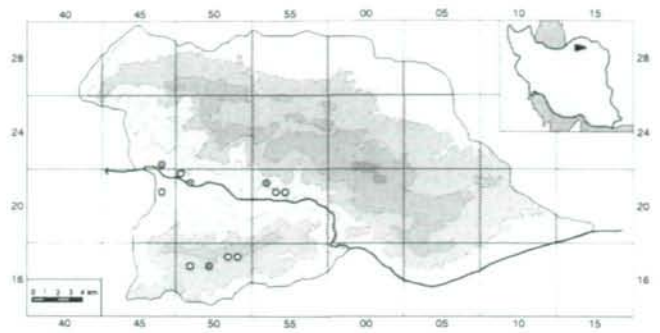
Map 63. *Prangos latiloba* Korovin



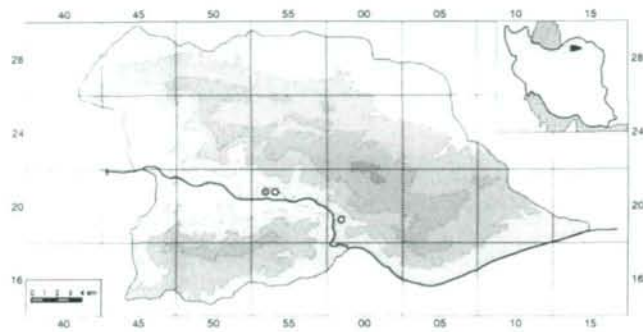
Map 64. *Sanicula europaea* L.



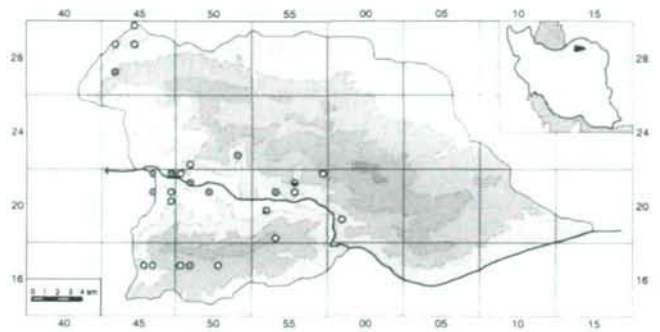
Map 65. *Scandix stellata* Banks & Sol.



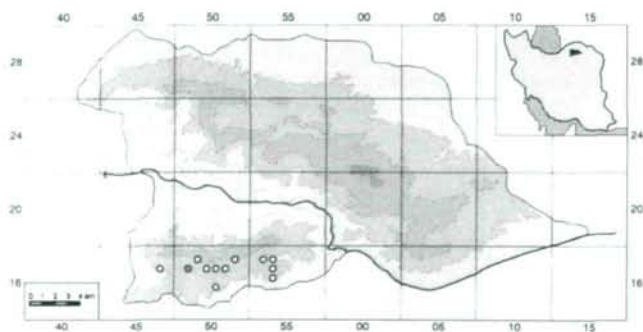
Map 66. *Seseli tortuosum* L. subsp. *kiabii* Akhani



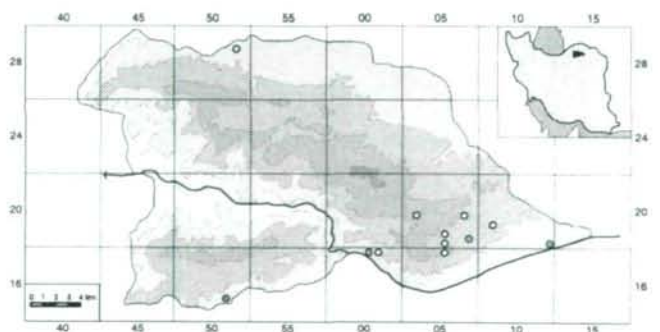
Map 67. *Tordylium maximum* L.



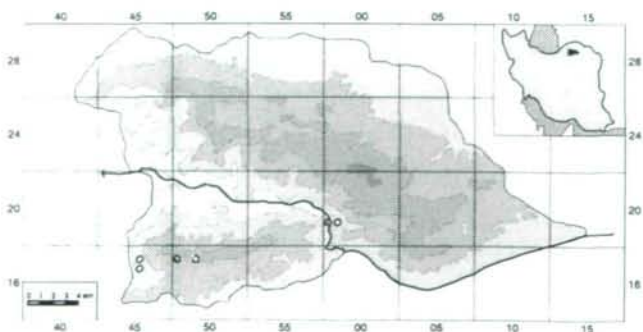
Map 68. *Torilis japonica* (Houtt.) DC.



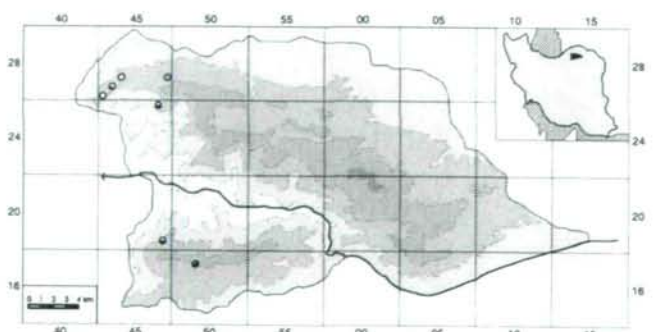
Map 69. *Trinia leiogona* (C. A. Mey.) B. Fedtsch.



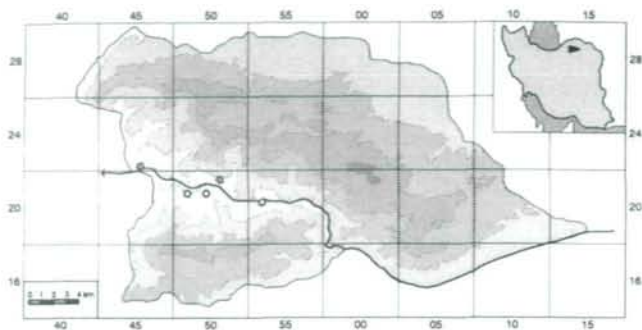
Map 70. *Zosima absinthifolia* (Vent.) Link



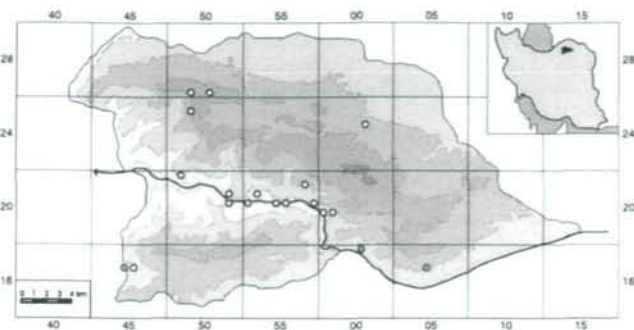
Map 71. *Vinca herbacea* Waldst. & Kit.



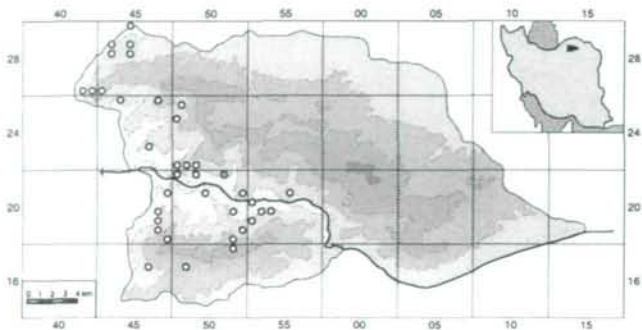
Map 72. *Ilex spinigera* (Loes.) Loes.



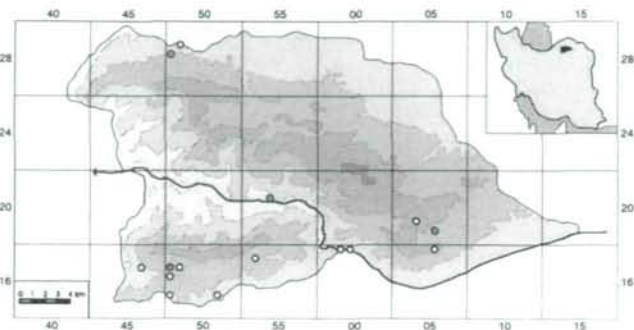
Map 73. *Periploca graeca* L.



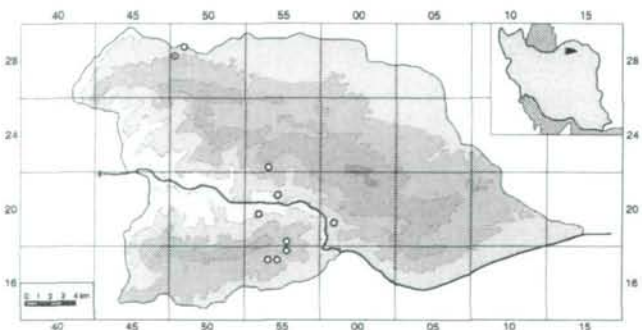
Map 74. *Vincetoxicum pumilum* Decne.



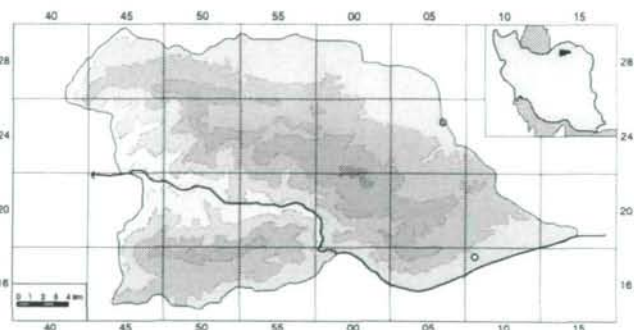
Map 75. *Vincetoxicum scandens* Sommier & Levier



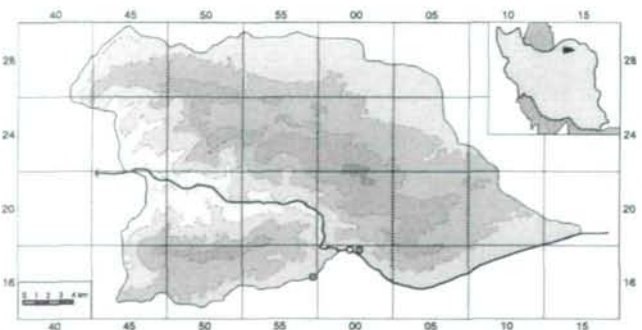
Map 76. *Achillea biebersteinii* Afan.



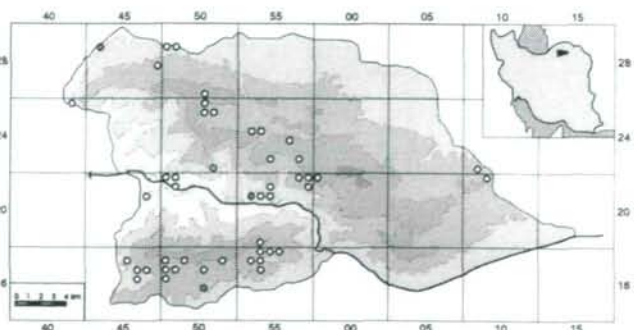
Map 77. *Achillea nobilis* L. subsp. *neireichii* (Kerner) Formánek



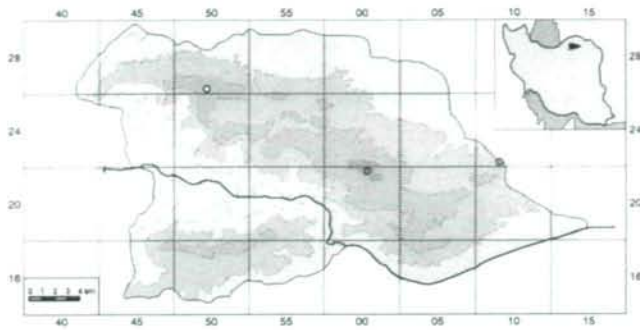
Map 78. *Achillea tenuifolia* Lam.



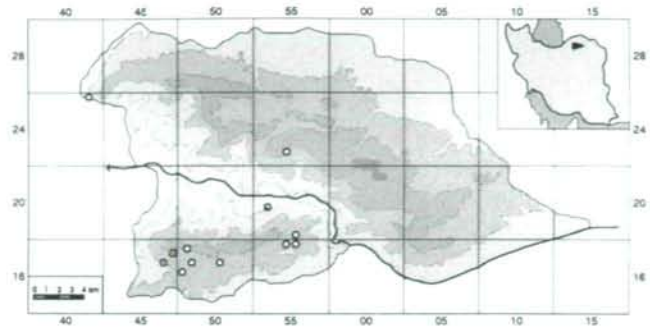
Map 79. *Anthemis austriaca* Jacq.



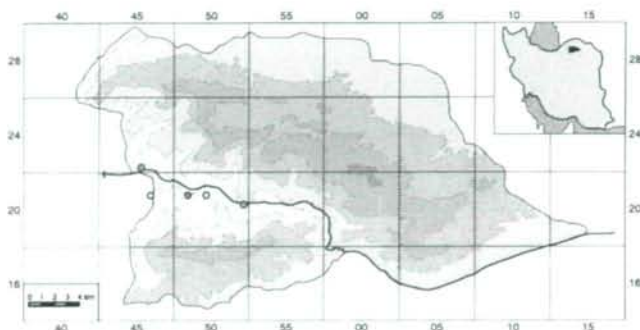
Map 80. *Anthemis triumfettii* (L.) All., s. l.



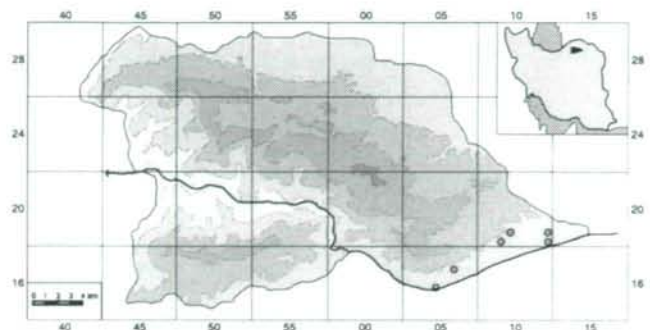
Map 81. *Arctium minus* (Hill) Bernh.



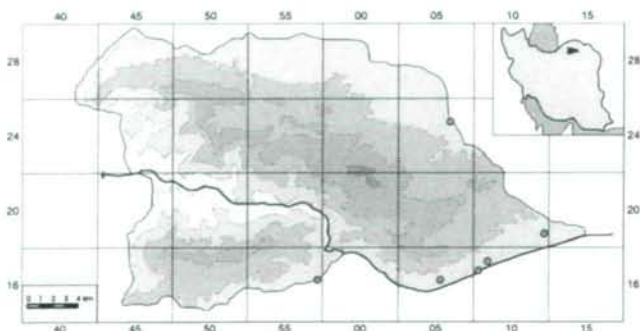
Map 82. *Artemisia absinthium* L.



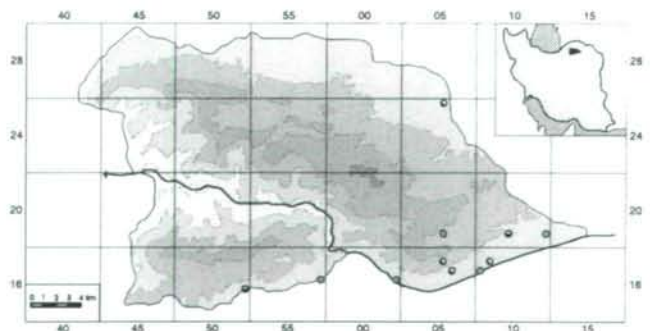
Map 83. *Artemisia annua* L.



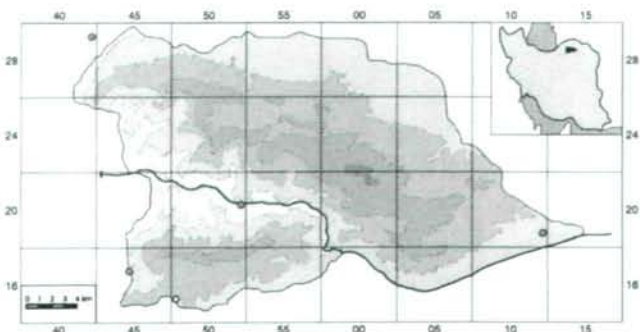
Map 84. *Artemisia* cf. *fragrans* Willd.



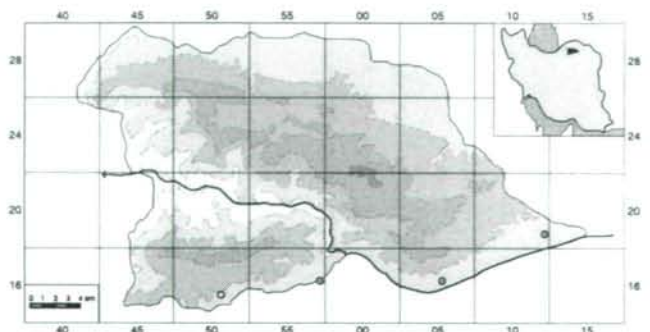
Map 85. *Artemisia* cf. *gypsacea* Krasch., Popov & Lincz. ex Poljakov



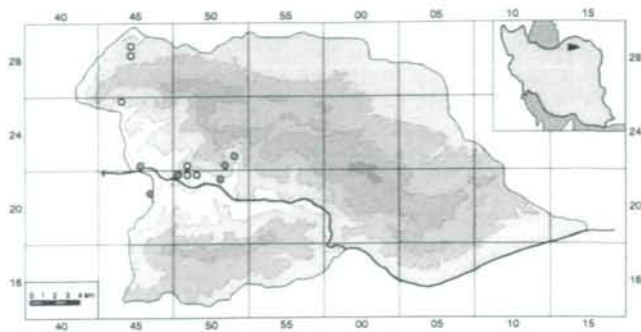
Map 86. *Artemisia* cf. *kopetdaghensis* Krasch.



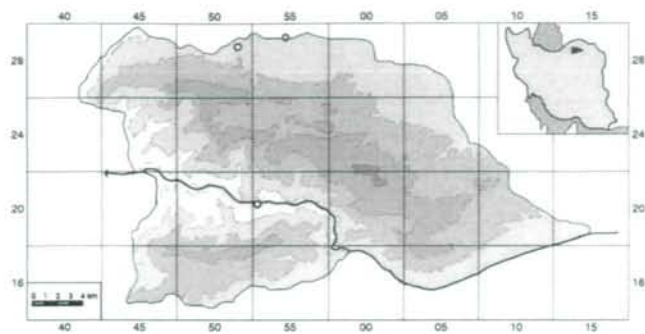
Map 87. *Artemisia scoparia* Waldst. & Kit.



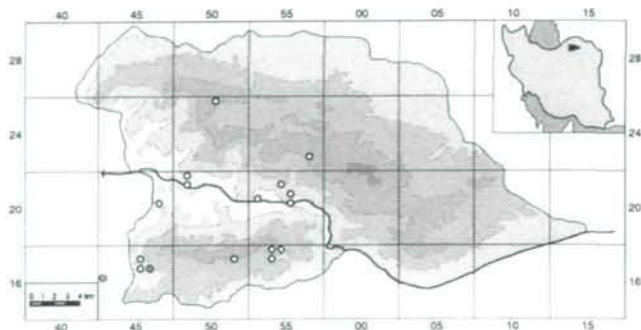
Map 88. *Artemisia* cf. *sieberi* Besser



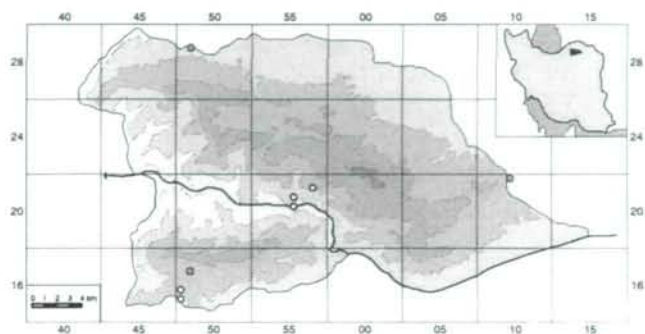
Map 89. *Artemisia vulgaris* L.



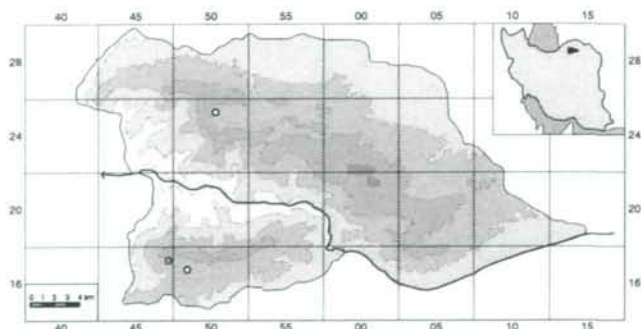
Map 90. *Bombycilaena erecta* (L.) Smoljan.



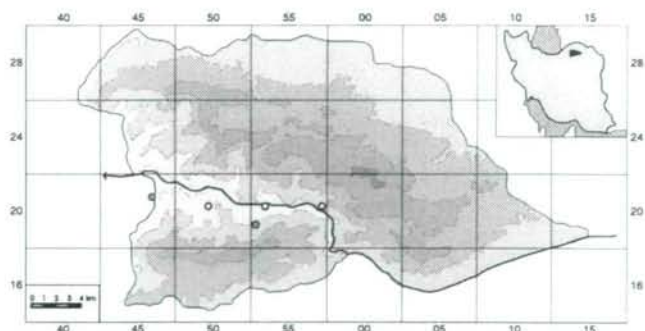
Map 91. *Callicephalus nitens* (M. Bieb. ex Willd.) C. A. Mey.



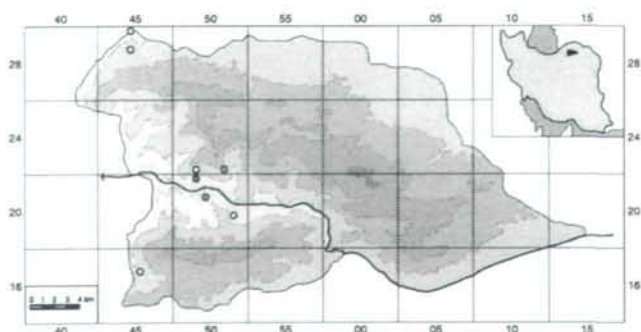
Map 92. *Carduus transcaspicus* Gand., s. l.



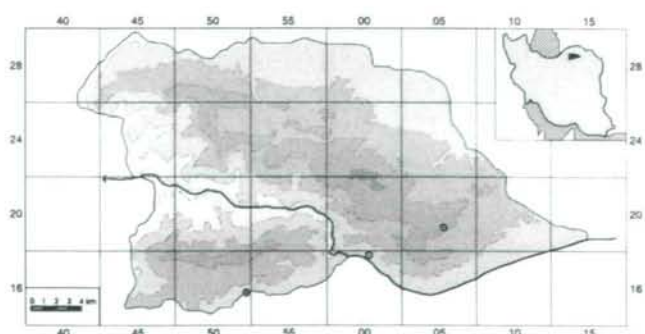
Map 93. *Carlina vulgaris* L.



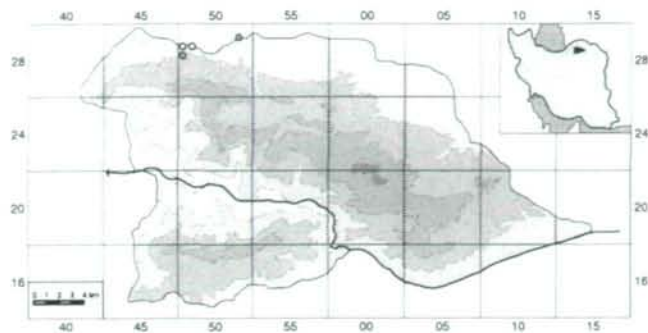
Map 94. *Carpesium abrotanoides* L.



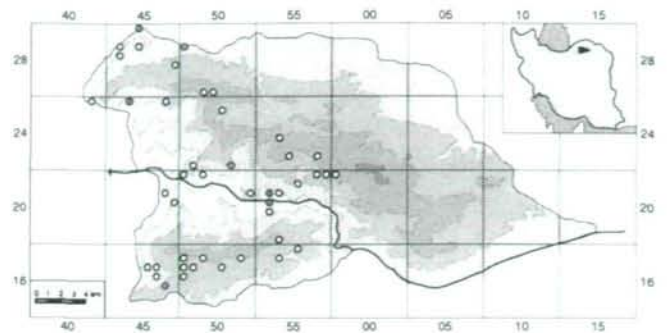
Map 95. *Carpesium cernuum* L.



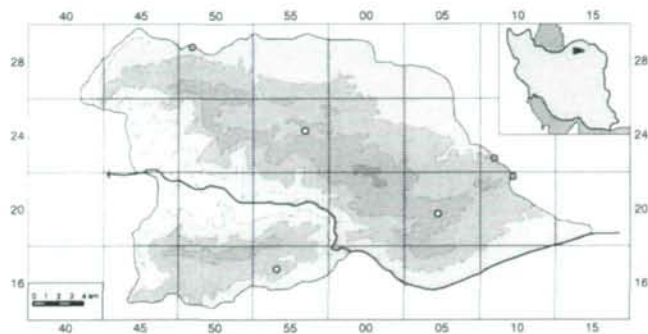
Map 96. *Centaurea depressa* M. Bieb.



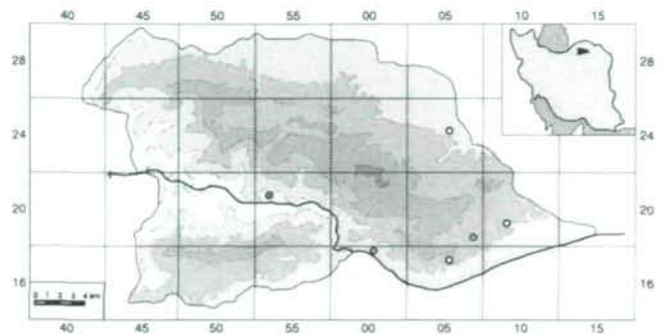
Map 97. *Centaurea golestanica* Akhani & Wagenitz



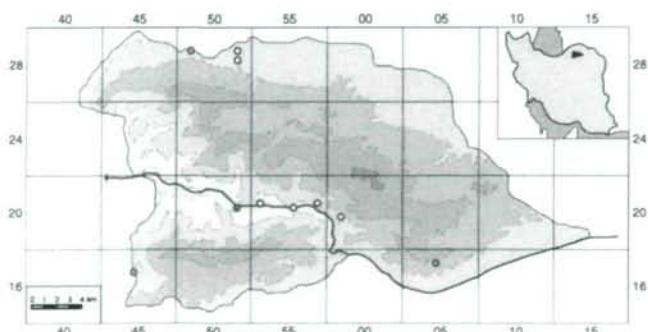
Map 98. *Centaurea hyrcanica* Borm.



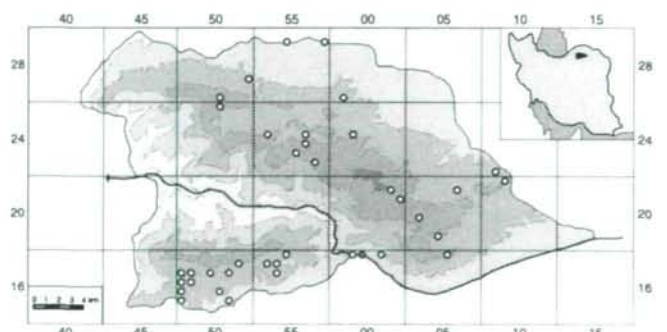
Map 99. *Centaurea kotschyi* (Boiss. & Heldr.) Hayek var. *persica* (Boiss.) Wagenitz



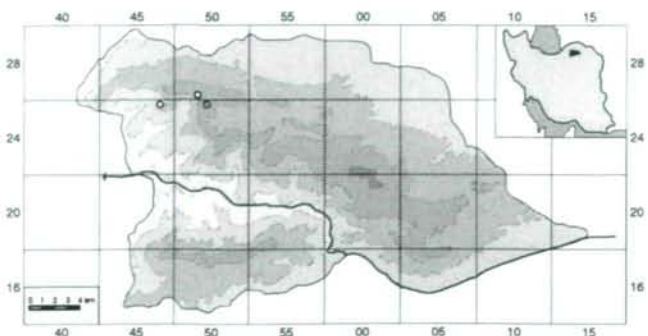
Map 100. *Centaurea leuzeoides* (Jaub. & Spach) Walp.



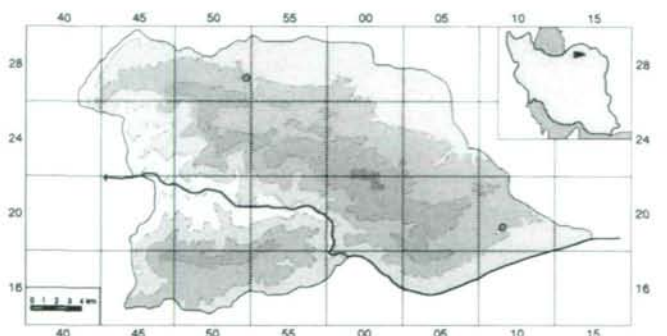
Map 101. *Centaurea sintenisiana* Gand.



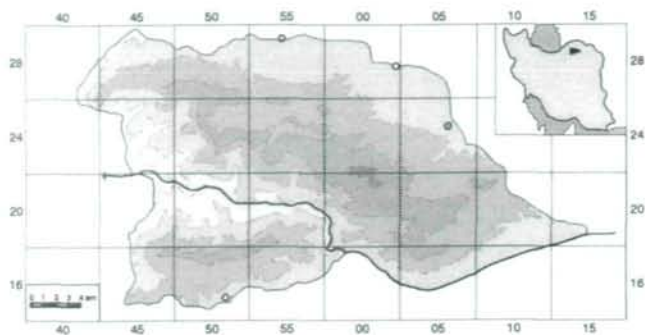
Map 102. *Centaurea virgata* Lam.



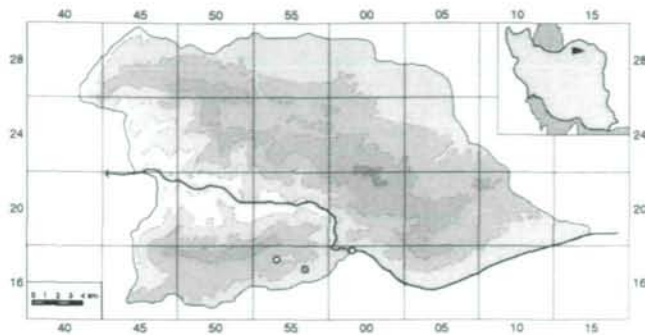
Map 103. *Centaurea zuvandica* (Sosn.) Sosn.



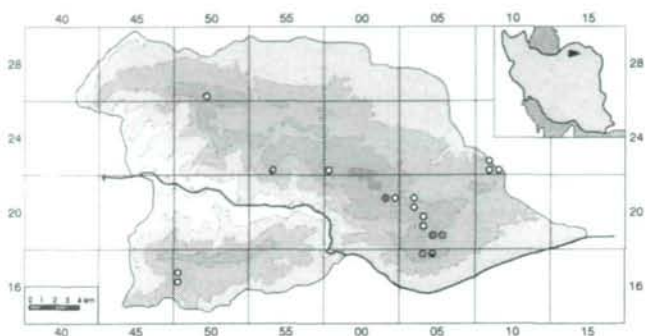
Map 104. *Cephalorrhynchus kossinskyi* (Krasch.) Kirp.



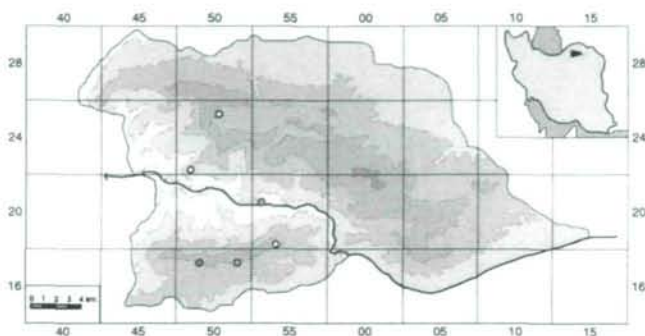
Map 105. *Chardinia orientalis* (L.) Kuntze



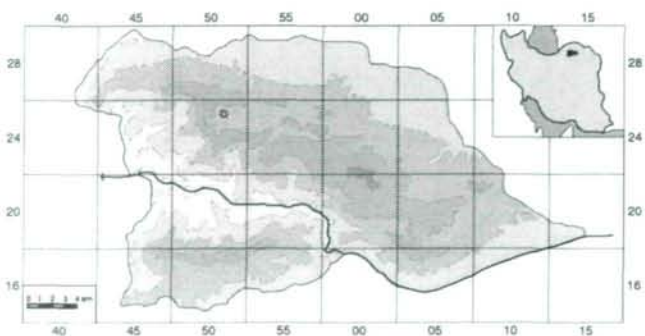
Map 106. *Chondrilla juncea* L.



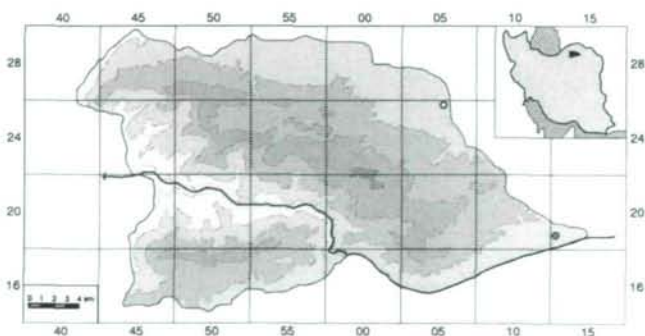
Map 107. *Cirsium bornmuelleri* Sint. ex Bornm.



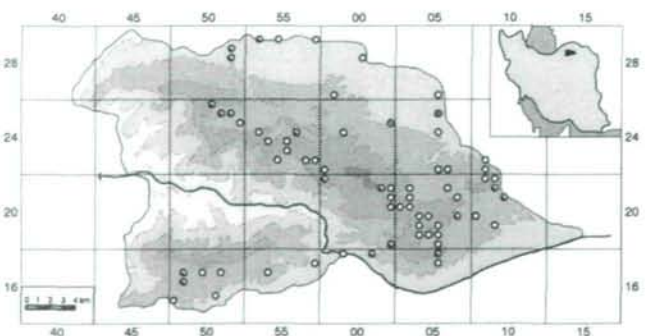
Map 108. *Cirsium osseticum* (Adams) Petr.



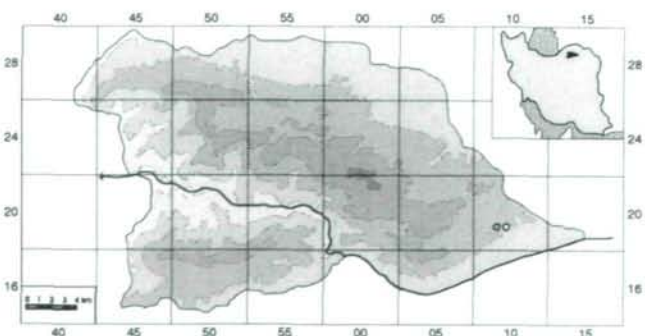
Map 109. *Cirsium turkestanicum* (Regel) Petr. var. *pseudolappaceum* (Kharadze) Petr.



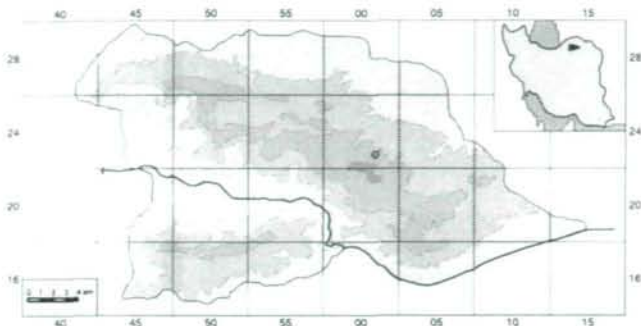
Map 110. *Cousinia arctotidifolia* Bunge



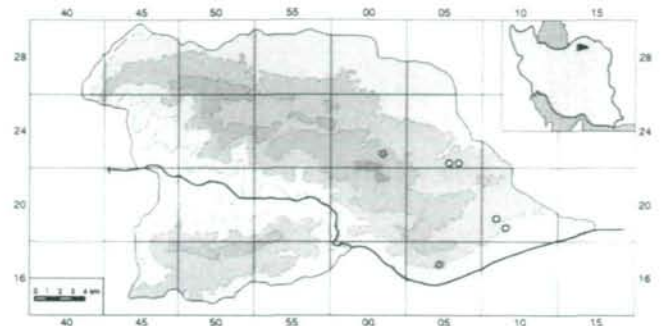
Map 111. *Cousinia decipiens* Boiss. & Buhse, s. l.



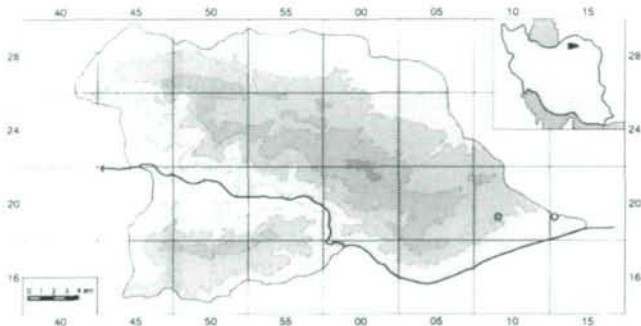
Map 112. *Cousinia eryngioides* Boiss.



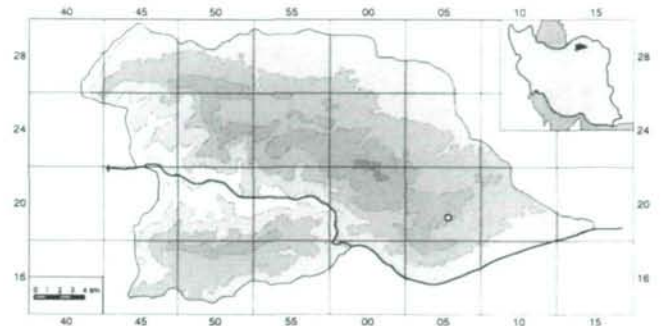
Map 113. *Cousinia leucantha* Bornm. & Sint.



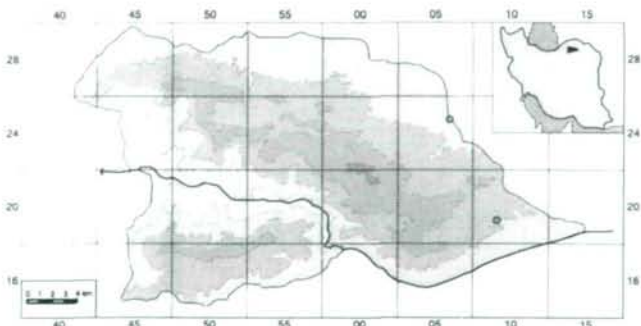
Map 114. *Cousinia meshhedensis* Bornm. & Rech. f.



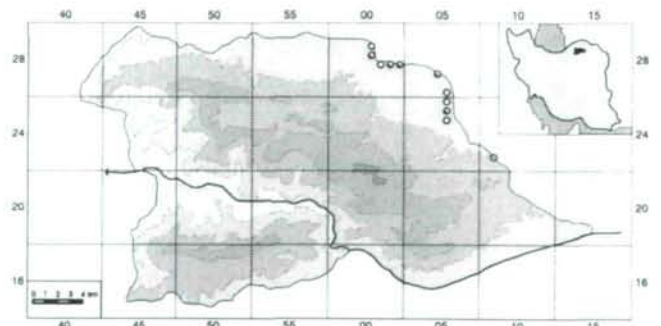
Map 115. *Cousinia neurocentra* Bunge



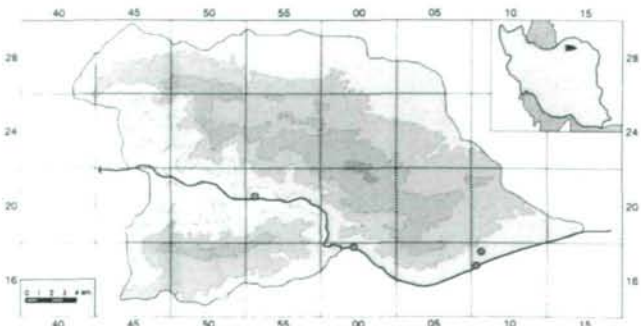
Map 116. *Cousinia smirnowii* Trautv.



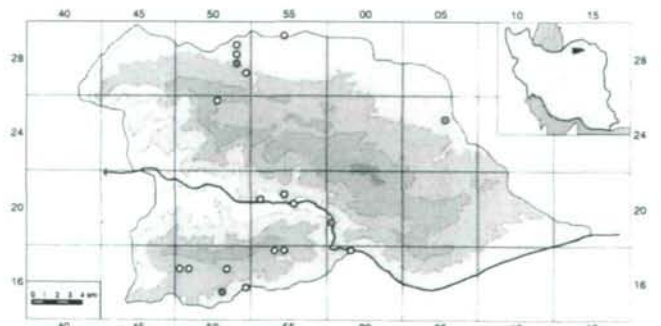
Map 117. *Cousinia tenella* Fisch. & C. A. Mey.



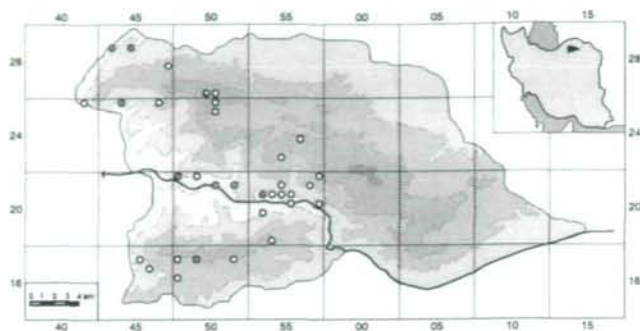
Map 118. *Cousinia turcomanica* C. Winkl.



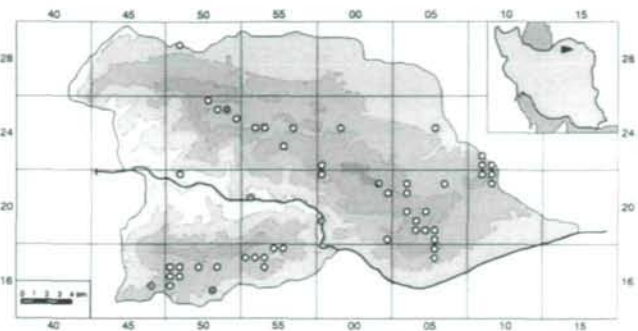
Map 119. *Crepis sancta* (L.) Babç., s. l.



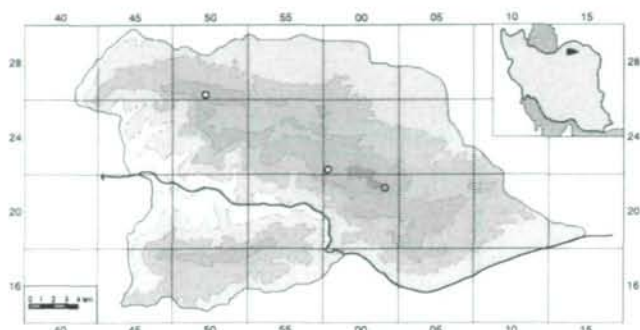
Map 120. *Crupina vulgaris* Cass.



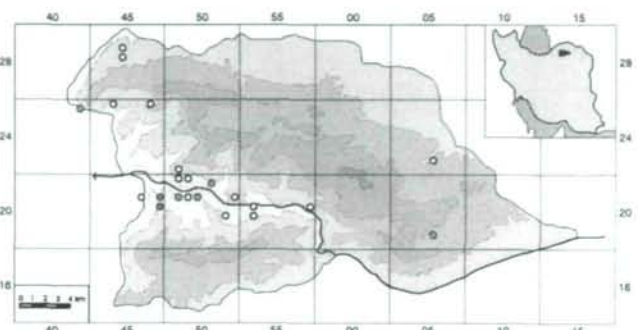
Map 121. *Echinops koelzii* Rech. f.



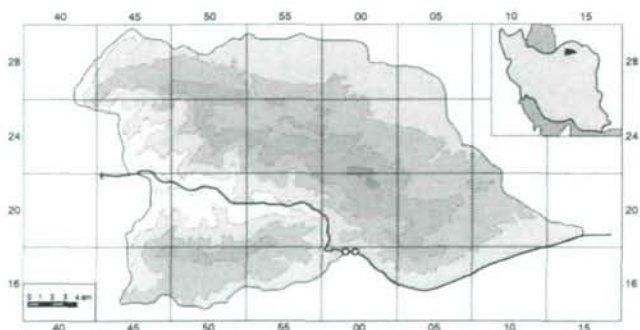
Map 122. *Echinops ritrodes* Bunge



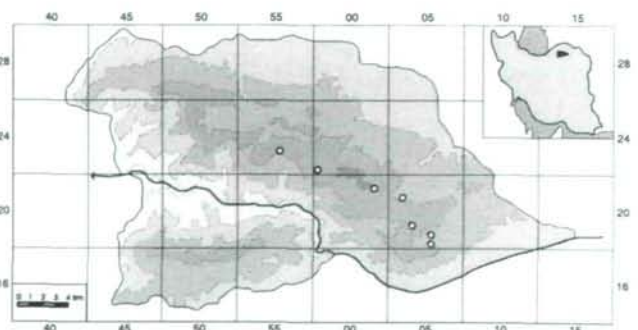
Map 123. *Erigeron acer* L., s. l.



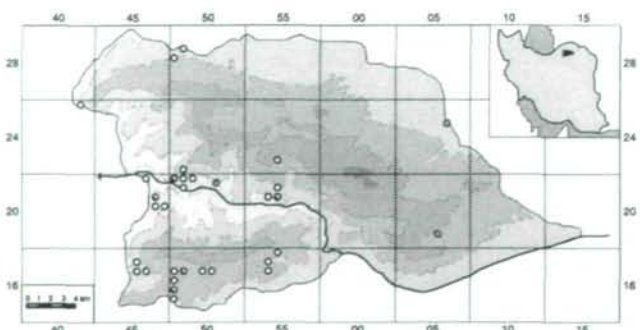
Map 124. *Eupatorium cannabinum* L.



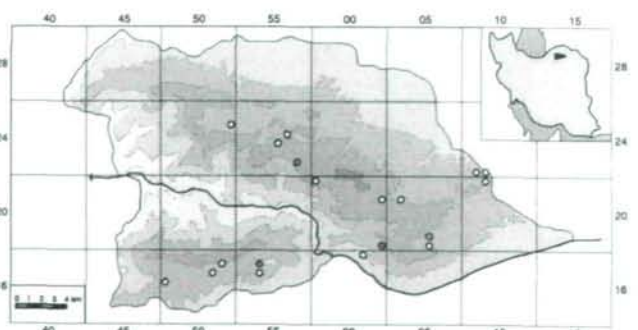
Map 125. *Garhadiolus angulosus* Jaub. & Spach



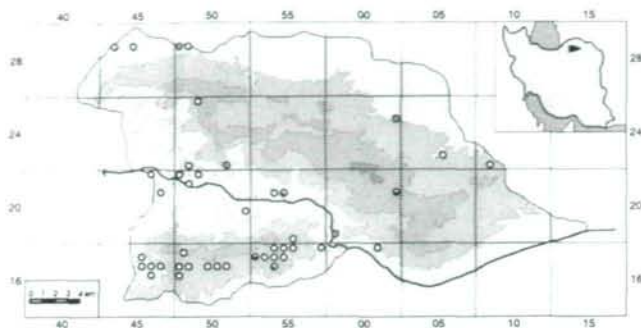
Map 126. *Helichrysum ocephalum* Boiss.



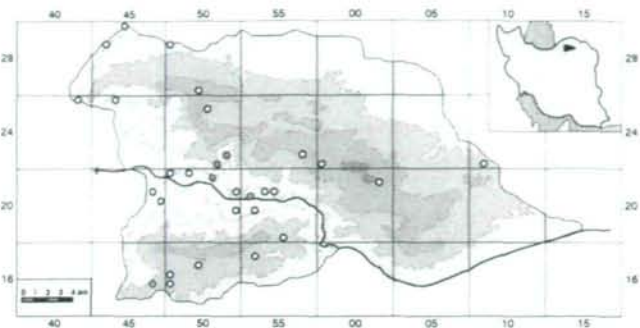
Map 127. *Heteropappus altaicus* (Willd.) Novopokr.



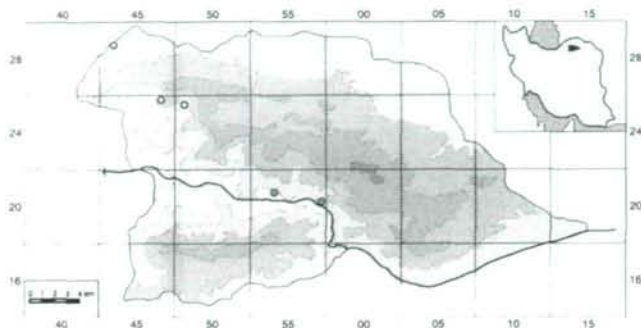
Map 128. *Inula oculus-christi* L.



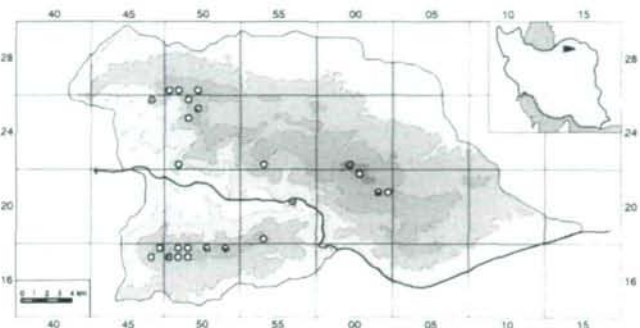
Map 129. *Inula salicina* L. subsp. *aspera* (Poir.) Hayek



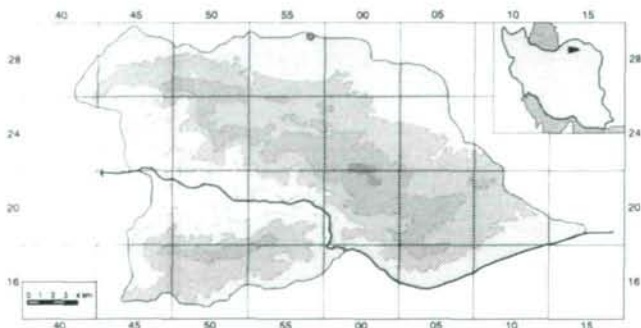
Map 130. *Inula thapsoides* (M. Bieb. ex Willd.) Spreng.



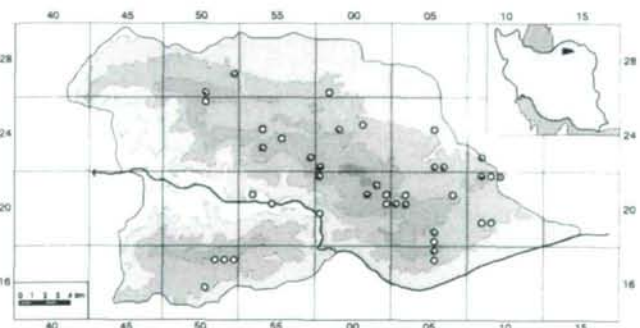
Map 131. *Inula vulgaris* (Lam.) Trevis.



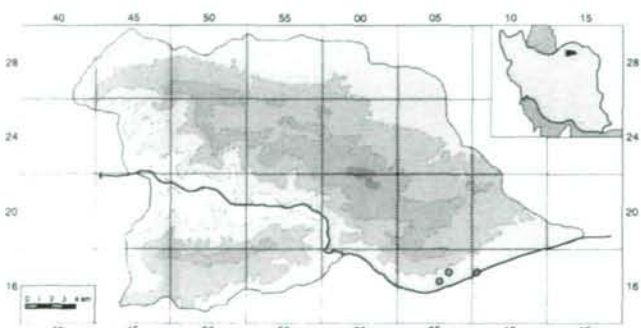
Map 132. *Iranecio othonnae* (M. Bieb.) B. Nord.



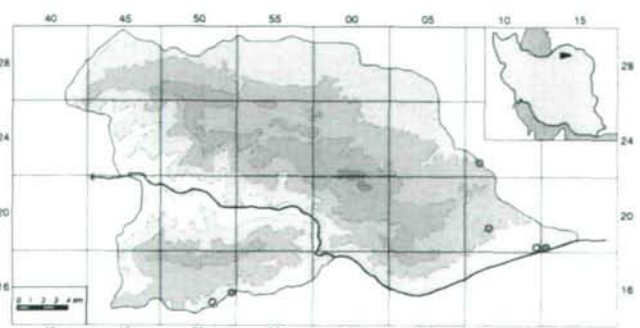
Map 133. *Jurinea antonowii* C. Winkl.



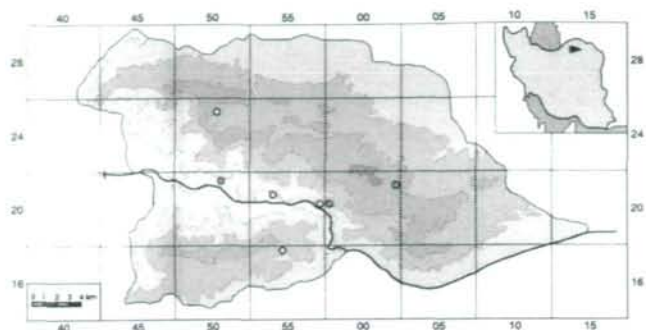
Map 134. *Jurinea monocephala* Aitsch. & Hemsl.



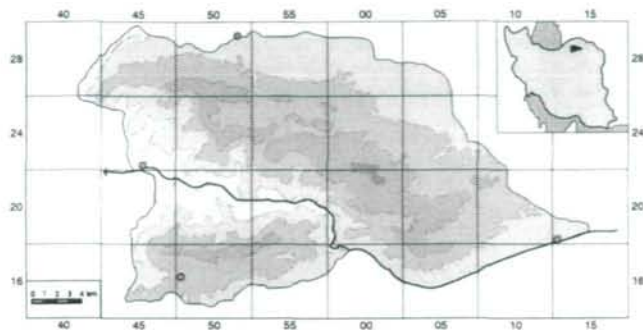
Map 135. *Jurinea radians* Boiss. subsp. *radians*



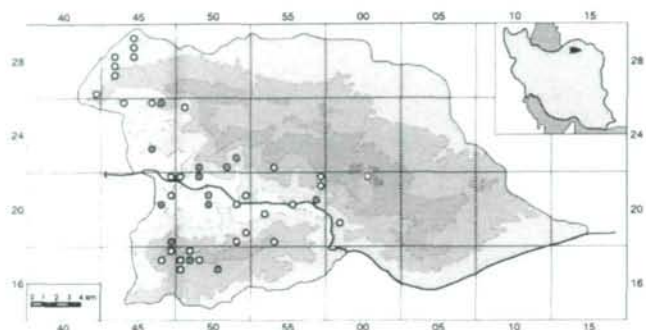
Map 136. *Koelpinia linearis* Pall.



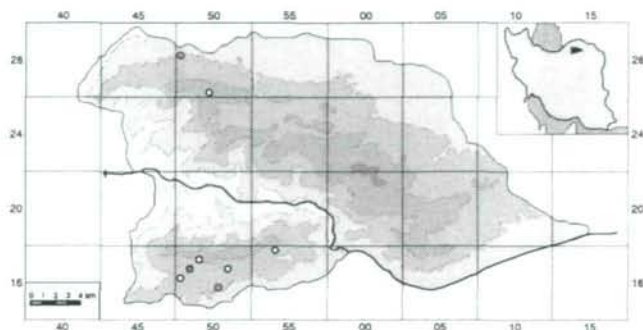
Map 137. *Lactuca georgica* Grossh.



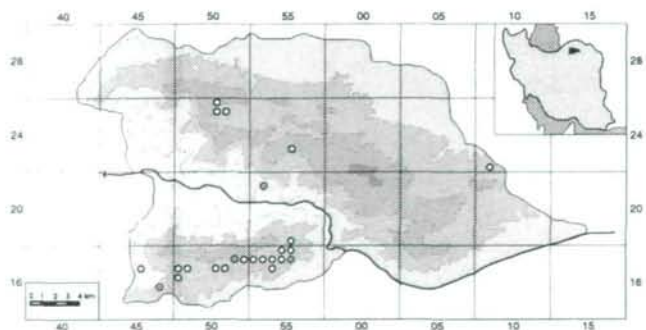
Map 138. *Lactuca serriola* L.



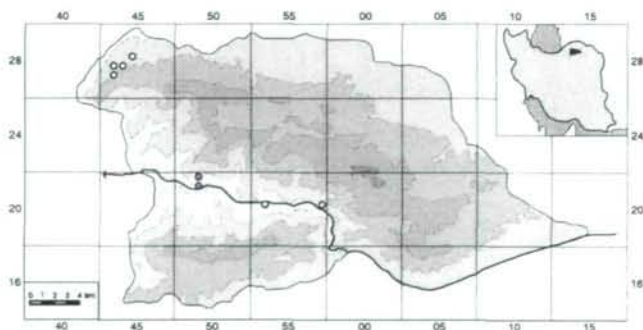
Map 139. *Lapsana communis* L., s. l.



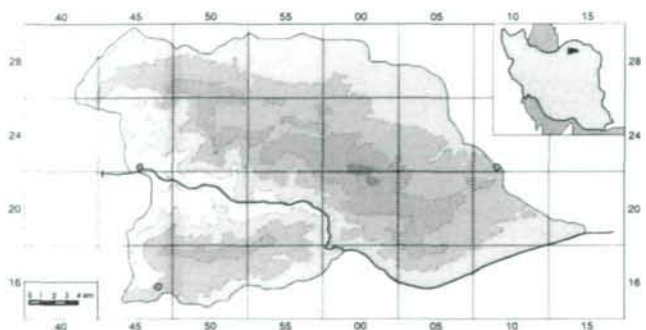
Map 140. *Leontodon asperimus* (Willd.) Boiss. ex Ball



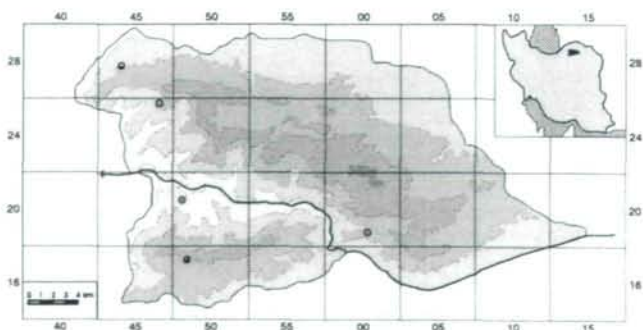
Map 141. *Linosyris vulgaris* Cass. ex Less.



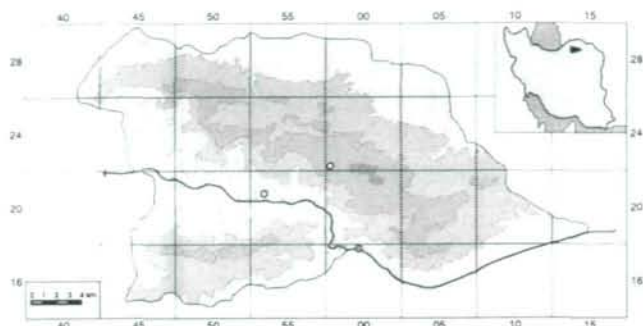
Map 142. *Myriactis wallichii* DC.



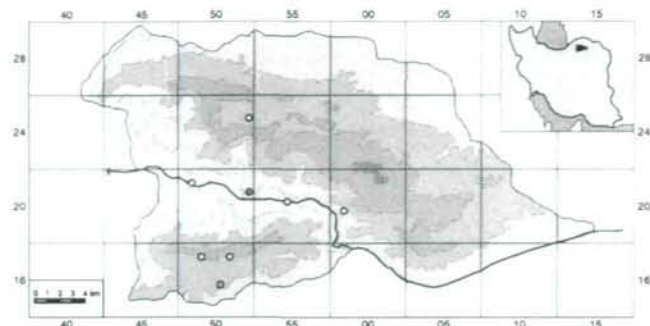
Map 143. *Onopordon acanthium* L.



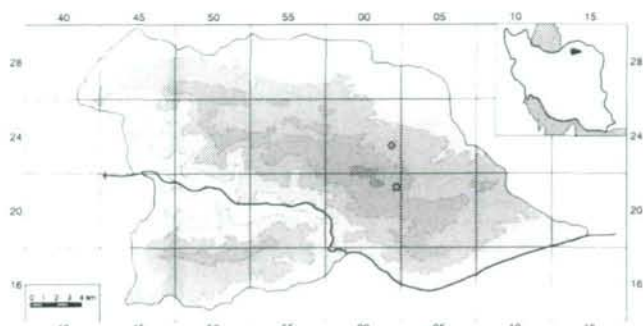
Map 144. *Petasites hybridus* (L.) P. Gaertn.



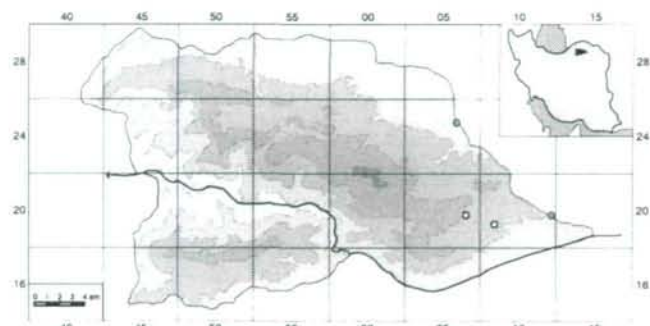
Map 145. *Picnomon acarna* (L.) Cass.



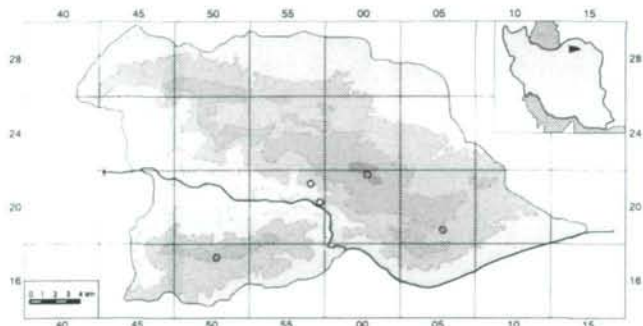
Map 146. *Picris strigosa* M. Bieb.



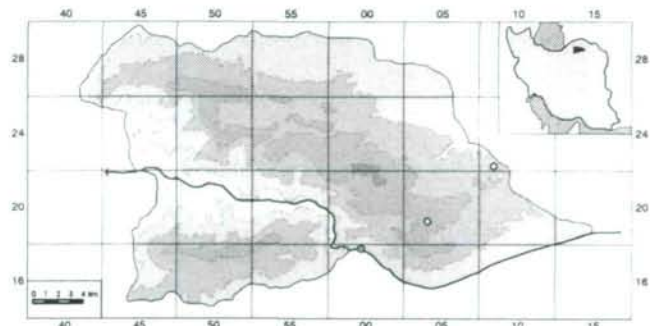
Map 147. *Psychogeton aucheri* (DC.) Grierson



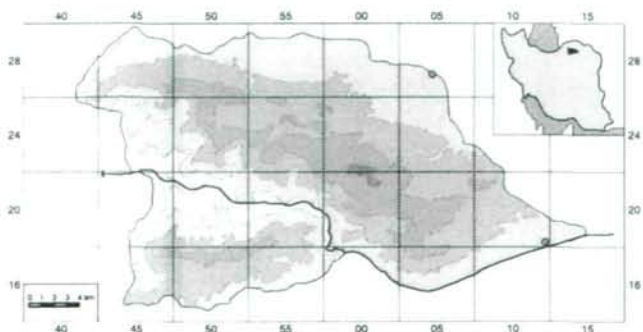
Map 148. *Scariola orientalis* (Boiss.) Soják



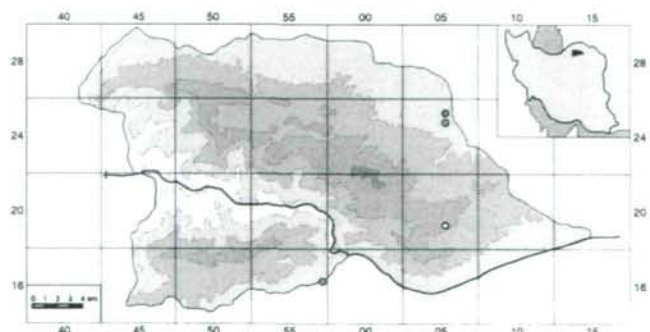
Map 149. *Scariola viminea* (L.) F. W. Schmidt



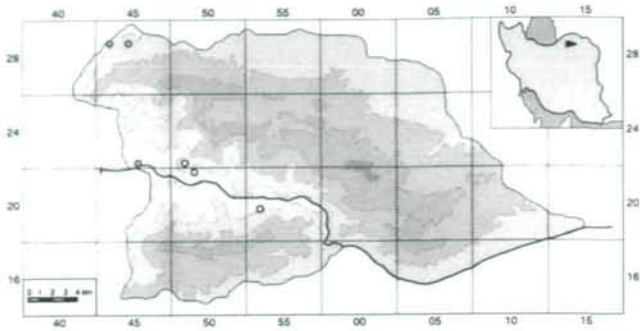
Map 150. *Scorzonera grossheimii* Lipsch. & Vassilcz.



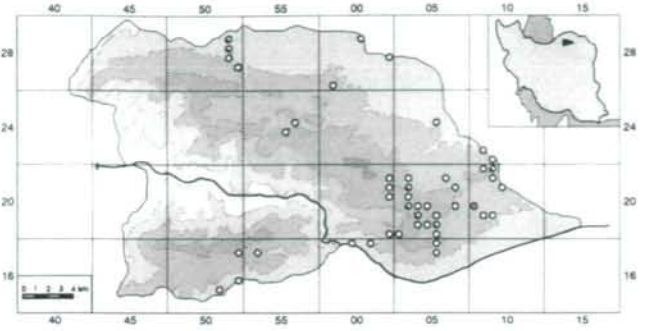
Map 151. *Scorzonera litwinowii* Krasch. & Lipsch.



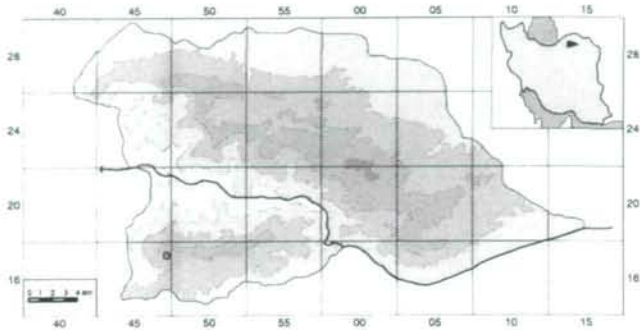
Map 152. *Scorzonera raddeana* C. Winkl.



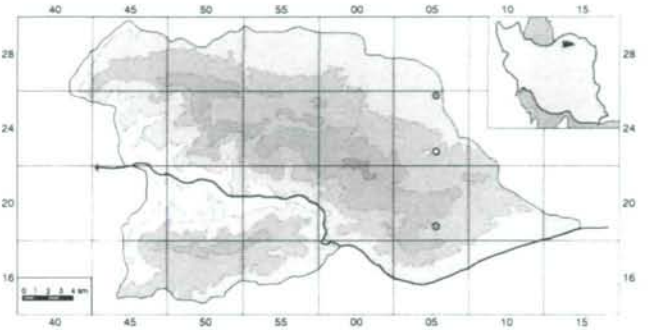
Map 153. *Senecio erucifolius* L. subsp. *grandidentatus* (Ledeb.) B. Nord.



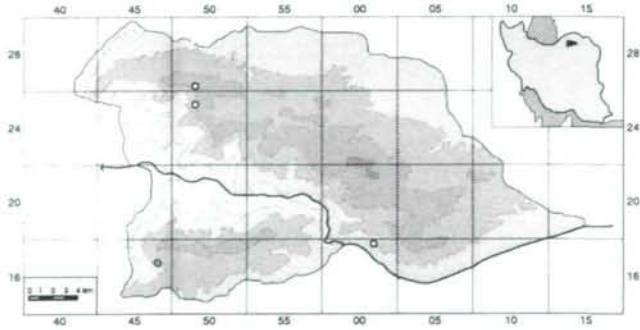
Map 154. *Serratula latifolia* Boiss.



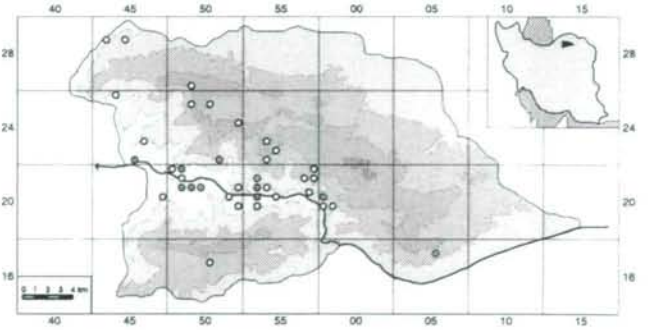
Map 155. *Serratula quinquefolia* M. Bieb. ex Willd.



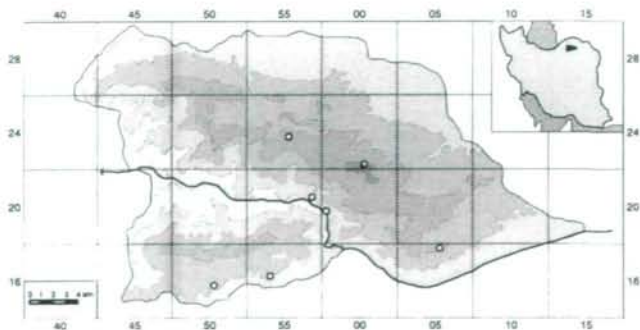
Map 156. *Sonchus palustris* L.



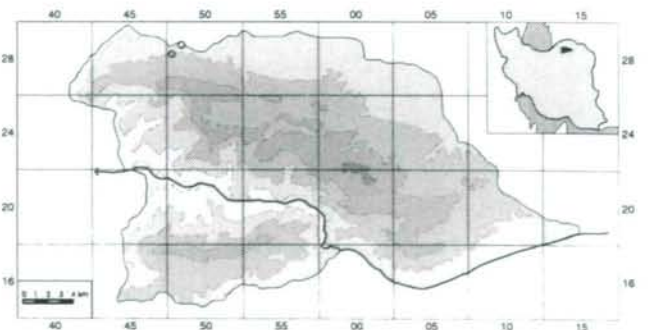
Map 157. *Tanacetum coccineum* (Willd.) Grierson



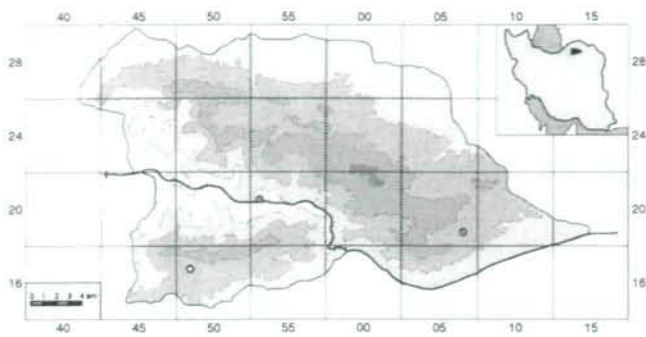
Map 158. *Tanacetum parthenium* (L.) Sch.-Bip.



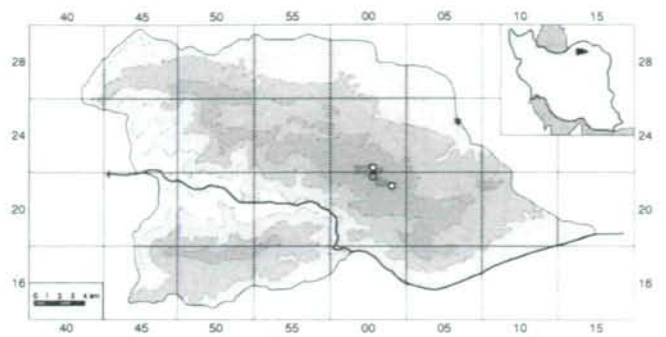
Map 159. *Tanacetum polycephalum* Sch.-Bip. subsp. *duderanum* (Boiss.) Podlech



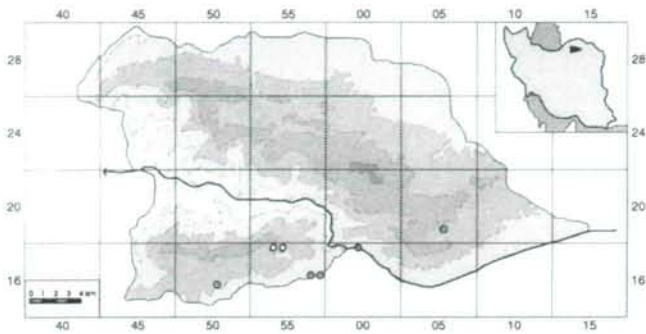
Map 160. *Tragopogon capitatus* S. Nikitin



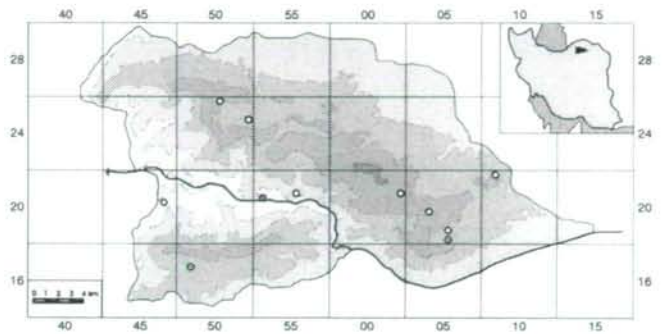
Map 161. *Tragopogon gongyrorrhizus* Rech. f.



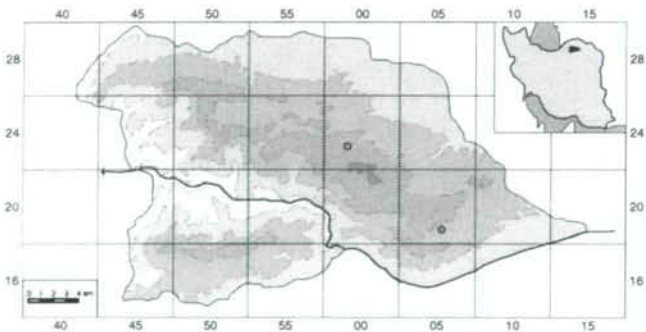
Map 162. *Tragopogon graminifolius* DC. (star); *T. kotschy* Boiss. (dot)



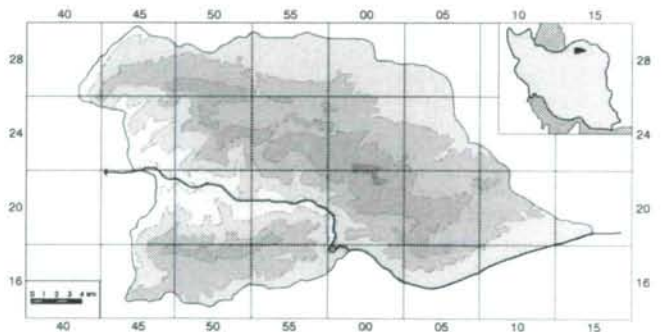
Map 163. *Tragopogon longirostris* Bisch.



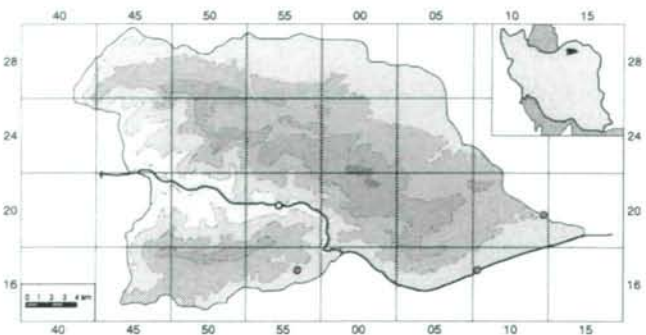
Map 164. *Tragopogon vvedenskyi* Popov ex Pavlov



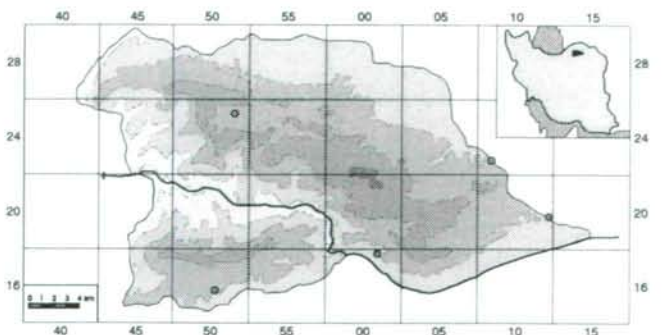
Map 165. *Tripleurospermum disciforme* (C. A. Mey.) Sch.-Bip.



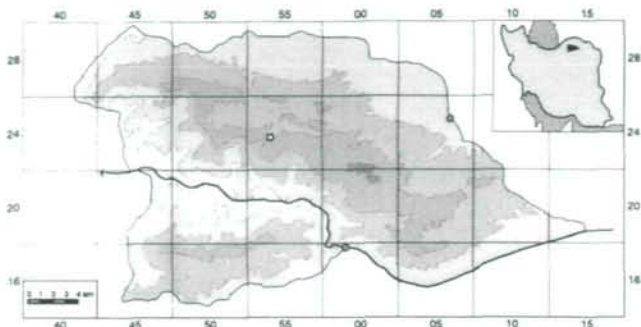
Map 166. *Tussilago farfara* L.



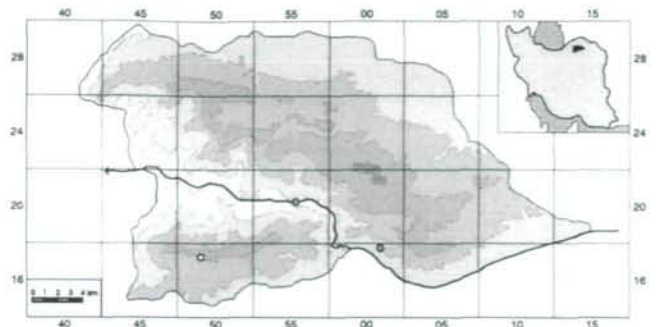
Map 167. *Varthemia persica* DC.



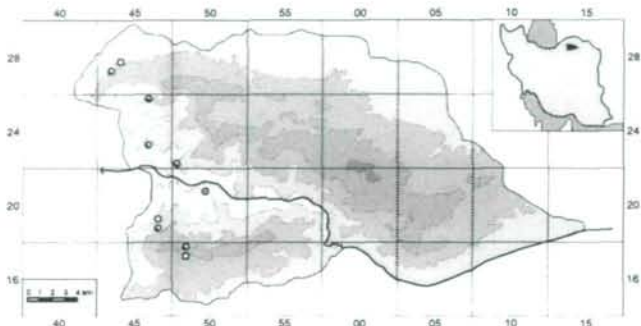
Map 168. *Berberis integerrima* Bunge (incomplete)



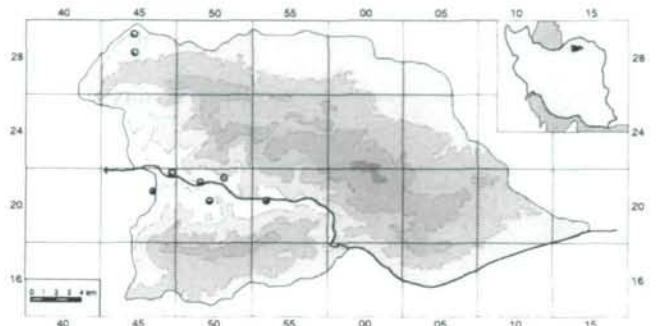
Map 169. *Berberis orthobotrys* Bien. ex C. K. Schneid.



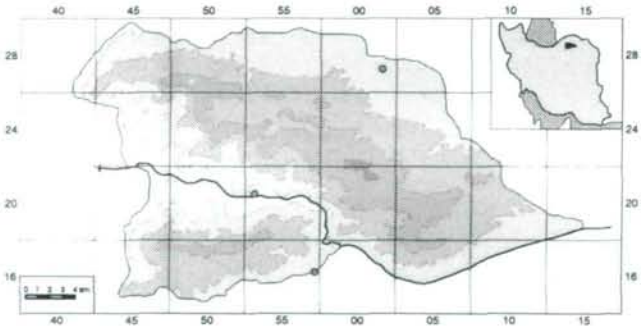
Map 170. *Berberis vulgaris* L.



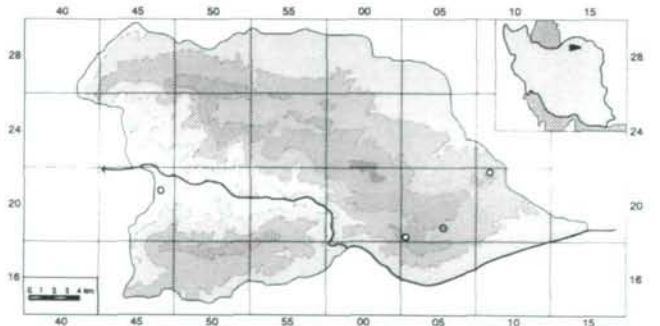
Map 171. *Alnus glutinosa* (L.) Gaertn.



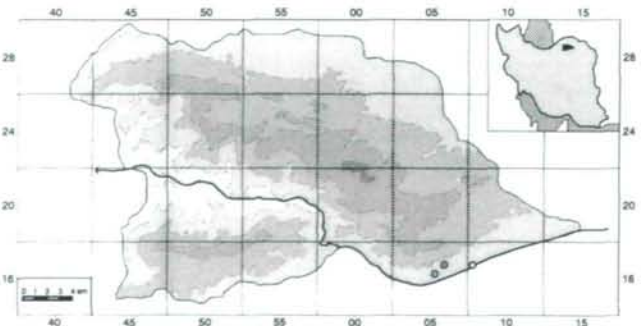
Map 172. *Alnus subcordata* C. A. Mey.



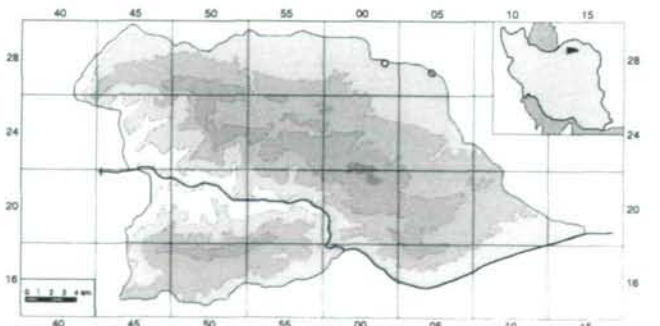
Map 173. *Anchusa arvensis* (L.) M. Bieb. subsp. *orientalis* (L.) Nordh.



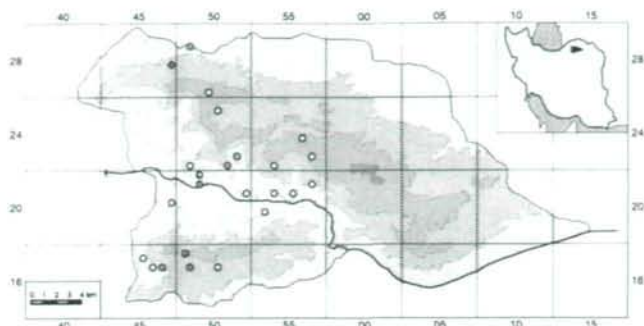
Map 174. *Anchusa azurea* Mill.



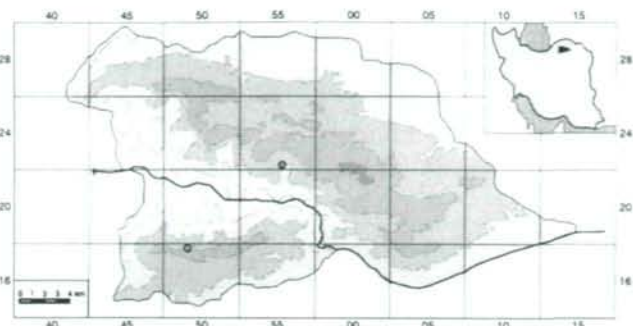
Map 175. *Arnebia decumbens* (Vent.) Coss. & Kralik



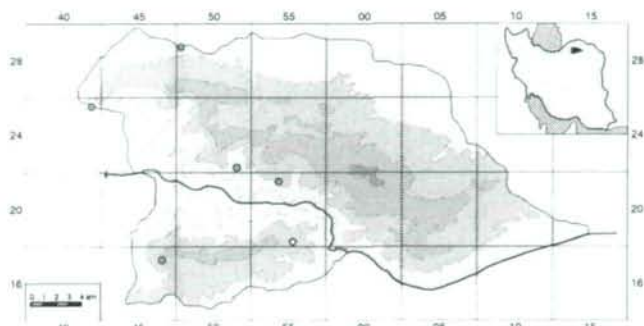
Map 176. *Arnebia grandiflora* (Trautv.) Popov



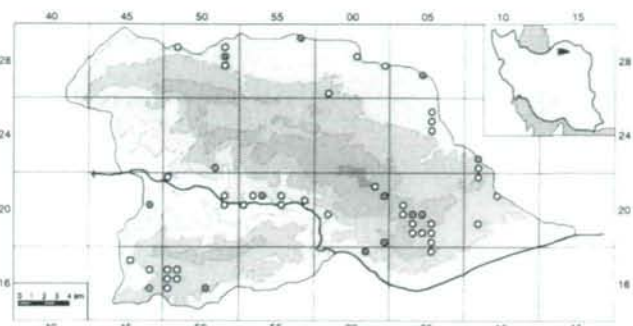
Map 177. *Cerinthe minor* L.



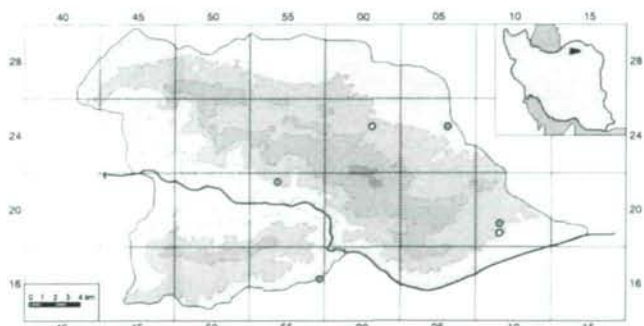
Map 178. *Cynoglossum kandavanensis* (Bornm. & Gauba) Akhani



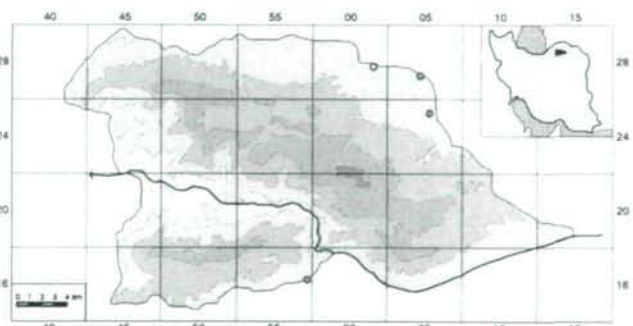
Map 179. *Echium amoenum* Fisch. & C. A. Mey.



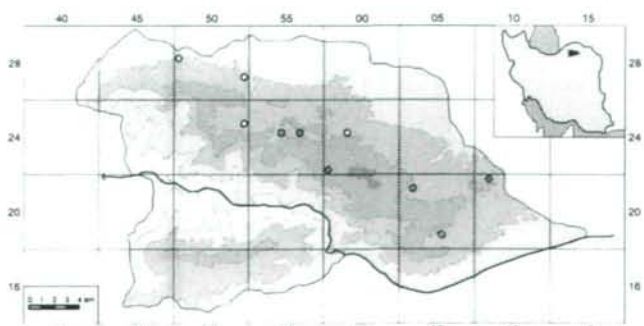
Map 180. *Lappula barbata* (M. Bieb.) Gürke, s. l.



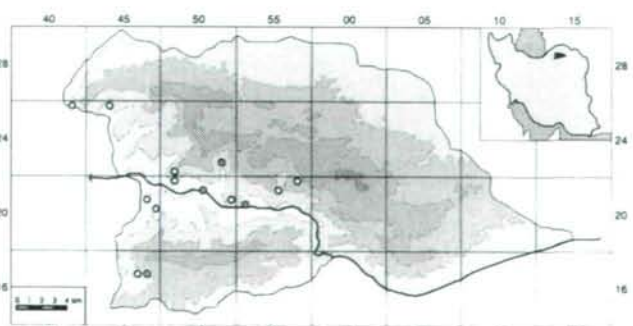
Map 181. *Lappula sinaica* (DC.) Asch. ex Schweinf.



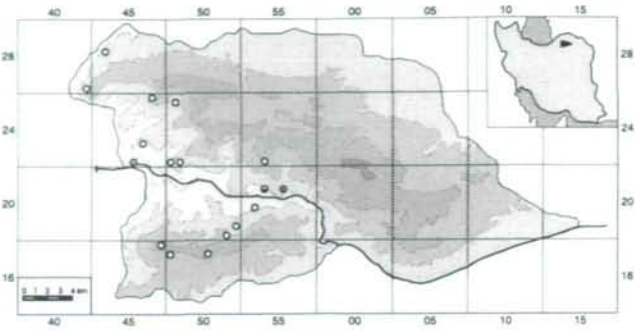
Map 182. *Lappula spinocarpos* (Forssk.) Asch.



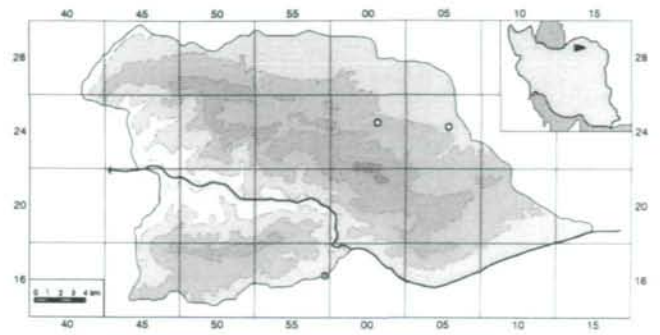
Map 183. *Lithospermum arvense* L.



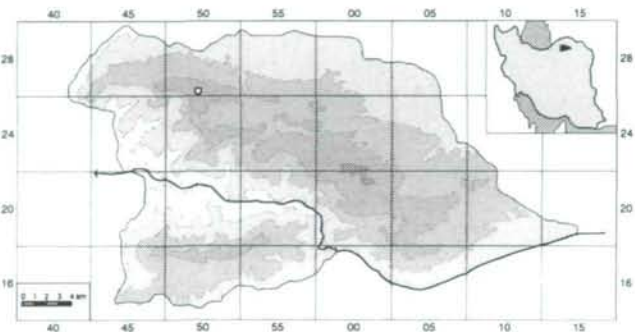
Map 184. *Lithospermum officinale* L.



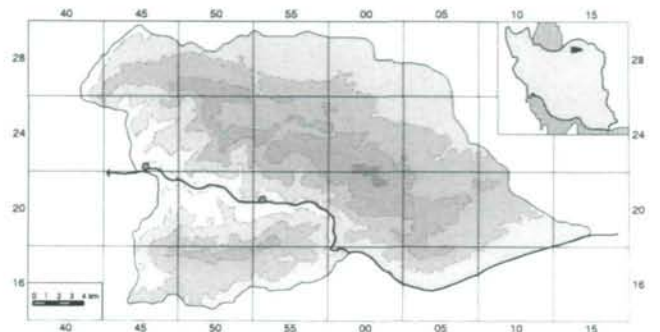
Map 185. *Lithospermum purpureocaeruleum* L.



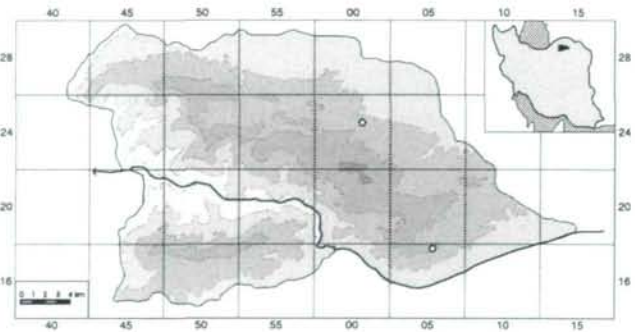
Map 186. *Lithospermum tenuiflorum* L.



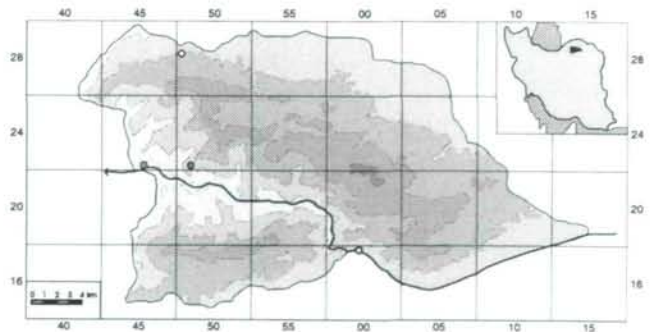
Map 187. *Myosotis alpestris* F. W. Schmidt



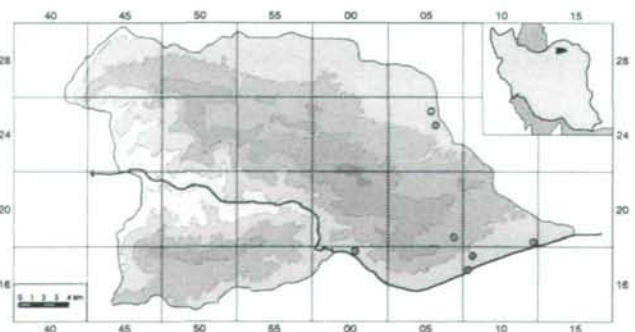
Map 188. *Myosotis arvensis* (L.) Hill.



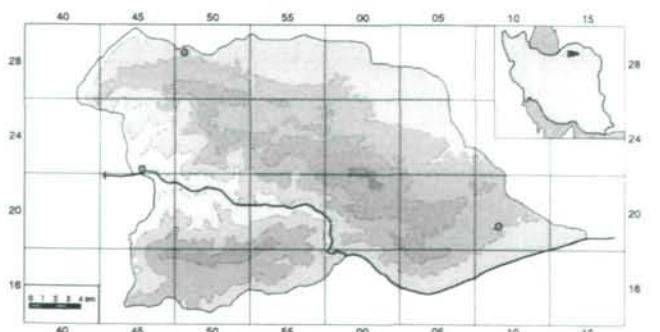
Map 189. *Myosotis minutiflora* Boiss. & Reuter



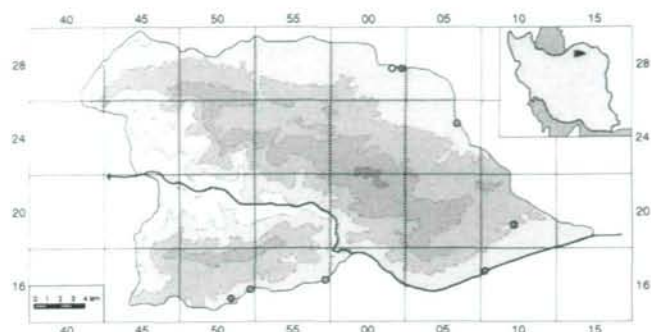
Map 190. *Myosotis ramosissima* Rochel



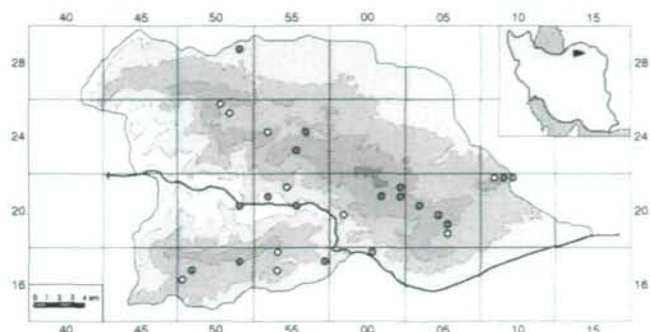
Map 191. *Nonea caspica* (Willd.) G. Don.



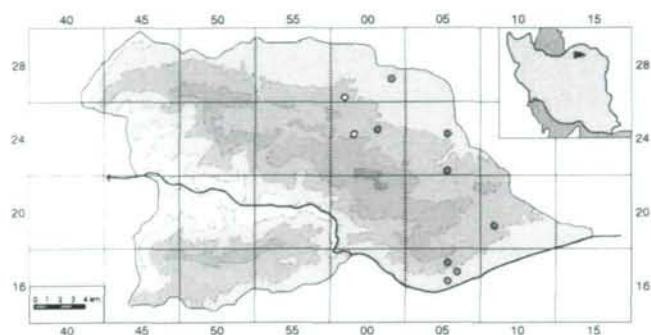
Map 192. *Nonea lutea* (Desr.) DC.



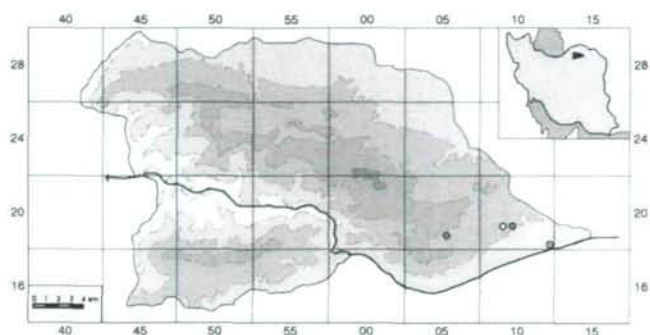
Map 193. *Nonea turcomanica* Popov



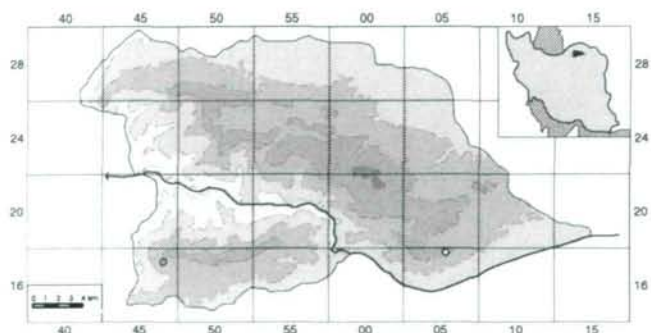
Map 194. *Onosma dichorantha* Boiss.



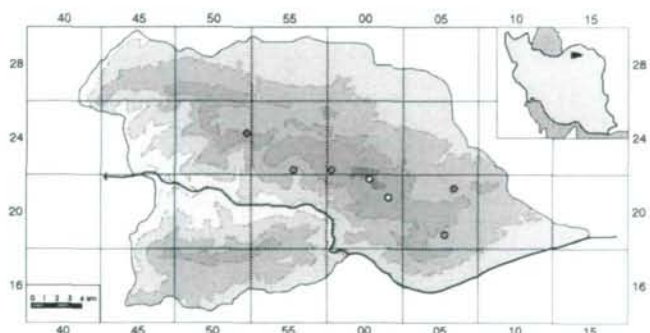
Map 195. *Onosma longiloba* Bunge



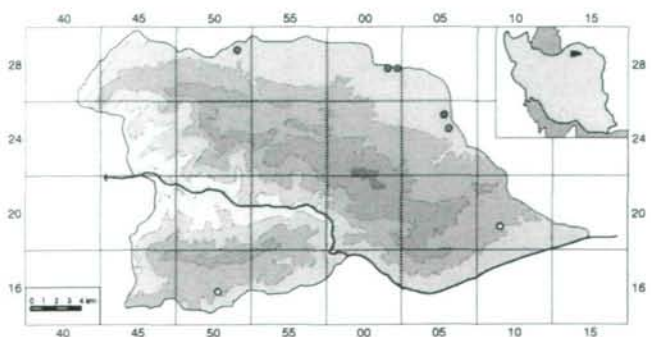
Map 196. *Rochelia bungei* Trautv.



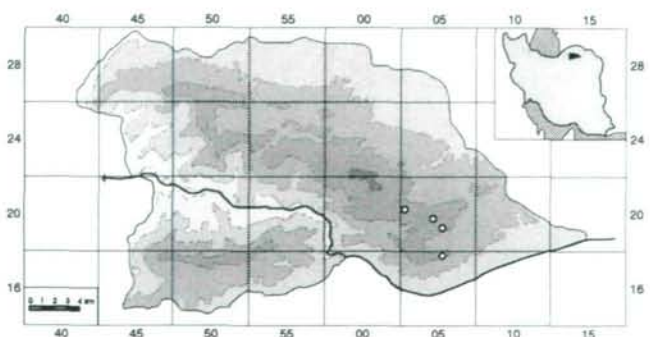
Map 197. *Rochelia persica* Bunge ex Boiss.



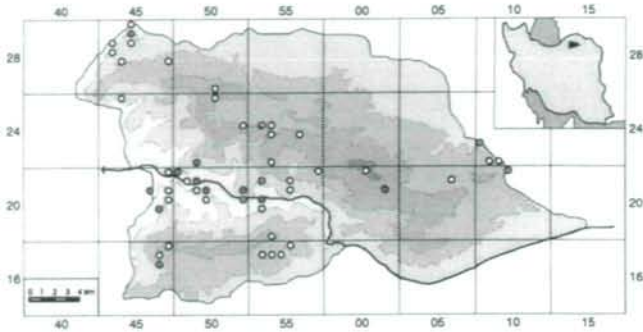
Map 198. *Solenathus circinnatus* Ledeb.



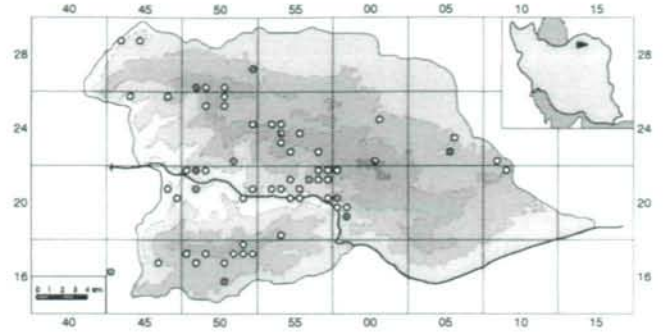
Map 199. *Aethionema carneum* (Banks & Sol.) B. Fedtsch.



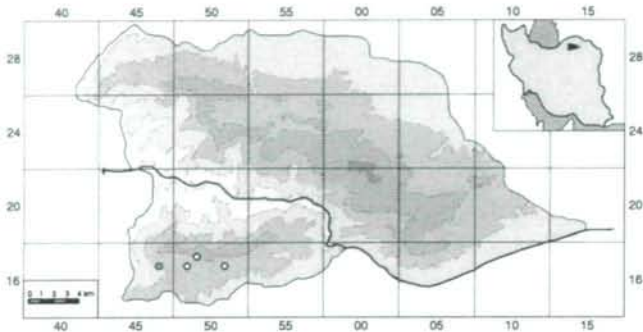
Map 200. *Aethionema trinervium* (DC.) Boiss.



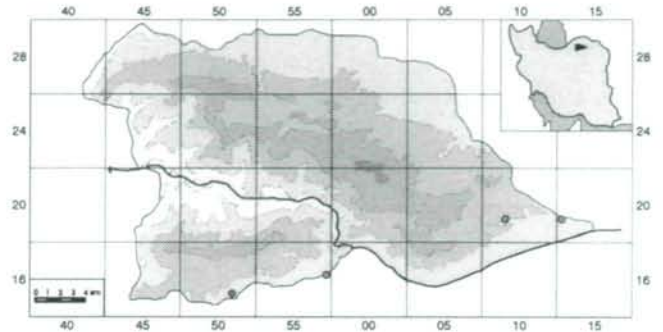
Map 201. *Alliaria petiolata* (M. Bieb.) Cavara & Grande



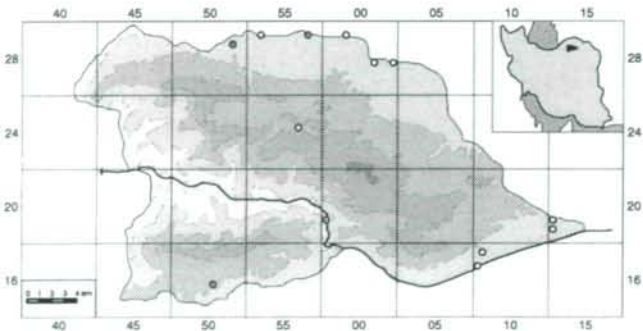
Map 202. *Alyssoipsis mollis* (Jacq.) O. E. Schulz



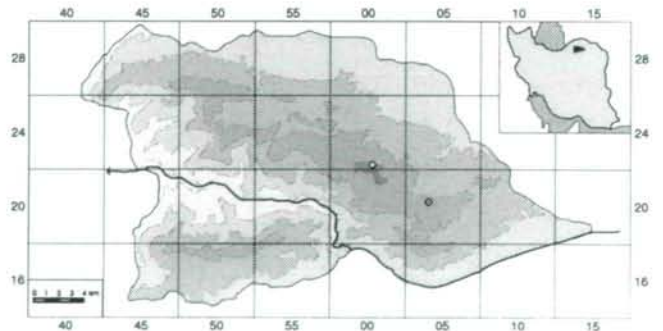
Map 203. *Alyssum alyssoides* (L.) L.



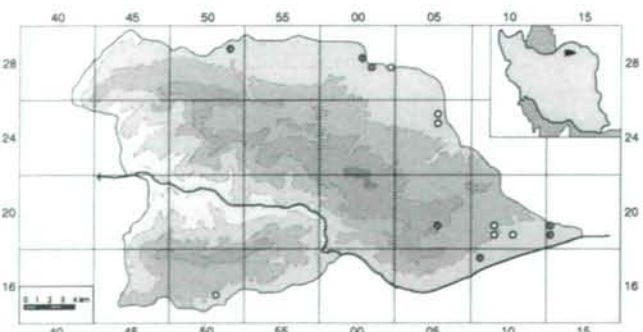
Map 204. *Alyssum dasycarpum* Willd.



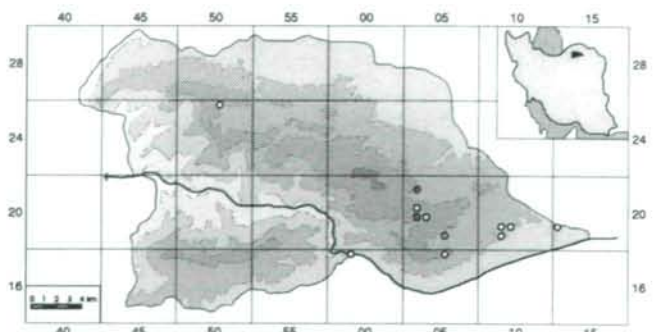
Map 205. *Alyssum desertorum* Stapf



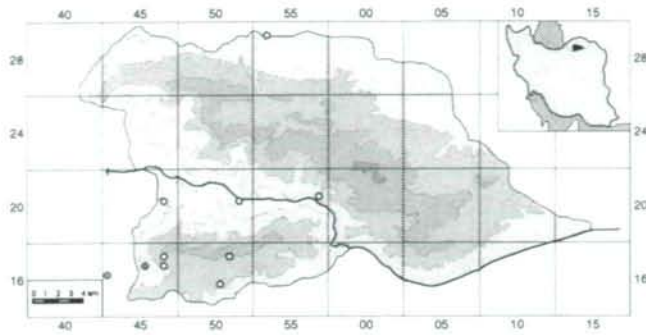
Map 206. *Alyssum lanceolatum* Baumgartner



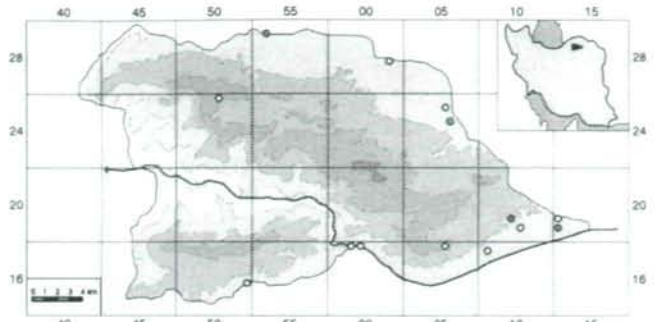
Map 207. *Alyssum linifolium* Willd.



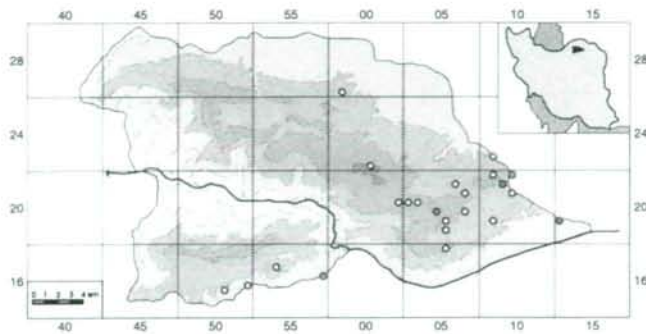
Map 208. *Alyssum minus* (L.) Rothm. var. *micranthum* (C. A. Mey.) T. R. Dudley



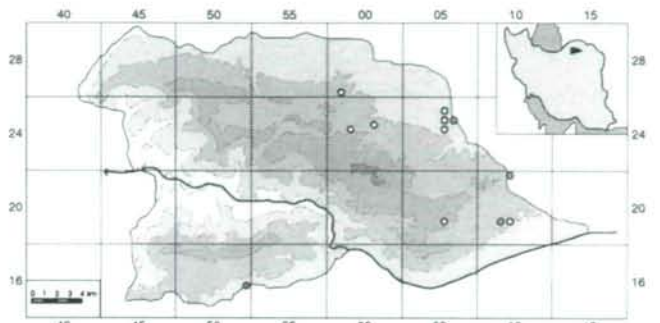
Map 209. *Alyssum strigosum* Banks & Sol.



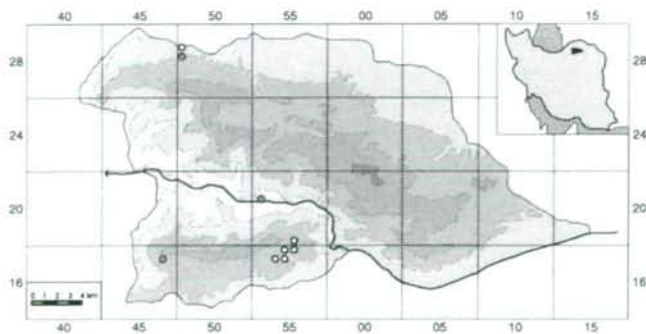
Map 210. *Alyssum szovitsianum* Fisch. & C. A. Mey.



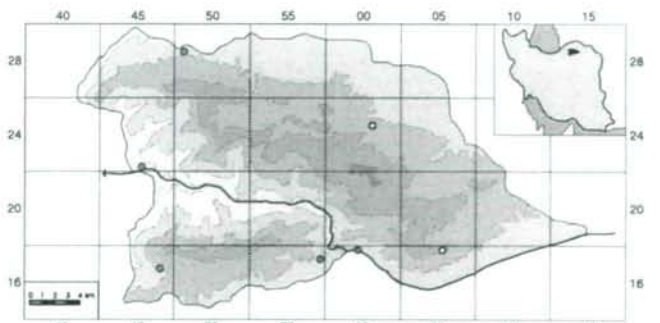
Map 211. *Alyssum tortuosum* Willd.



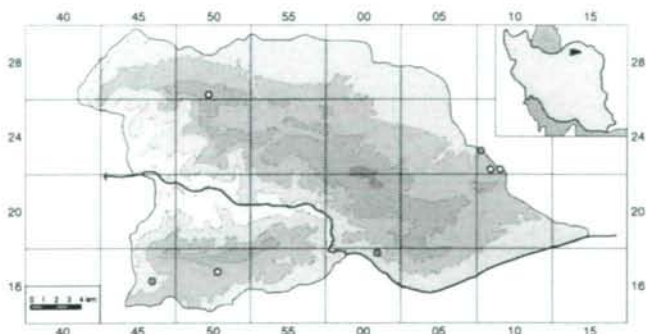
Map 212. *Arabidopsis pumila* (Willd.) N. Busch



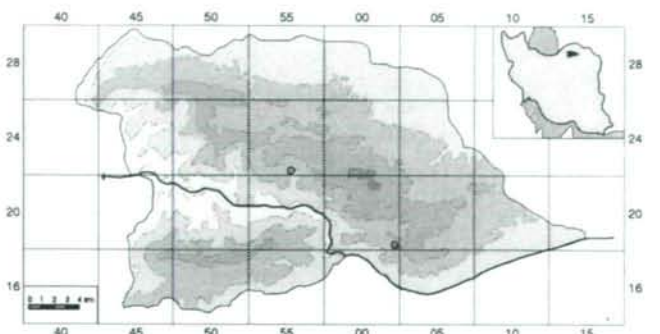
Map 213. *Arabis glabra* (L.) Bernh.



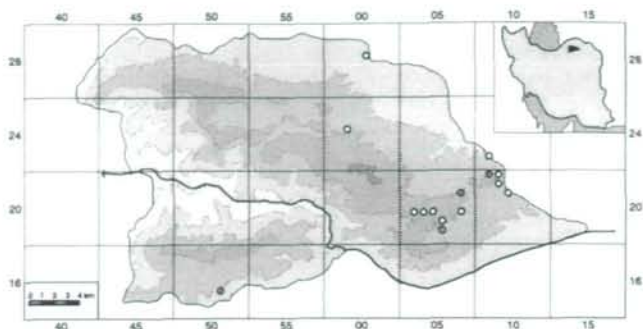
Map 214. *Arabis nova* Vill.



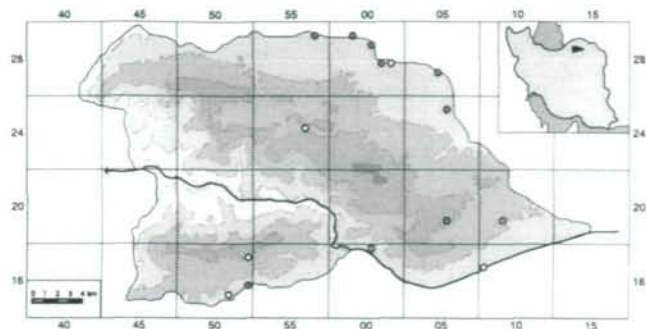
Map 215. *Arabis sagitata* (Bertol.) DC.



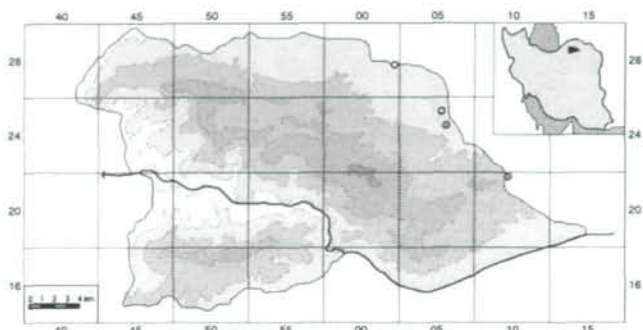
Map 216. *Barbarea plantaginea* DC.



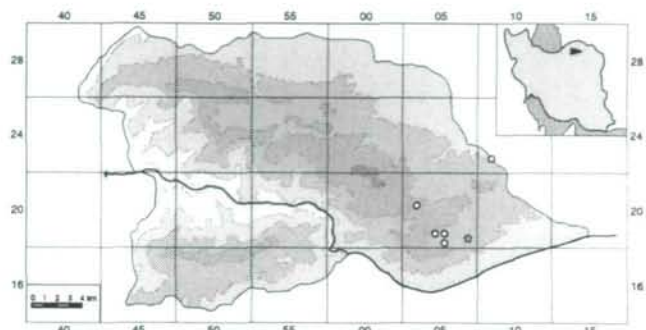
Map 217. *Brassica elongata* Ehrh.



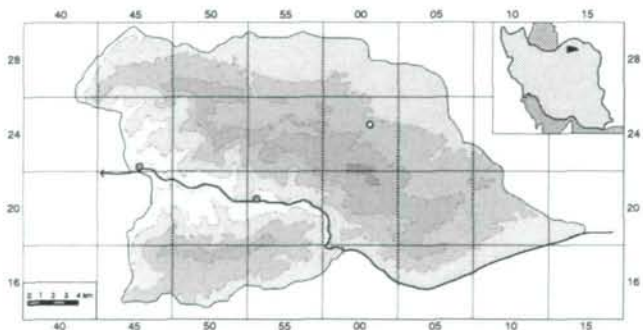
Map 218. *Camelina rumelica* Velen.



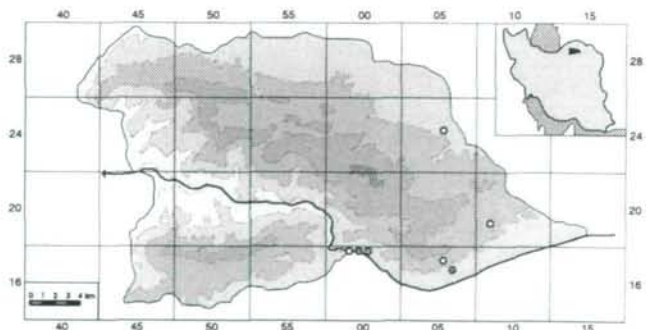
Map 219. *Chorispora tenella* (Pall.) DC.



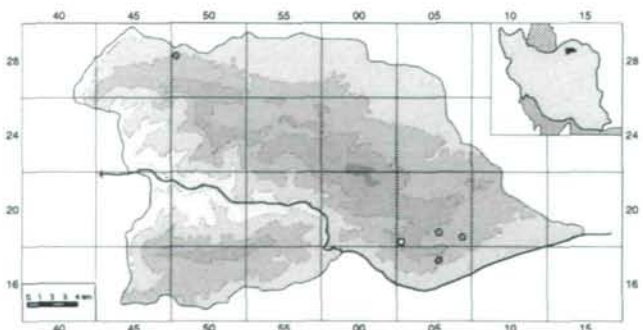
Map 220. *Clausia turkestanica* Lipsky



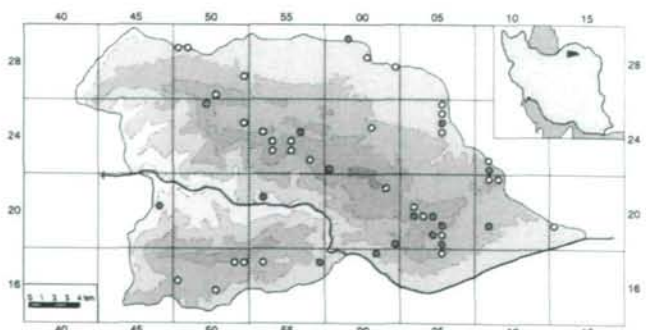
Map 221. *Clypeola jonthlaspi* L.



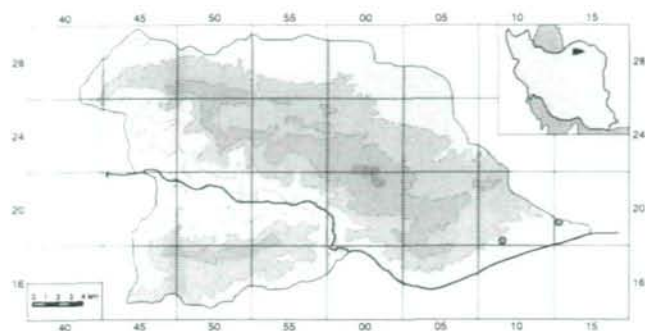
Map 222. *Crambe kotschyana* Boiss.



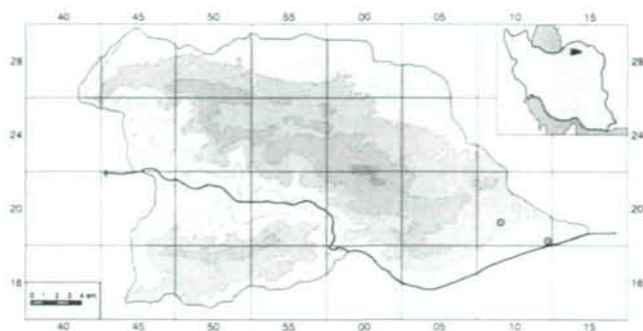
Map 223. *Draba huetii* Boiss.



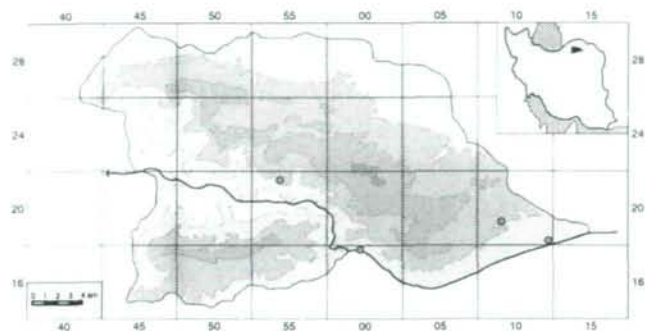
Map 224. *Erysimum ischnostylum* Freyn & Sint.



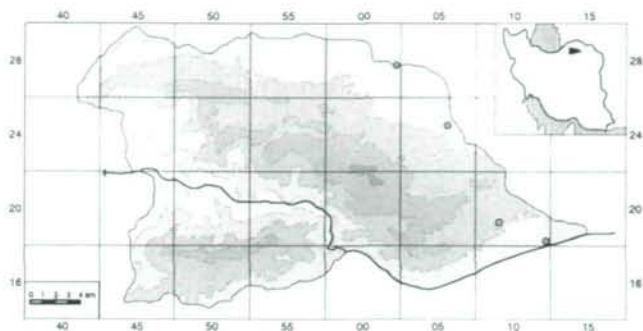
Map 225. *Erysimum kerbabaevii* Kurbanov & Gudkova



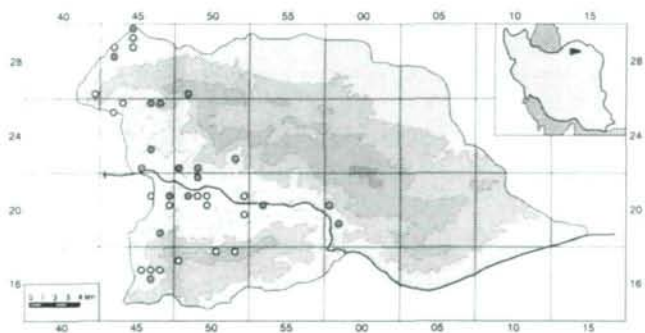
Map 226. *Euclidium syriacum* (L.) R. Br.



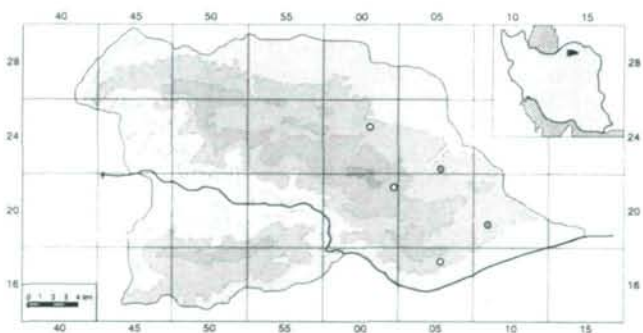
Map 227. *Euclidium tenuissimum* (Pall.) Fedtsch.



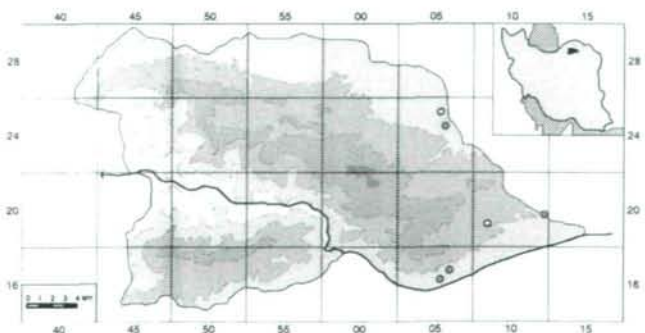
Map 228. *Goldbachia laevigata* (M. Bieb.) DC.



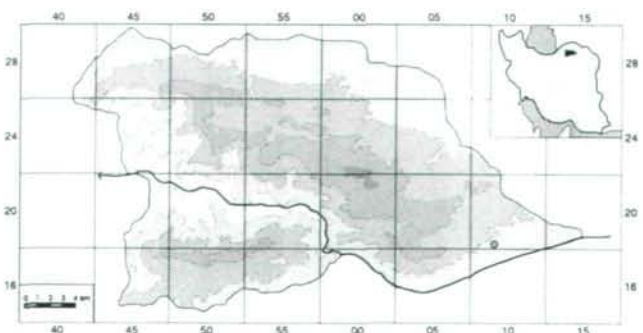
Map 229. *Hesperis hyrcana* Bornm. & Gauba



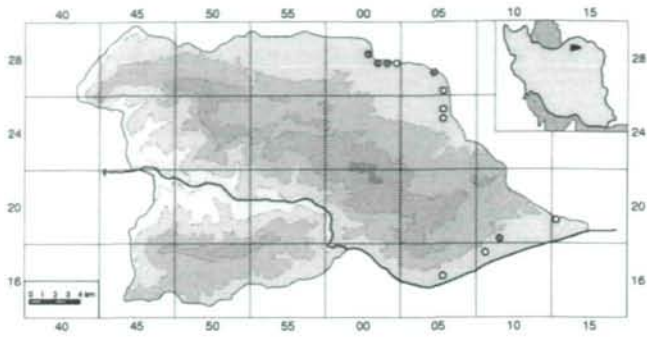
Map 230. *Matthiola alyssifolia* (DC.) Bornm.



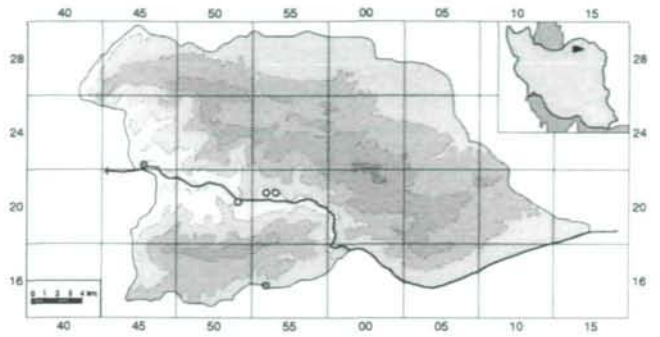
Map 231. *Matthiola farinosa* Bunge



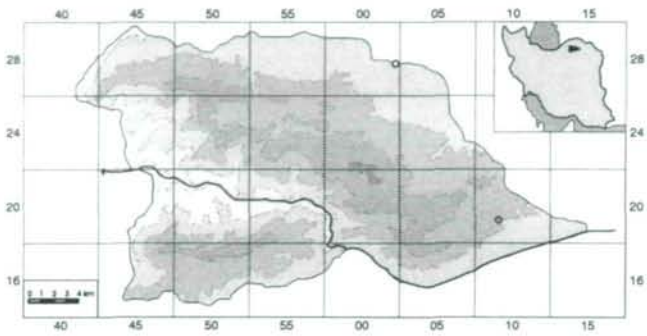
Map 232. *Moriera spinosa* Boiss.



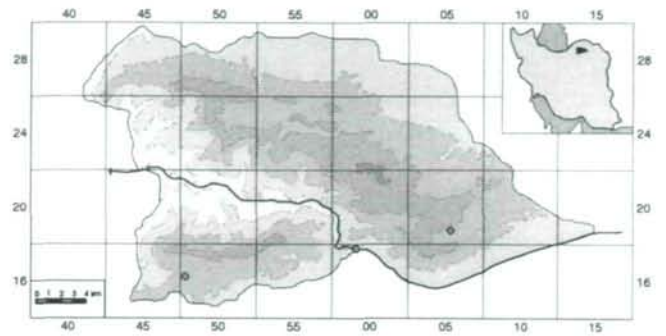
Map 233. *Neotorularia dentata* (Freyn. & Sint.) Hedge & J. Léonard



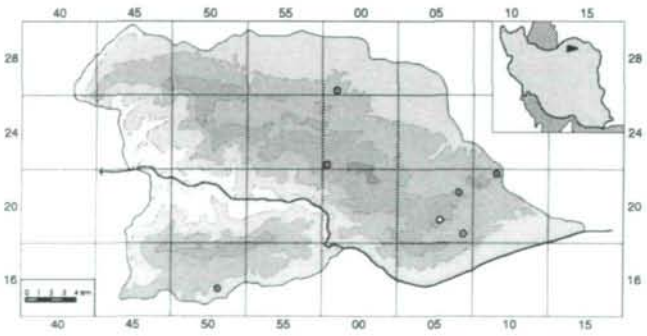
Map 234. *Rapistrum rugosum* (L.) All.



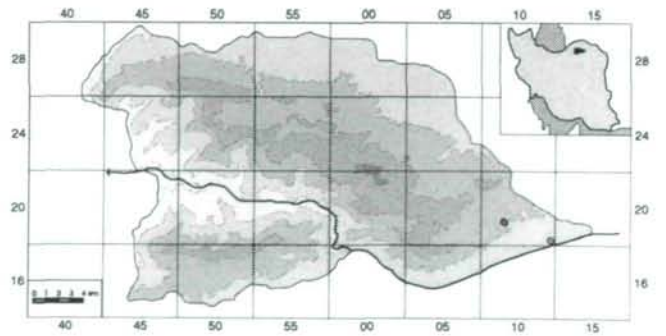
Map 235. *Sameraria armena* (L.) Desv.



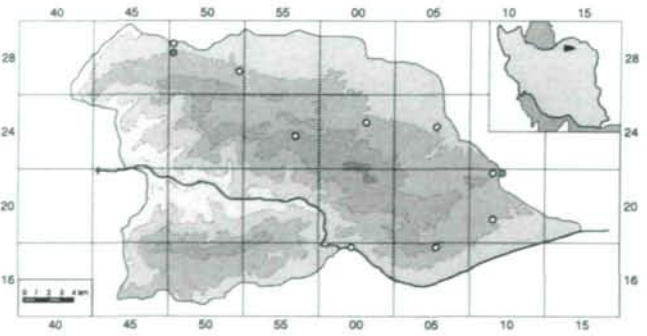
Map 236. *Sisymbrium altissimum* L.



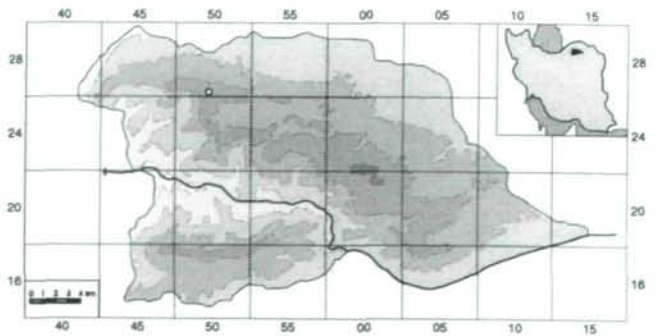
Map 237. *Sterigmostemum ramosissimum* (O. E. Schulz) Rech. f.



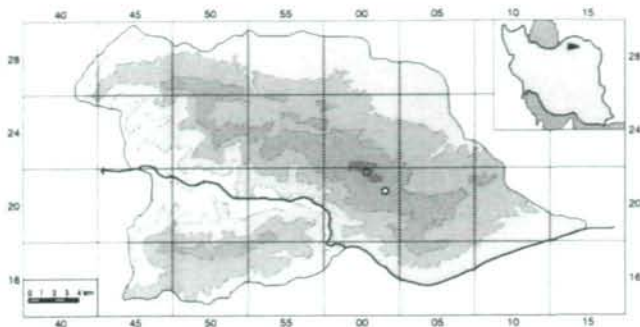
Map 238. *Tauscheria lasiocarpa* Fisch. ex DC.



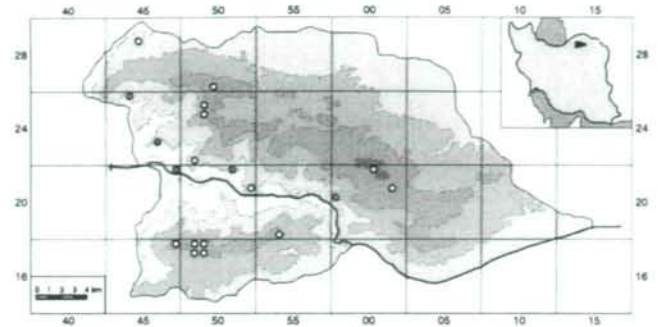
Map 239. *Thlaspi perfoliatum* L.



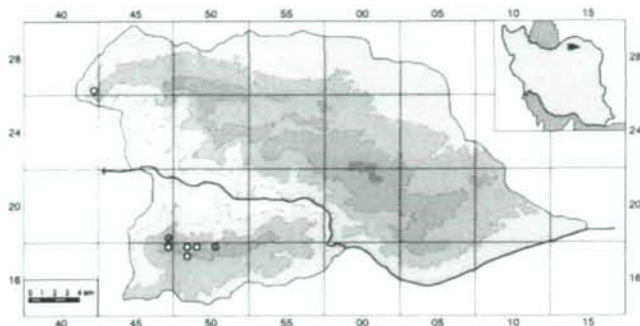
Map 240. *Thlaspi stenocarpum* (Boiss.) Hedge



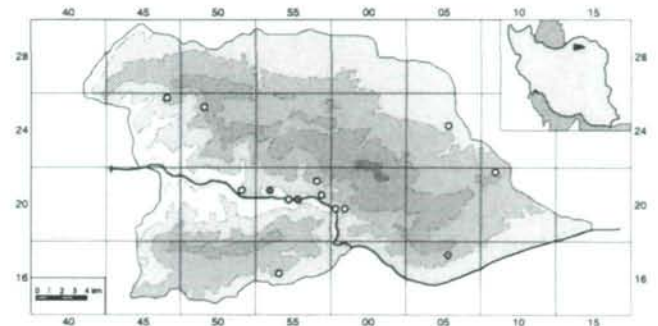
Map 241. *Asyneuma amplexicaule* (Willd.) Hand.-Mazz.



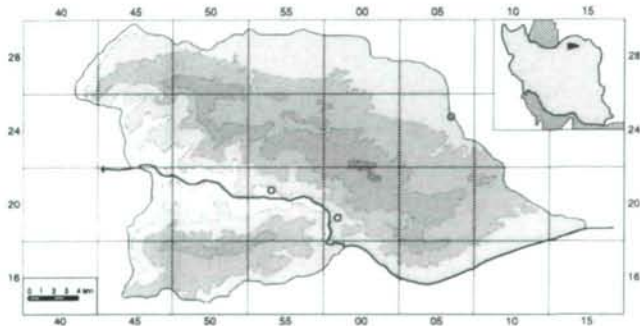
Map 242. *Campanula glomerata* L.



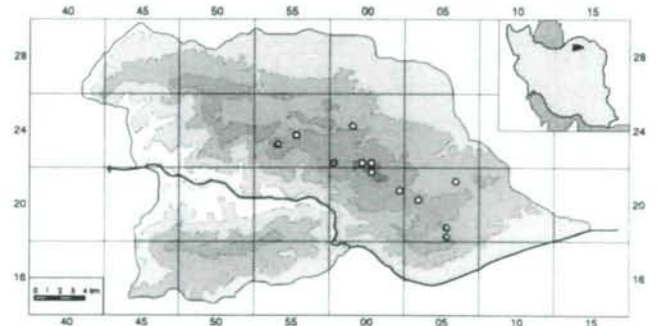
Map 243. *Campanula latifolia* L.



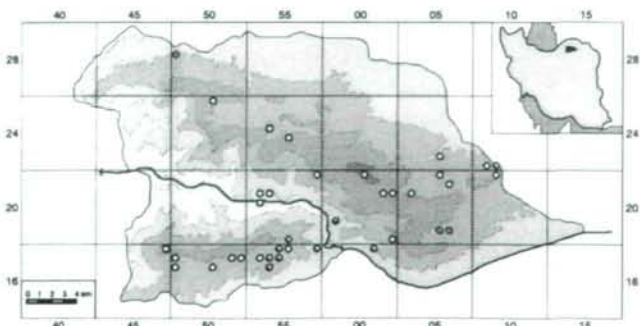
Map 244. *Campanula lourica* Boiss.



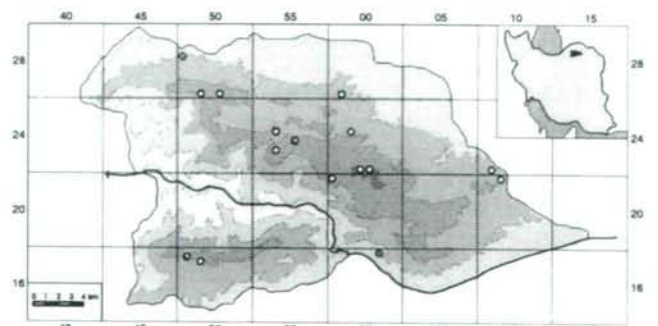
Map 245. *Campanula rapunculus* L.



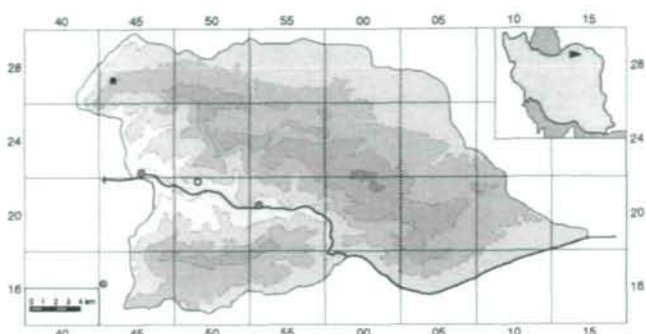
Map 246. *Lonicera bracteolaris* Boiss. & Buhse



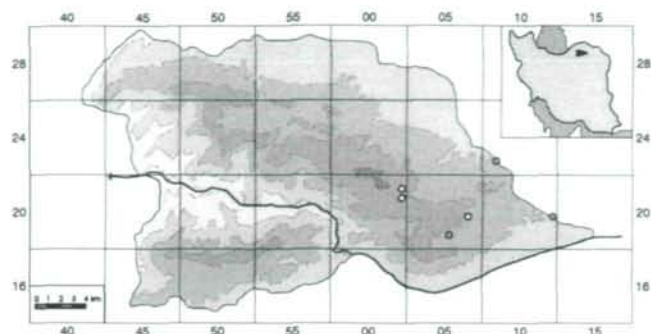
Map 247. *Lonicera floribunda* Boiss. & Buhse



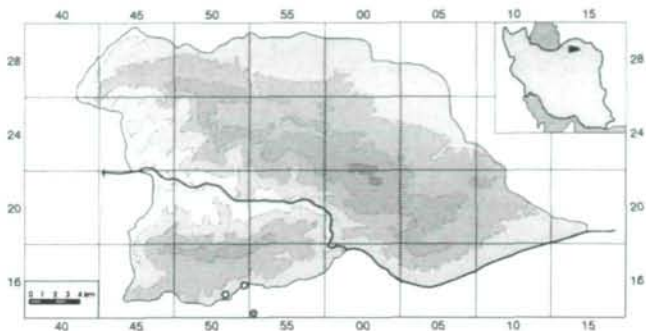
Map 248. *Lonicera iberica* M. Bieb.



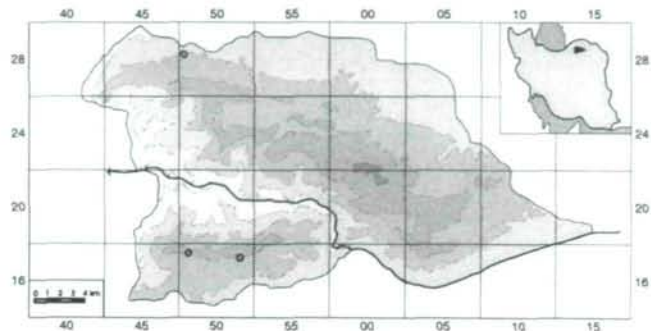
Map 249. *Sambucus ebulus* L.



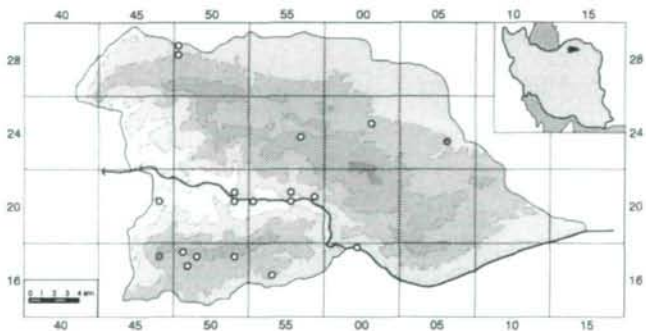
Map 250. *Acanthophyllum glandulosum* Bunge ex Boiss.



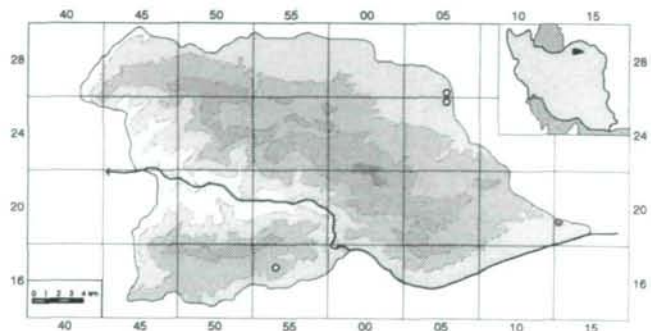
Map 251. *Acanthophyllum pungens* (Bunge) Boiss.



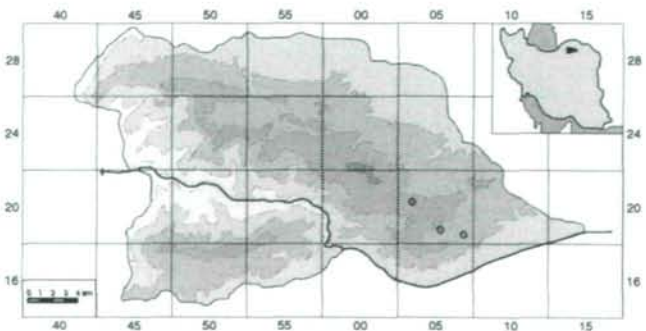
Map 252. *Agrostemma githago* L.



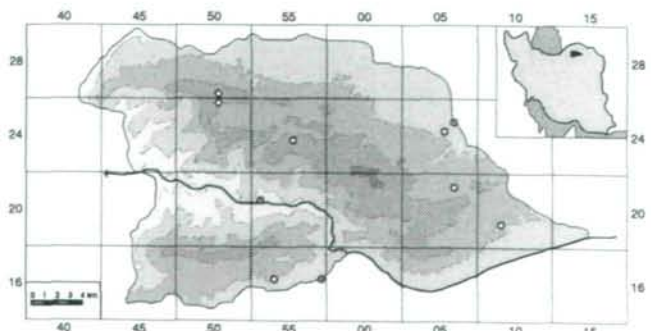
Map 253. *Arenaria serpyllifolia* L.



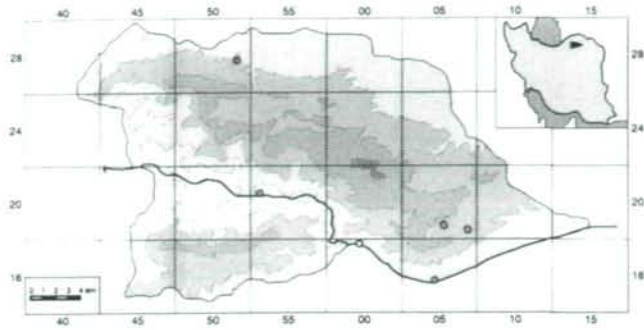
Map 254. *Buffonia sintenisii* Freyn



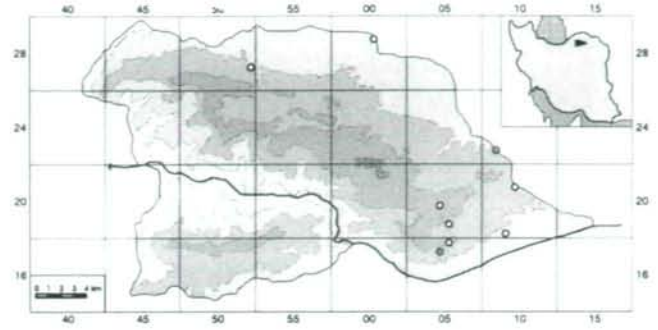
Map 255. *Cerastium dichotomum* L.



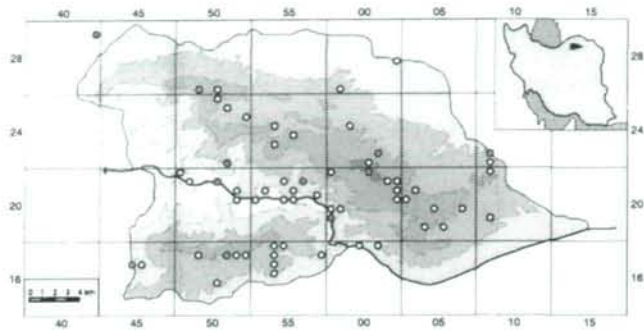
Map 256. *Cerastium inflatum* Link ex Desf.



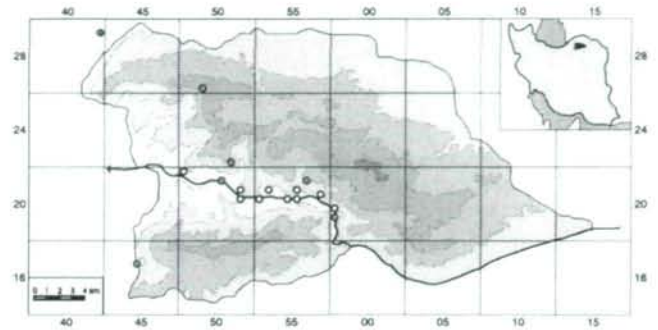
Map 257. *Cerastium perfoliatum* L.



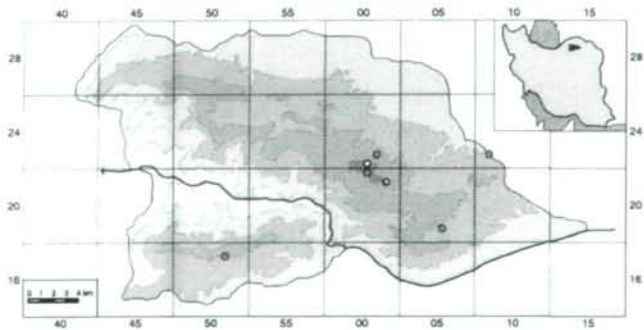
Map 258. *Dianthus crinitus* Sm. subsp. *turcomanicus* (Schischk.) Rech.f.



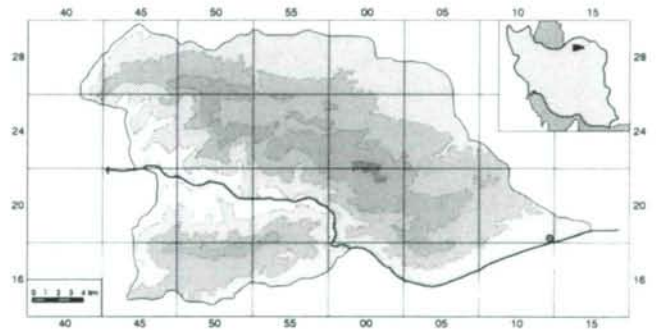
Map 259. *Dianthus orientalis* Adams, s. l.



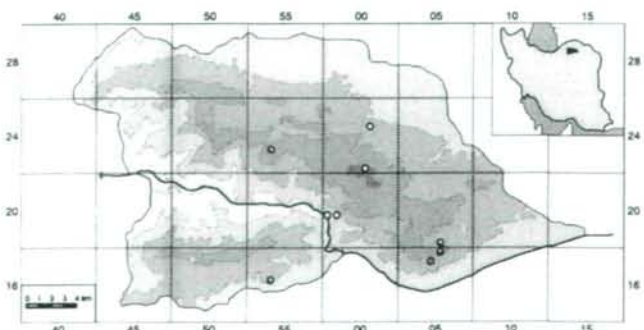
Map 260. *Dianthus orientalis* Adams subsp. *gorganicus* Rech.f.



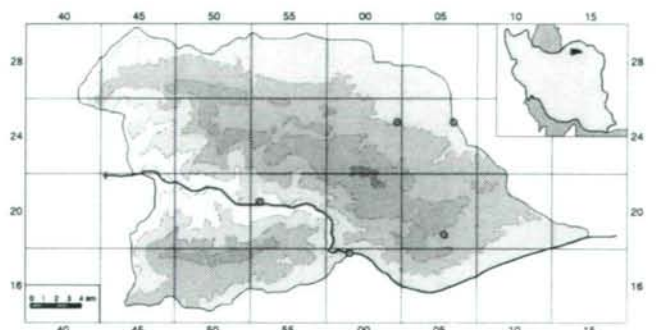
Map 261. *Dianthus orientalis* Adams subsp. *stenocalyx* (Boiss.) Rech. f.



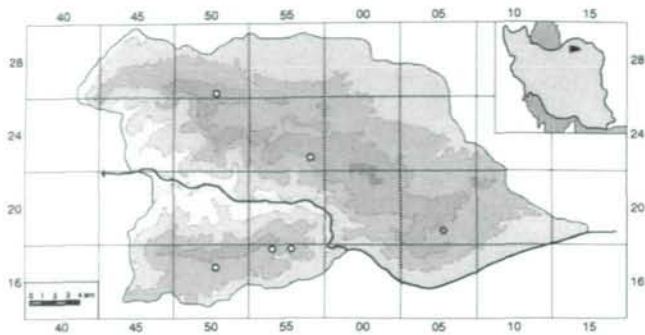
Map 262. *Diaphanoptera stenocalyca* Rech. f. & Schiman-Czeika



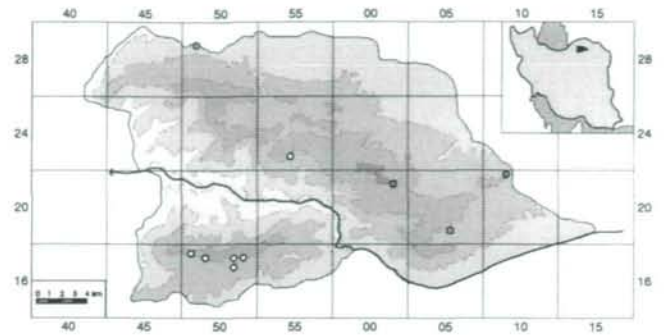
Map 263. *Gypsophila aretioides* Boiss.



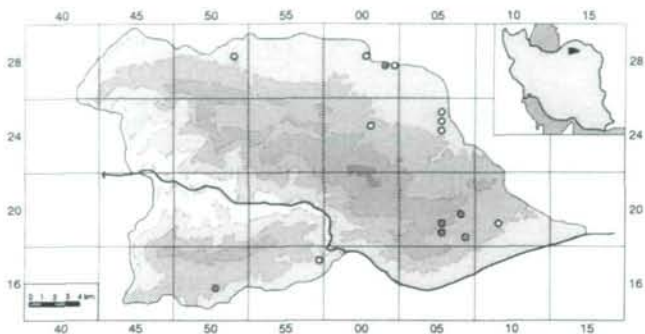
Map 264. *Gypsophila bicolor* (Frey & Sint.) Grossh.



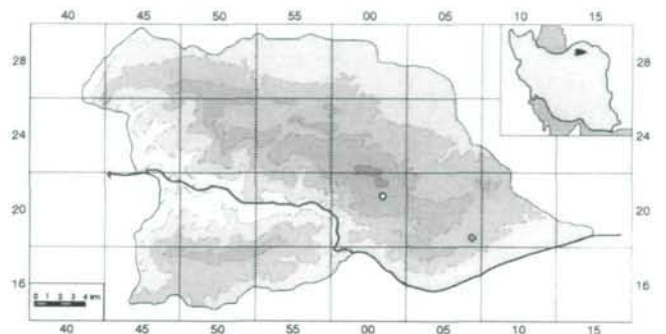
Map 265. *Herniaria cashemiriana* J. Gay



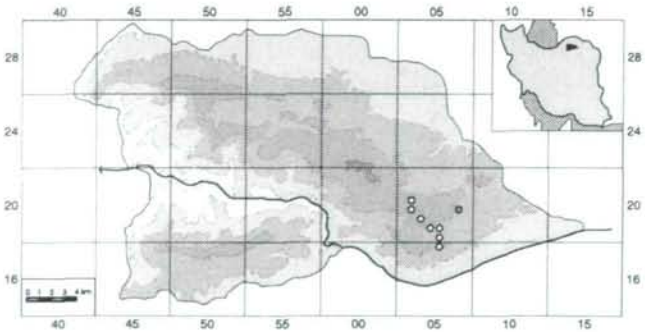
Map 266. *Herniaria incana* Lam.



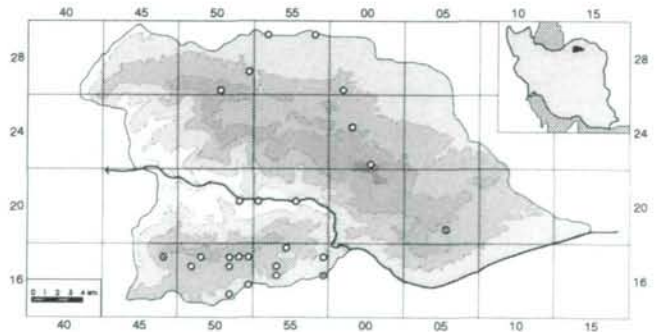
Map 267. *Holosteum glutinosum* (M. Bieb.) Fisch. & C. A. Mey.



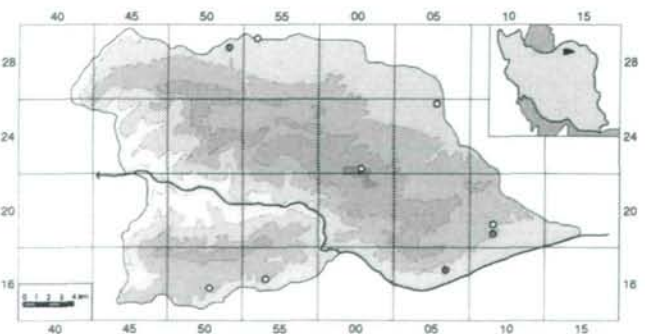
Map 268. *Lepyrodiclis stellarioides* Schrenk ex Fisch. & C. A. Mey.



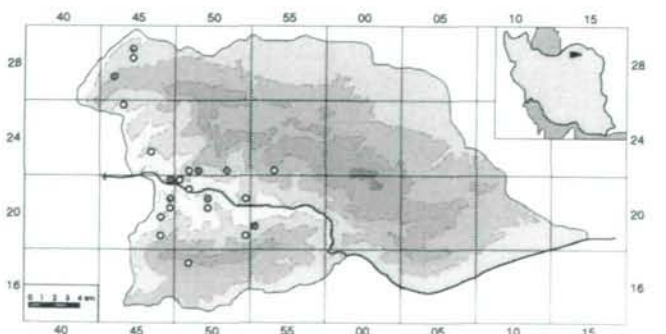
Map 269. *Mesostomma kotschyana* (Fenzl ex Boiss.) Vved. subsp. *alghanica* Rech. f.



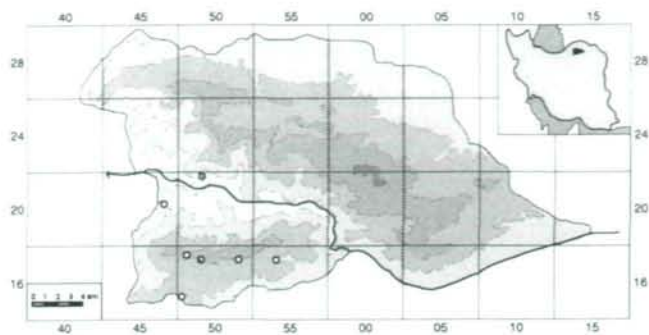
Map 270. *Minuartia hamata* (Hausskn.) Mattf.



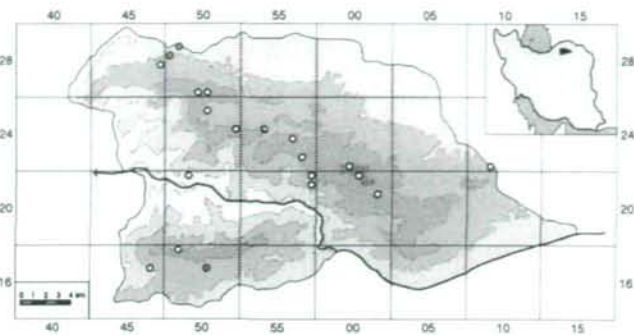
Map 271. *Minuartia meyeri* (Boiss.) Bomm.



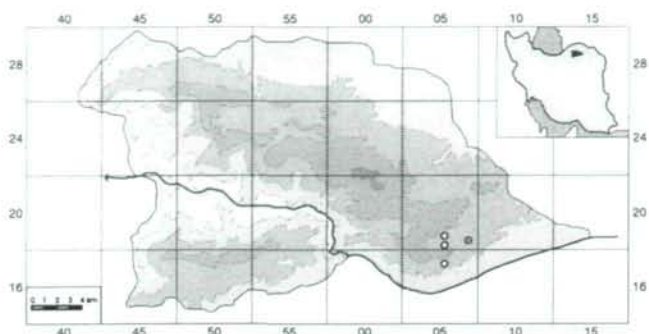
Map 272. *Moehringia trinervia* (L.) Clairv.



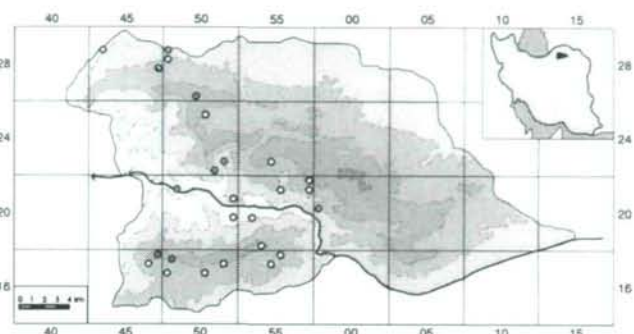
Map 273. *Petrorhagia prolifera* (L.) P. W. Ball & Heywood



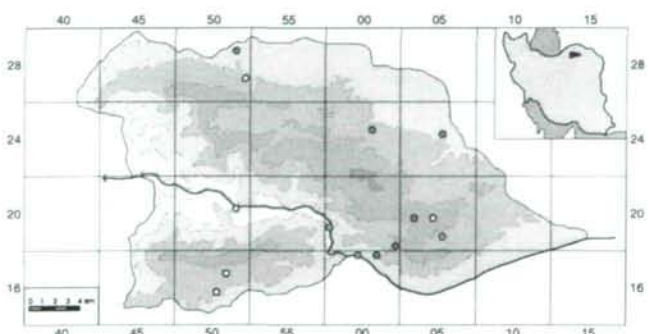
Map 274. *Saponaria bodeana* Boiss.



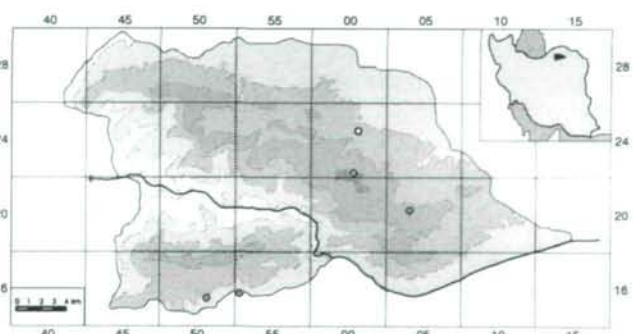
Map 275. *Silene aucheriana* Boiss.



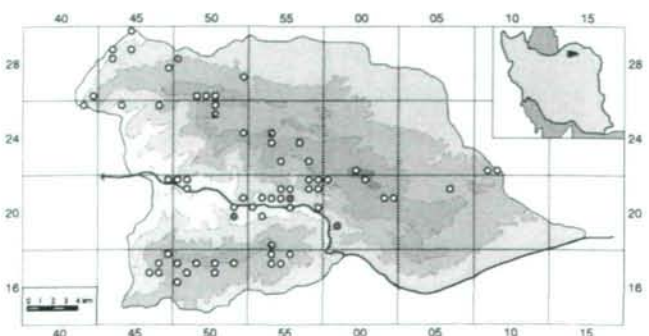
Map 276. *Silene coronaria* (L.) Clairv.



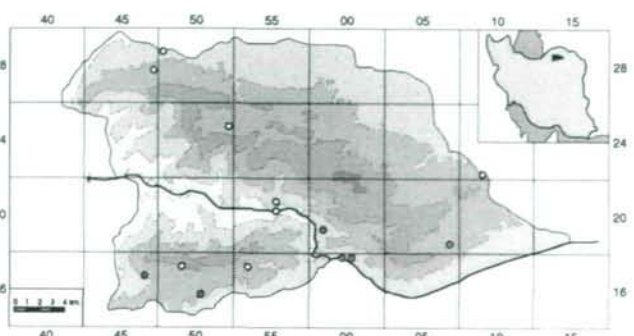
Map 277. *Silene cyri* Schischk.



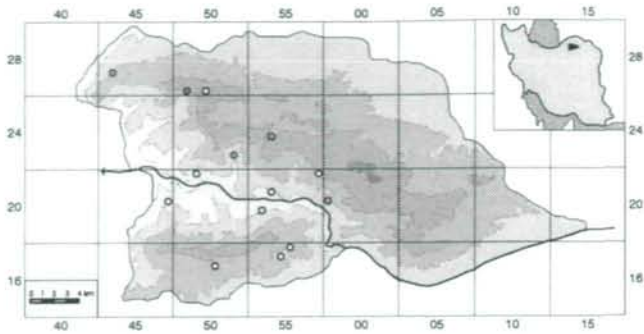
Map 278. *Silene indepressa* Schischk.



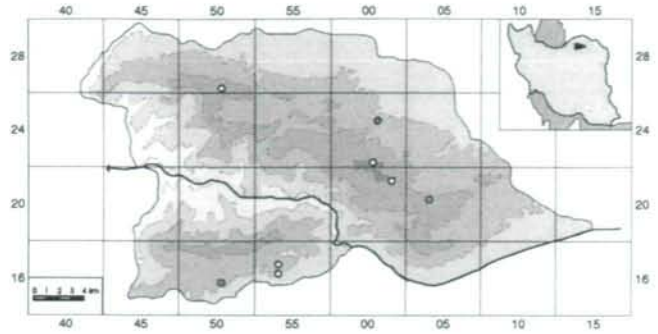
Map 279. *Silene italica* (L.) Pers.



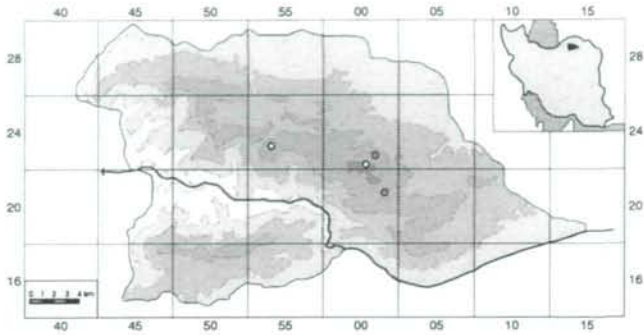
Map 280. *Silene latifolia* Poir., s. l.



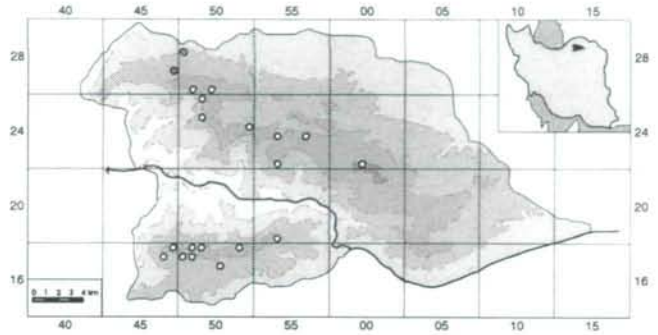
Map 281. *Silene noctiflora* L.



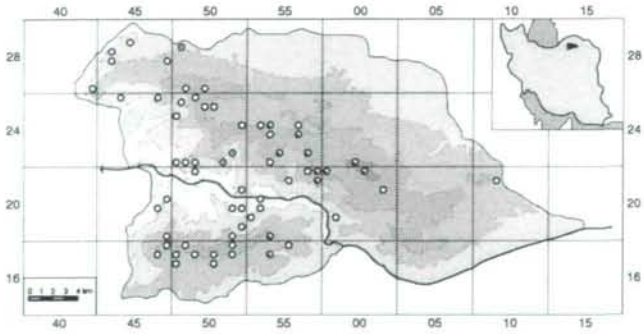
Map 282. *Silene tenella* C. A. Mey.



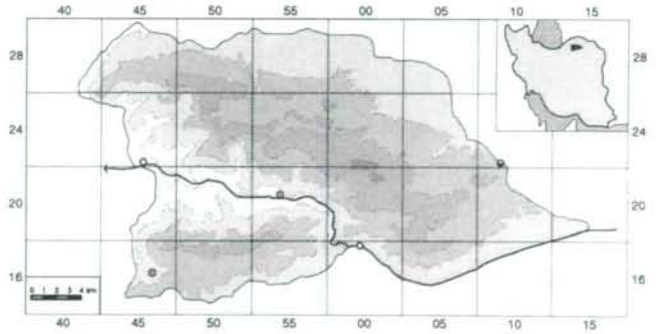
Map 283. *Silene viscosa* (L.) Pers.



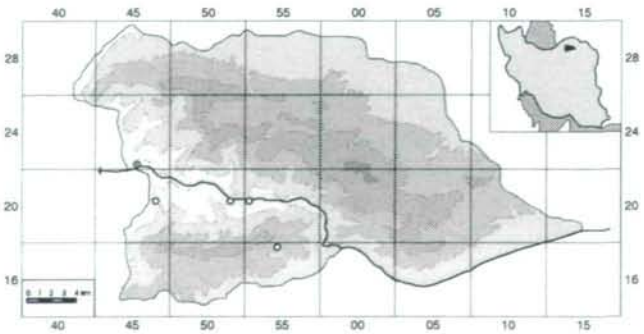
Map 284. *Silene vulgaris* (Moench) Garcke



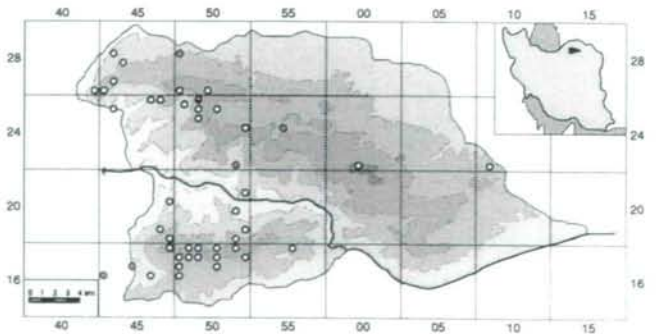
Map 285. *Stellaria holostea* L.



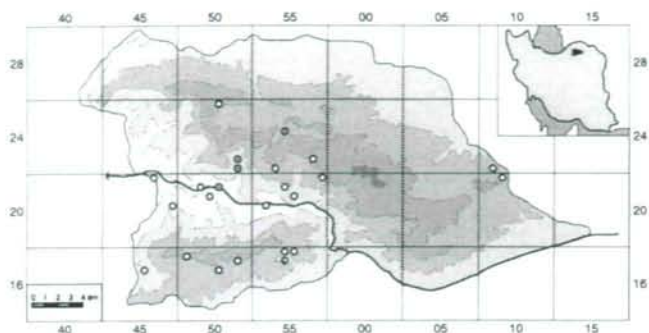
Map 286. *Stellaria media* (L.) Vill.



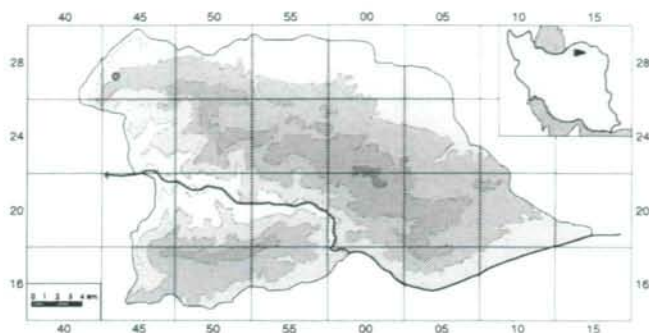
Map 287. *Velezia rigida* L.



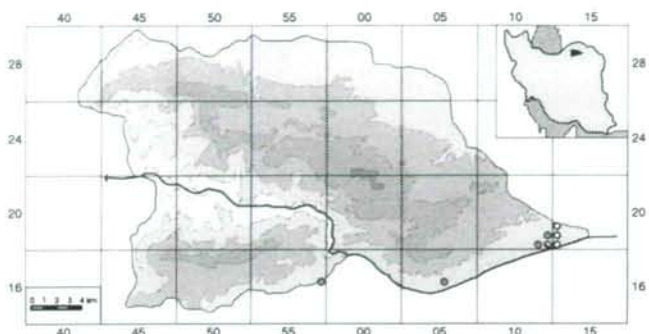
Map 288. *Euonymus latifolia* Mill.



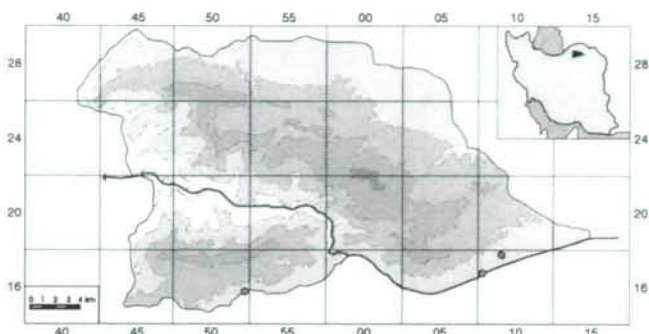
Map 289. *Euonymus velutina* (C. A. Mey.) Fisch. & C. A. Mey.



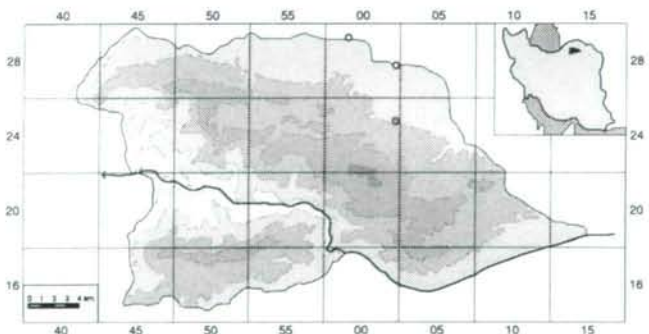
Map 290. *Ceratophyllum submersum* L., & *Ranunculus lingua* L.



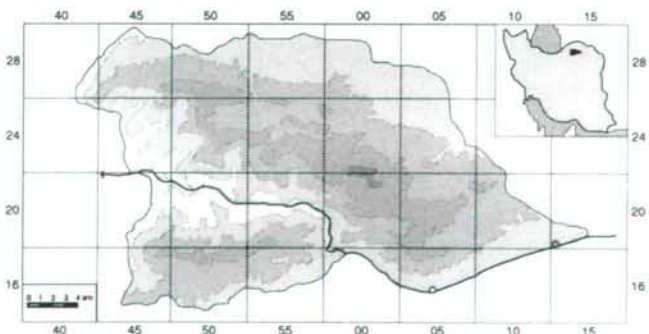
Map 291. *Anabasis aphylla* L.



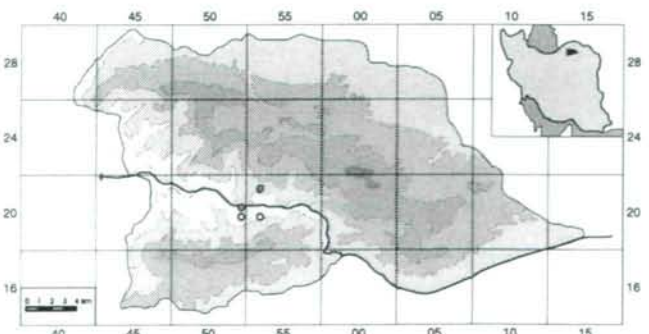
Map 292. *Anabasis eriopoda* (Schrenk) Benth. ex Volkens



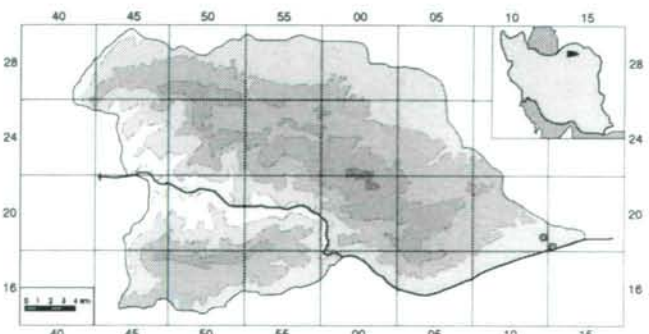
Map 293. *Anabasis jaxartica* (Bunge) Benth. ex Volkens



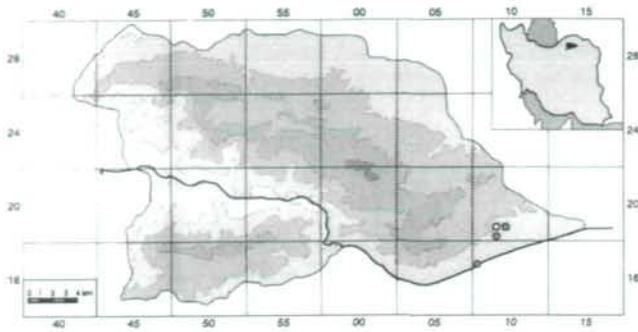
Map 294. *Atriplex aucheri* Moq.



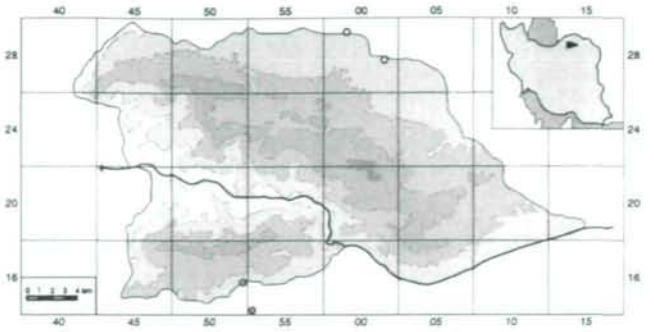
Map 295. *Atriplex patula* L.



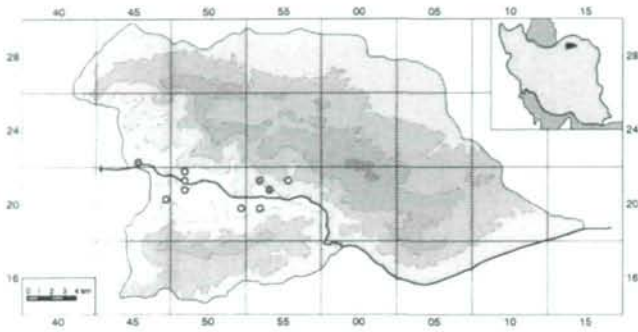
Map 296. *Atriplex tatarica* L.



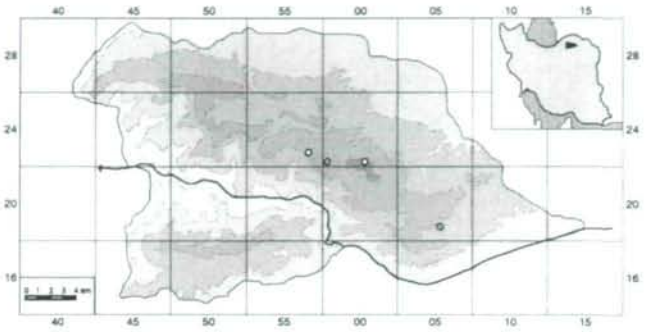
Map 297. *Atriplex verrucifera* M. Bieb.



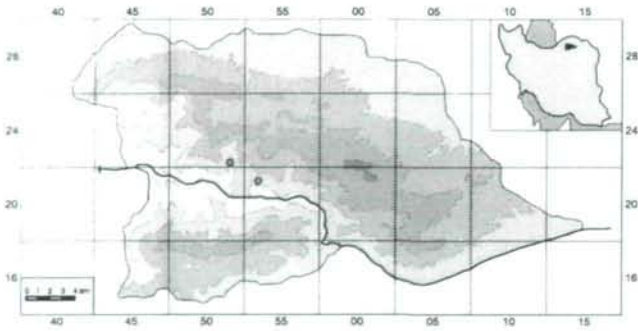
Map 298. *Camphorosma monspeliaca* L.



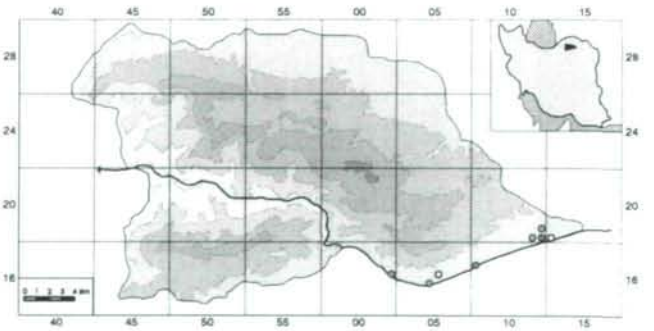
Map 299. *Chenopodium album* L.



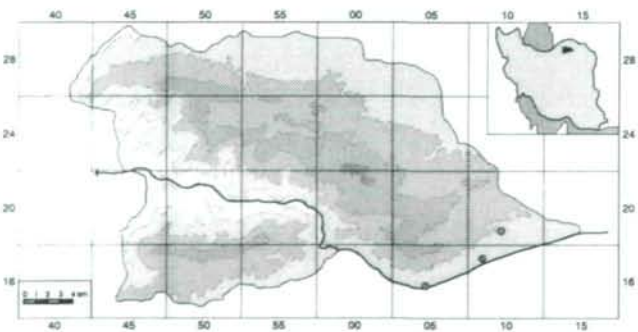
Map 300. *Chenopodium foliosum* Asch.



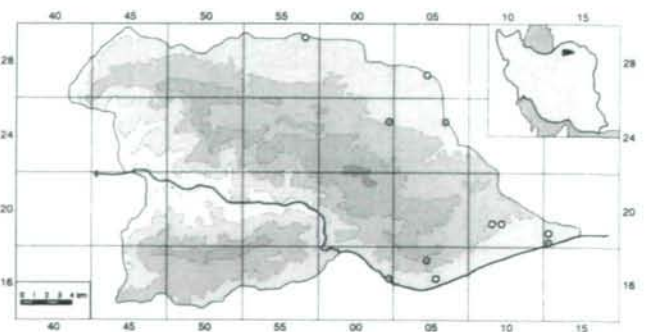
Map 301. *Chenopodium vulvaria* L.



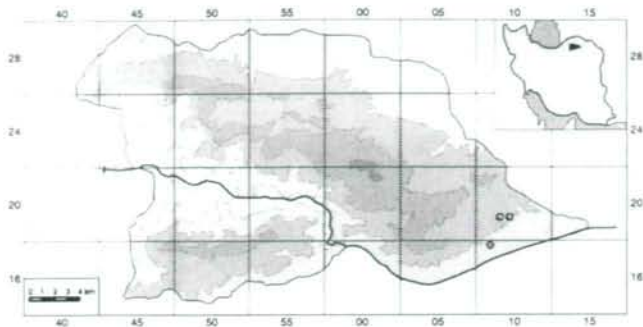
Map 302. *Climacoptera brachiata* (Pall.) Botsch.



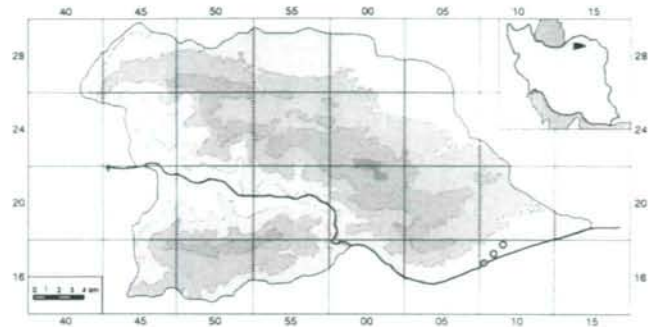
Map 303. *Climacoptera turcomanica* (Litw.) Botsch.



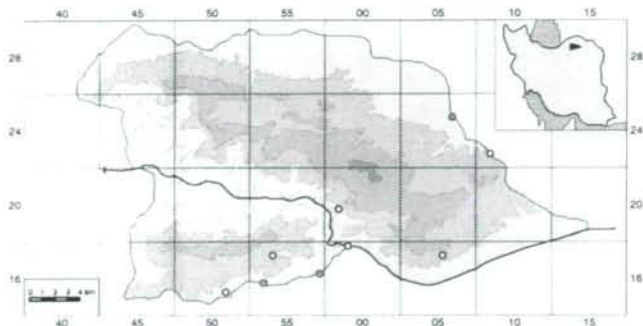
Map 304. *Halothamnus glaucus* (M. Bieb.) Botsch., s. l.



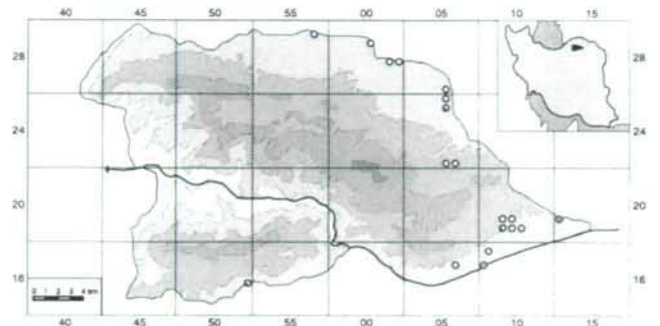
Map 305. *Haloxylon ammodendron* (C. A. Mey.) Bunge ex Fenzl



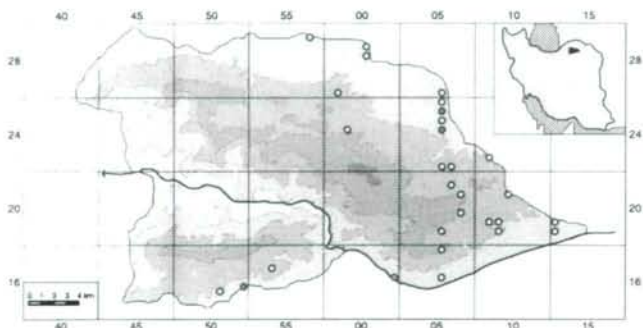
Map 306. *Kalidium caspicum* (L.) Ung.-Sternb.



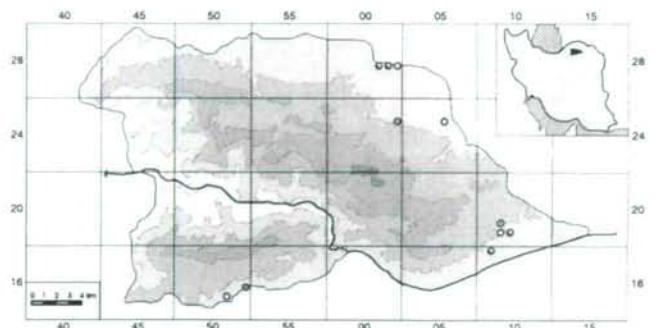
Map 307. *Kochia prostrata* (L.) Schrad.



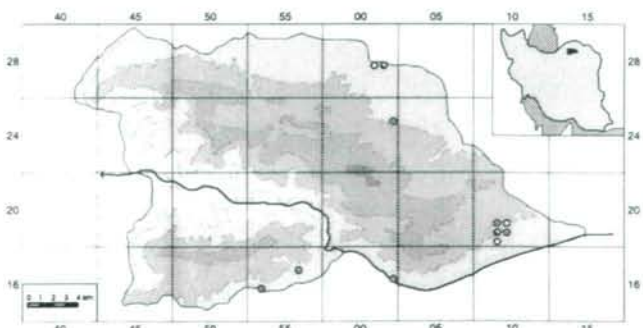
Map 308. *Krascheninnikovia ceratoides* (L.) Gueldenst.



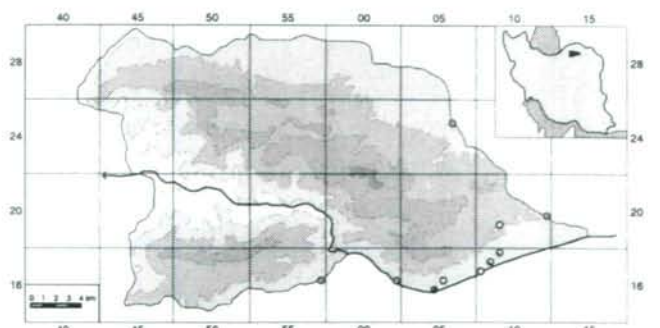
Map 309. *Noaea mucronata* (Forssk.) Asch. & Schweif.



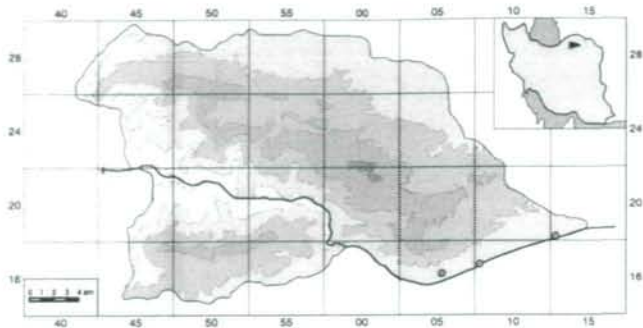
Map 310. *Salsola arbusculiformis* Drobow



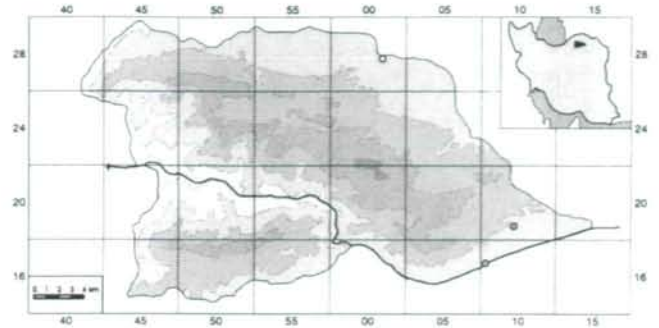
Map 311. *Salsola aucheri* (Moq.) Bunge ex Iljin



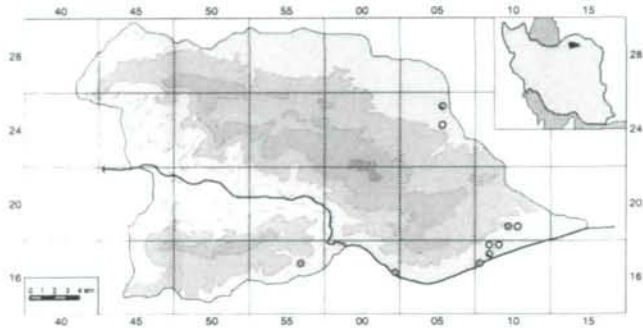
Map 312. *Salsola dendroides* Pall.



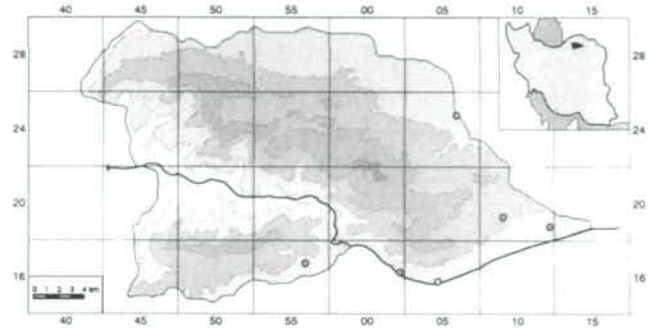
Map 313. *Salsola nitraria* Pall.



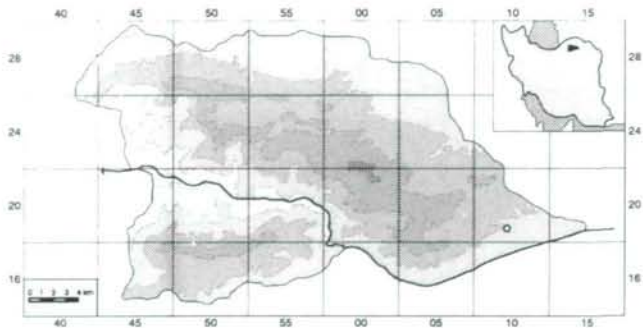
Map 314. *Salsola orientalis* S. G. Gmel.



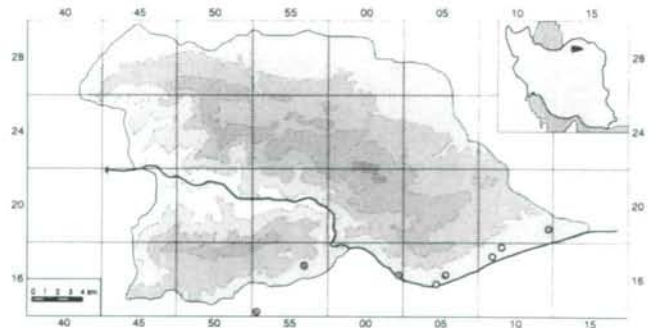
Map 315. *Salsola tomentosa* (Moq.) Spach



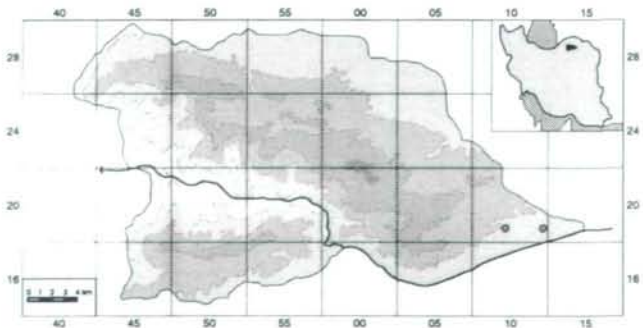
Map 316. *Suaeda altissima* (L.) Pall.



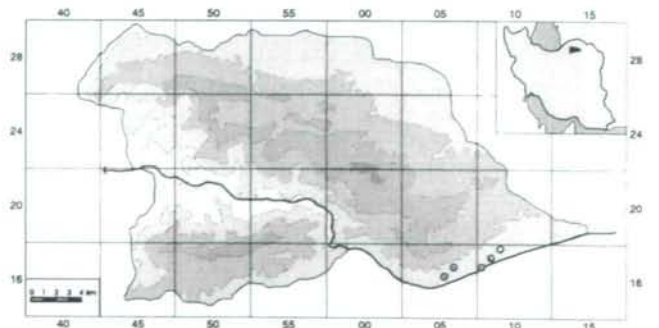
Map 317. *Suaeda linifolia* Pall.



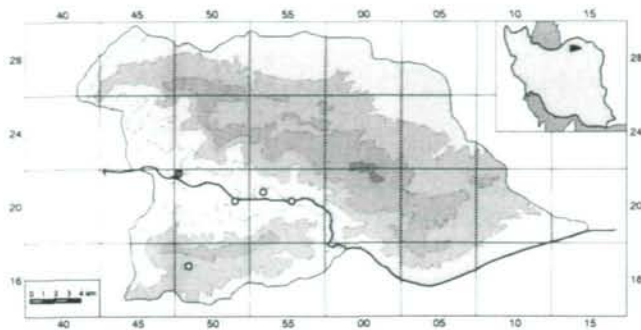
Map 318. *Suaeda microphylla* Pall.



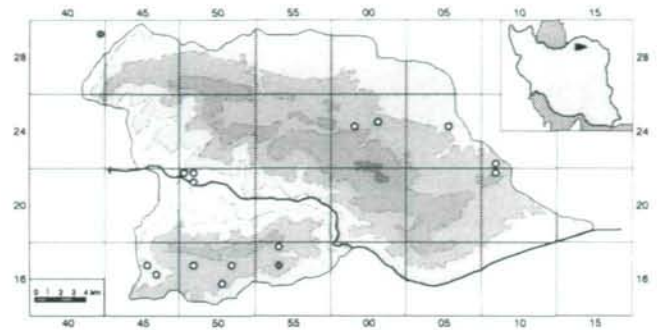
Map 319. *Suaeda microsperma* (C. A. Mey.) Fenzl



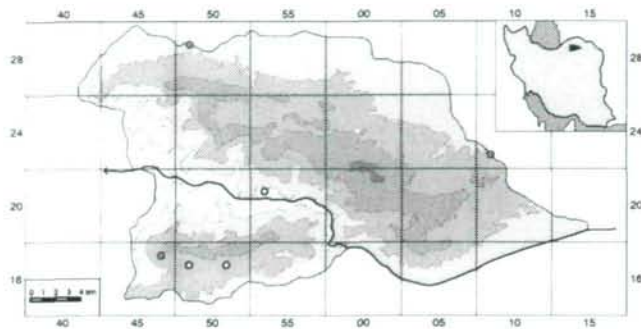
Map 320. *Suaeda physophora* Pall.



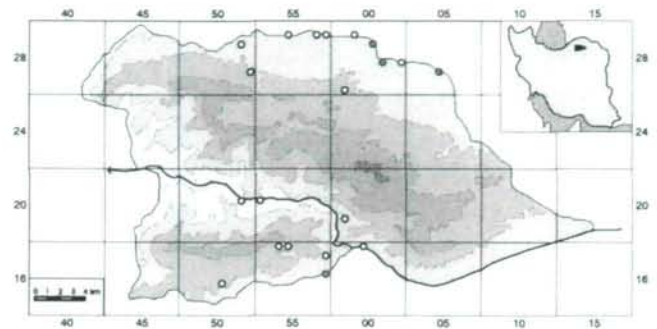
Map 321. *Fumana arabica* (L.) Spach



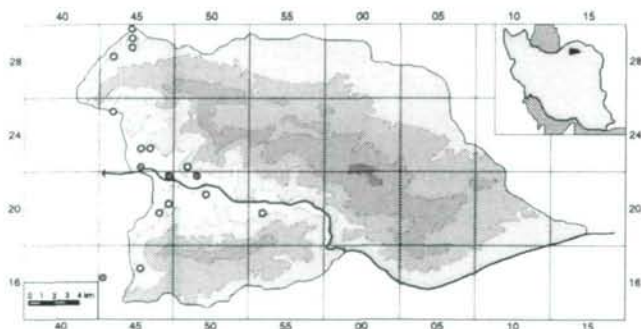
Map 322. *Fumana procumbens* (Dun.) Gren. & Godr.



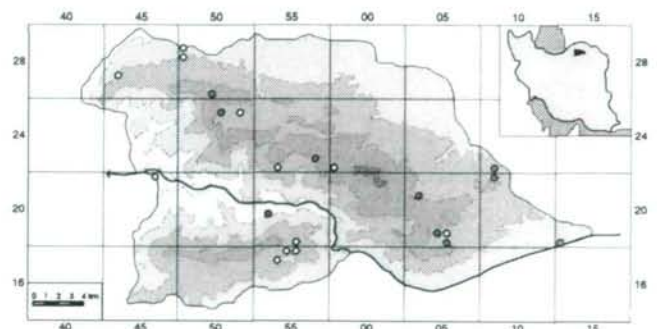
Map 323. *Helianthemum nummularium* (L.) Mill.



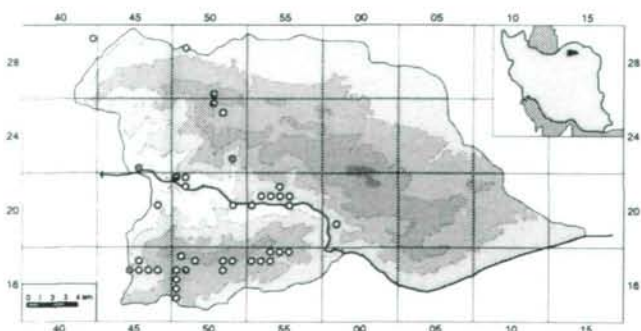
Map 324. *Helianthemum salicifolium* (L.) Mill.



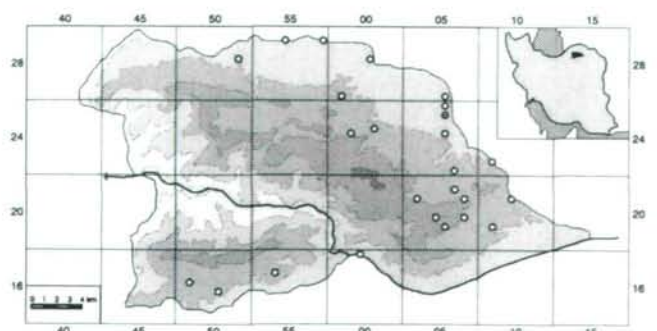
Map 325. *Calystegia sylvatica* (Kit.) Griseb.



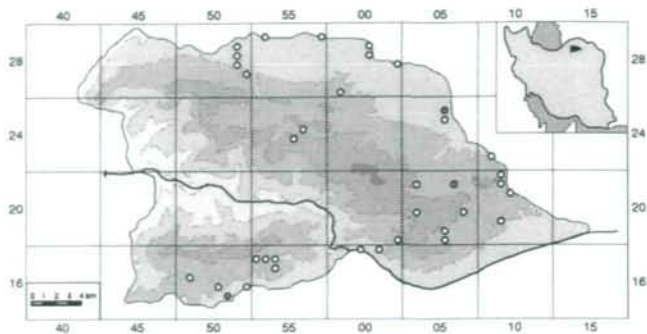
Map 326. *Convolvulus arvensis* L.



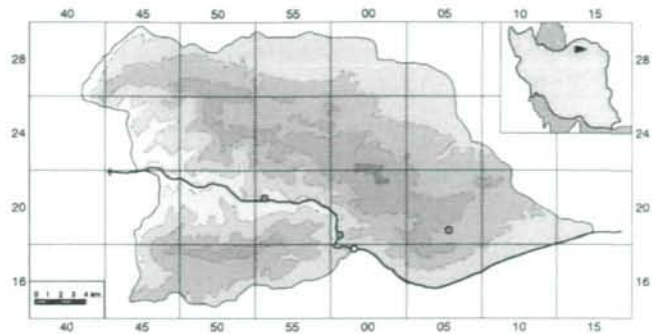
Map 327. *Convolvulus cantabrica* L.



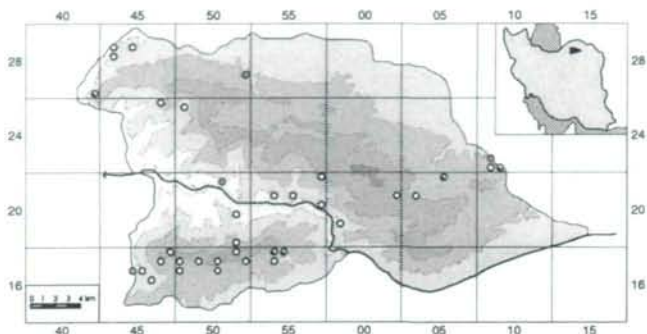
Map 328. *Convolvulus commutatus* Boiss.



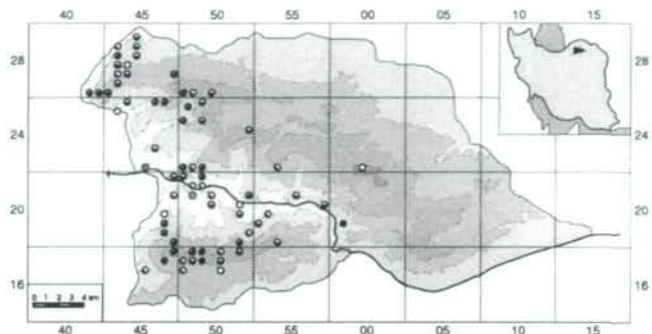
Map 329. *Convolvulus pseudocantabrica* Schrenk



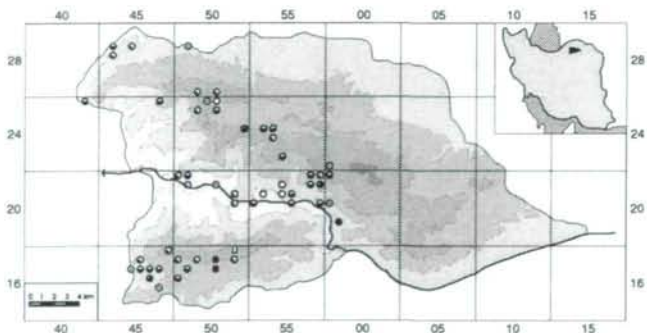
Map 330. *Convolvulus subhirsutus* Regel & Schmalh.



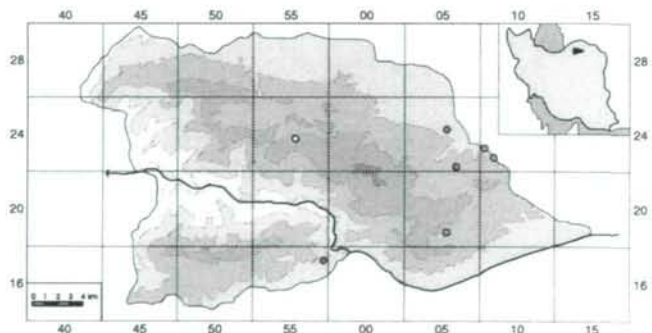
Map 331. *Cornus sanguinea* L. subsp. *australis* (C.A.Mey.) Jáv.



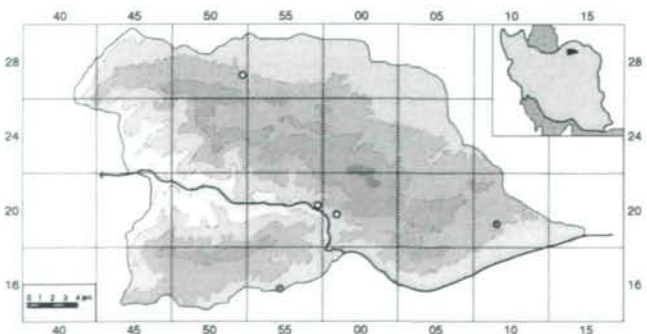
Map 332. *Carpinus betulus* L.



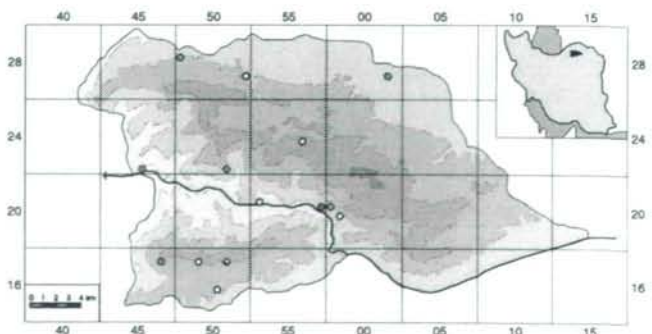
Map 333. *Carpinus orientalis* Mill.



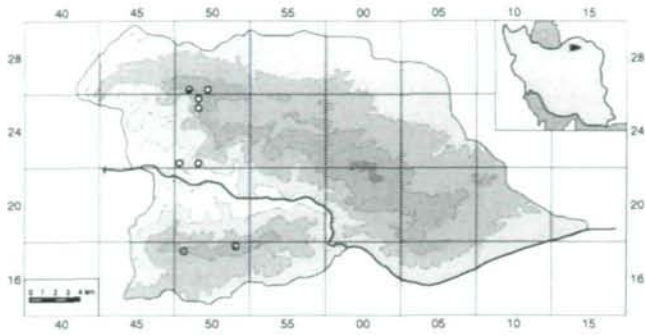
Map 334. *Rosularia radicata* (Boiss. & Hohen.) Eggeli



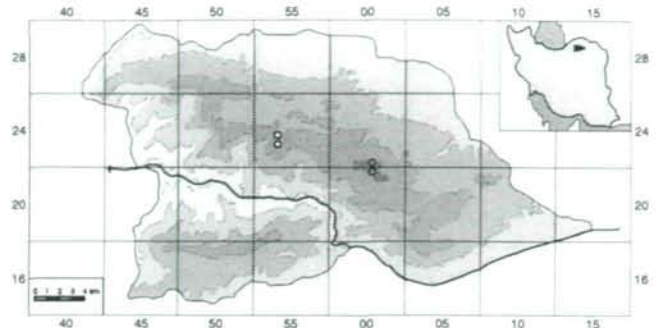
Map 335. *Rosularia sempervivum* (M. Bieb.) A. Berger



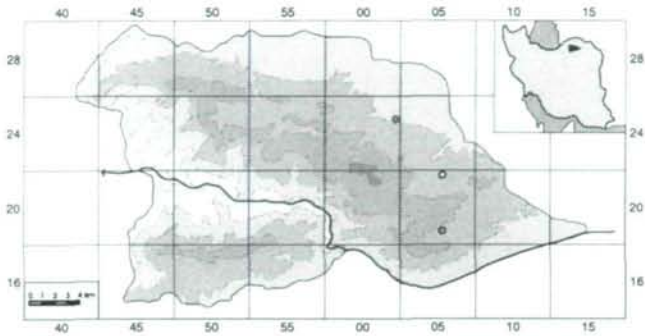
Map 336. *Sedum pallidum* M. Bieb. & *S. pentapetalum* Boriss.



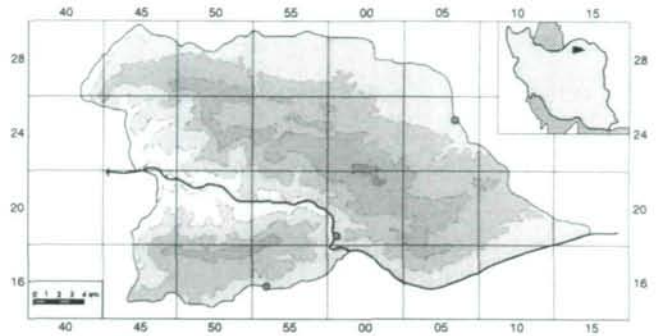
Map 337. *Sedum stoloniferum* S. G. Gmel.



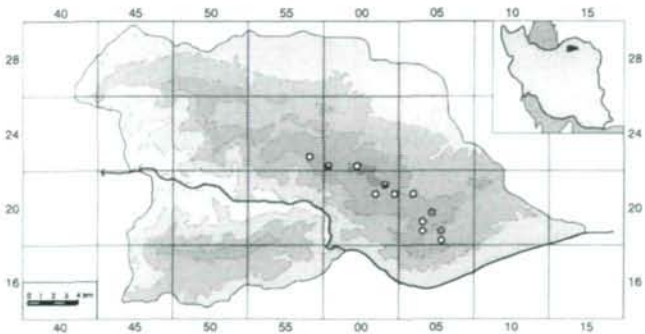
Map 338. *Sempervivum iranicum* Bornm. & Gauba



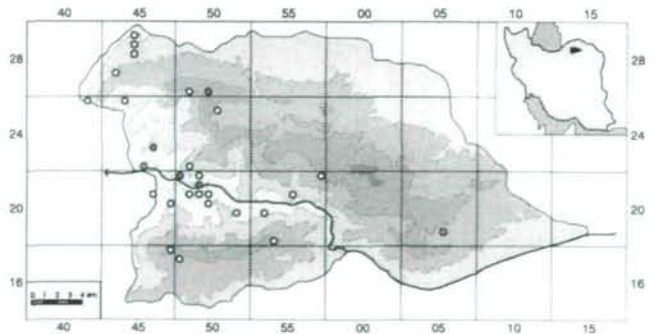
Map 339. *Bryonia aspera* Steven ex Ledeb.



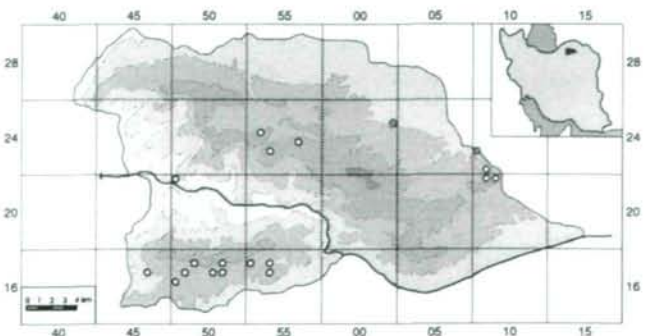
Map 340. *Cuscuta monogyna* Vahl



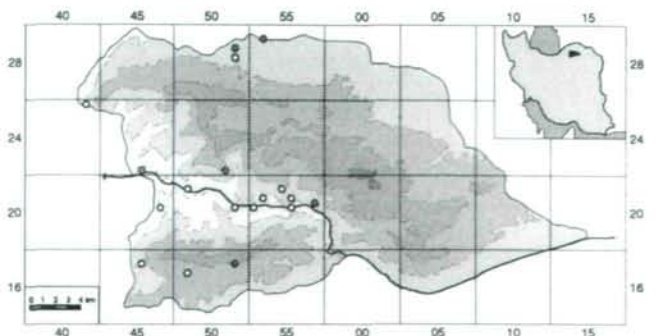
Map 341. *Cephalaria microcephala* Boiss.



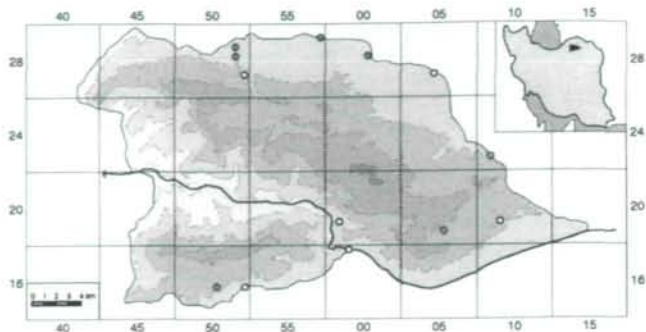
Map 342. *Dipsacus strigosus* Willd. ex Roem. & Schult.



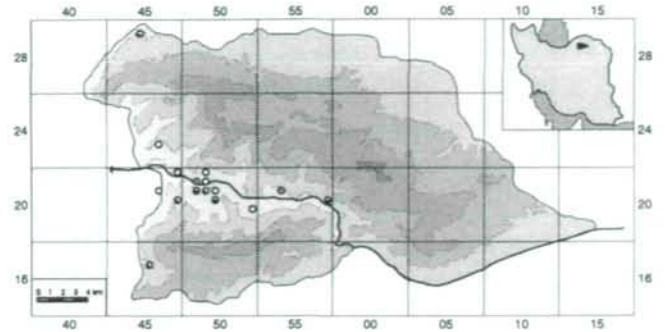
Map 343. *Scabiosa columbaria* L.



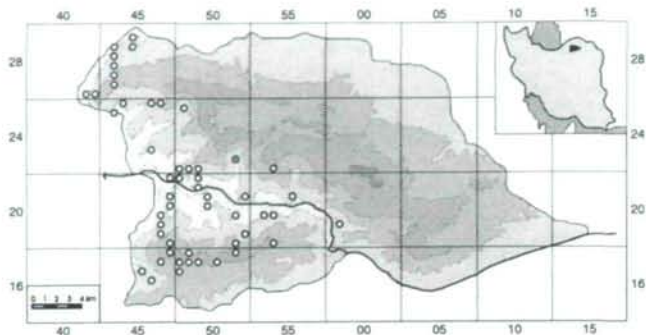
Map 344. *Scabiosa micrantha* Desf.



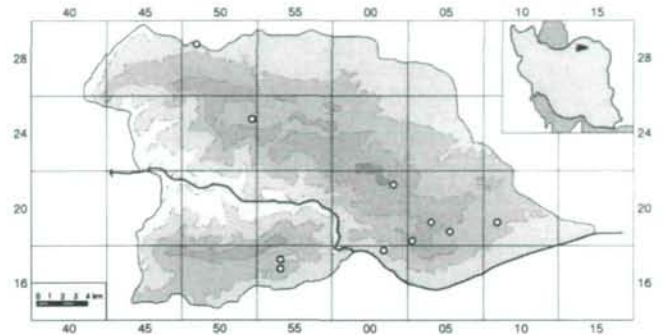
Map 345. *Scabiosa rotata* M. Bieb.



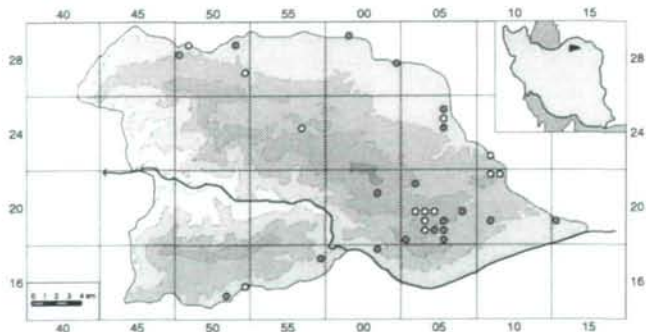
Map 346. *Diospyrus lotus* L.



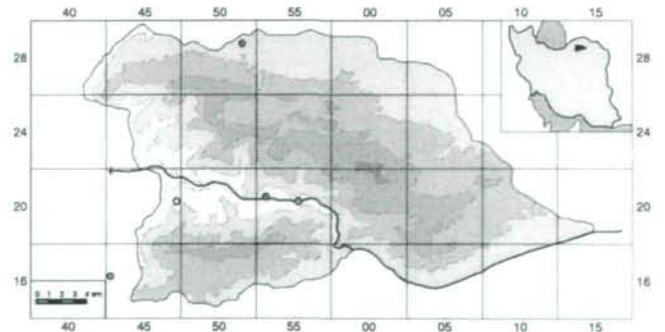
Map 347. *Euphorbia amygdaloides* L.



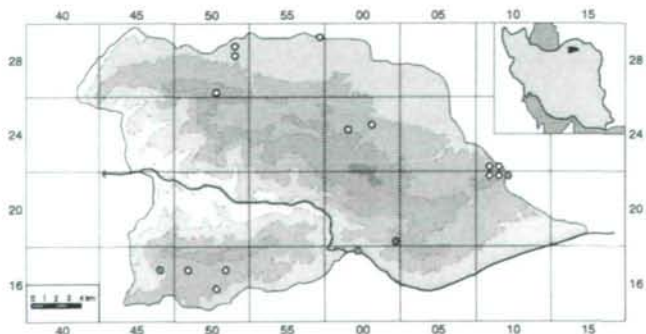
Map 348. *Euphorbia buhsei* Boiss.



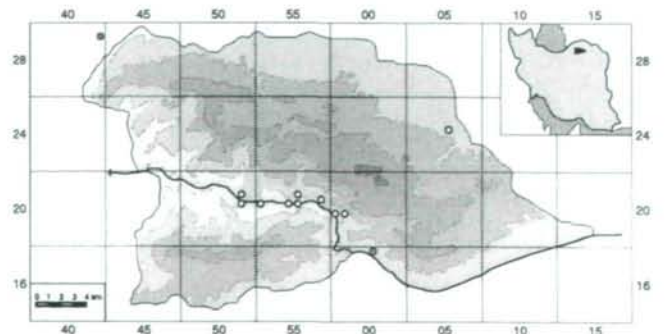
Map 349. *Euphorbia bungei* Boiss.



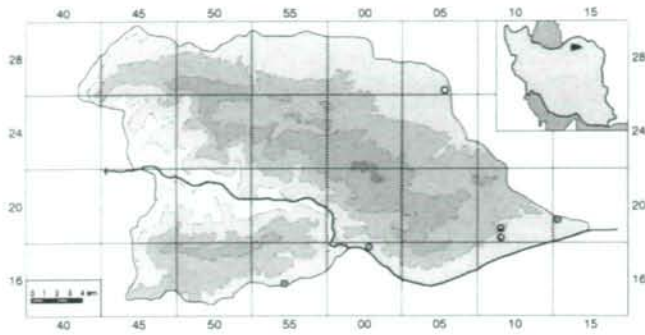
Map 350. *Euphorbia falcata* L.



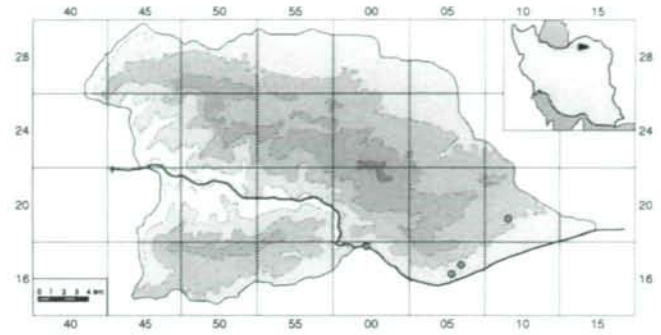
Map 351. *Euphorbia humilis* C. A. Mey. ex Ledeb.



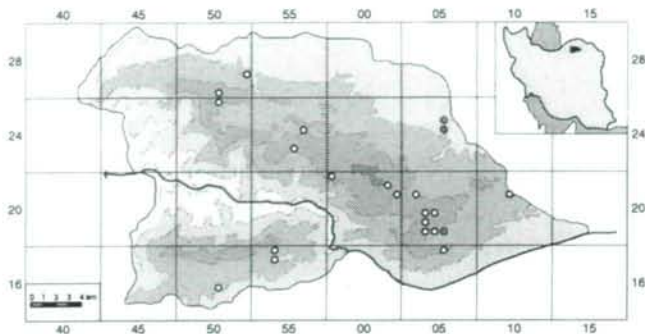
Map 352. *Euphorbia marschalliana* Boiss.



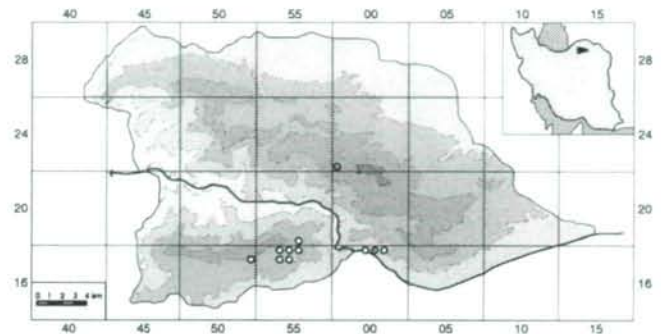
Map 353. *Astragalus podolobus* Bornm. & Hohen.



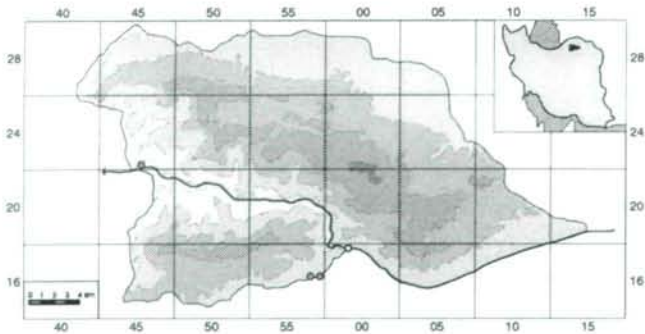
Map 354. *Astragalus campylorrhynchus* Fisch. & C.A.Mey.



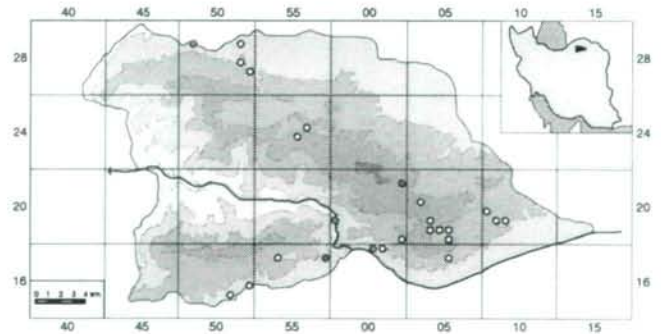
Map 355. *Astragalus khoshiyailensis* Sirj. & Rech. f.



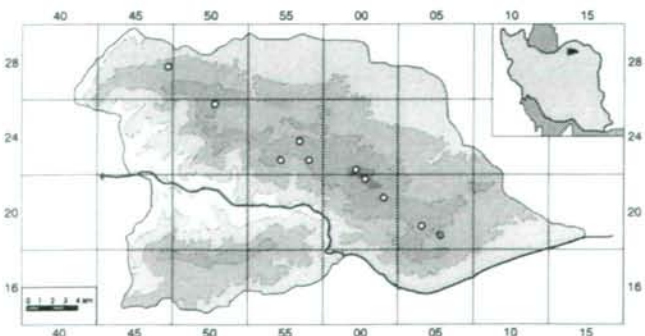
Map 356. *Astragalus retamocarpus* Boiss.



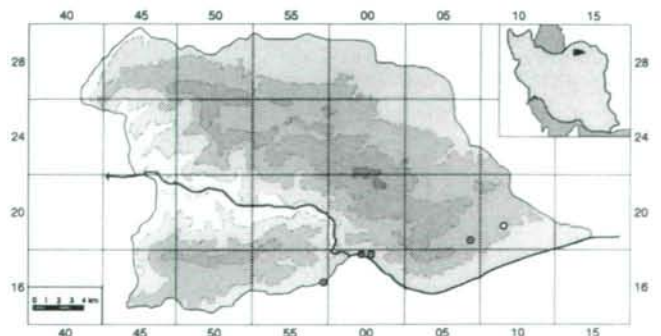
Map 357. *Astragalus hamosus* L.



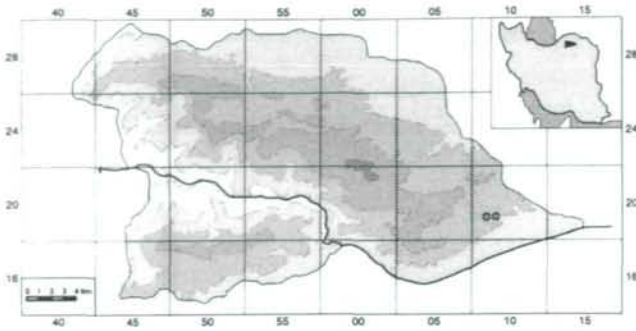
Map 358. *Astragalus citrinus* Bunge subsp. *citrinus*



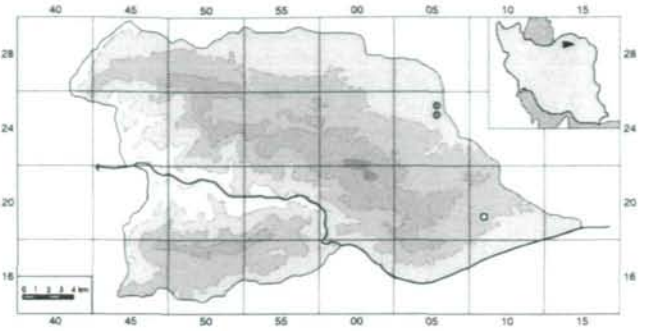
Map 359. *Astragalus kopedaghi* Boriss. var. *orientikopedaghiensis* V. V. Niktin



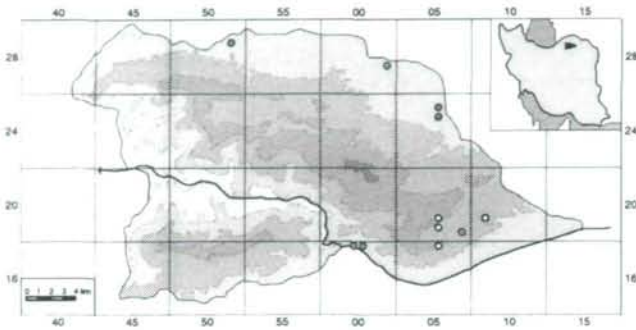
Map 360. *Astragalus nephtonensis* Freyn



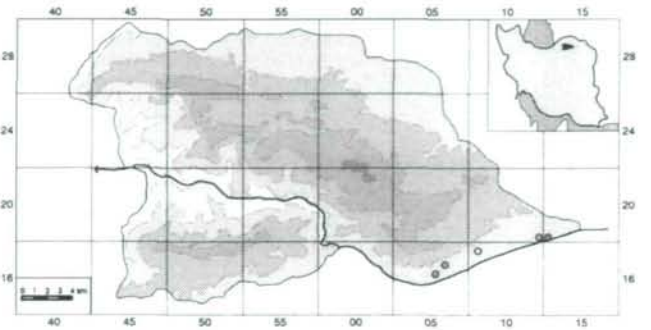
Map 361. *Astragalus pseudoindurascens* Sirj. & Rech. f.



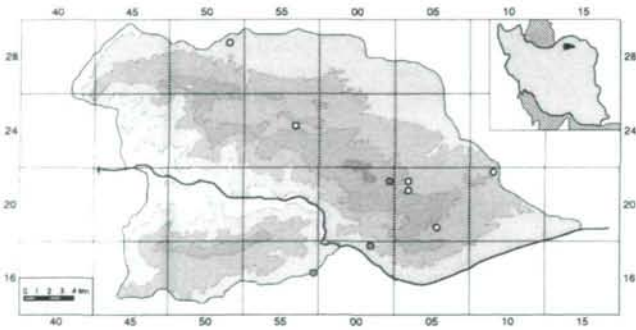
Map 362. *Astragalus pendulinus* Popov & B. Fedtsch.



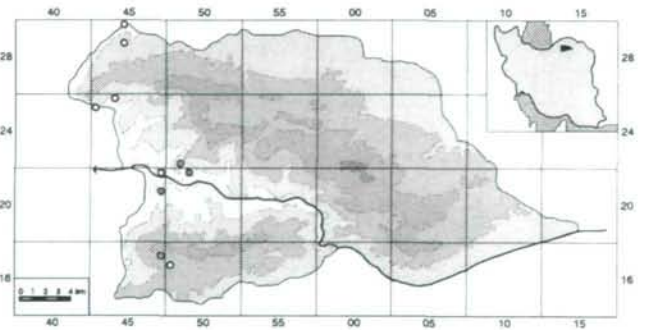
Map 363. *Astragalus sumbari* Popov



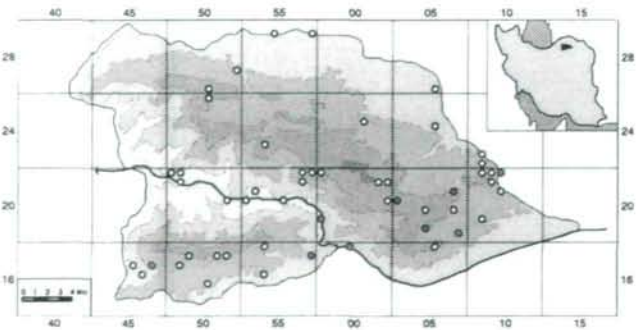
Map 364. *Astragalus ufraensis* Freyn & Sint.



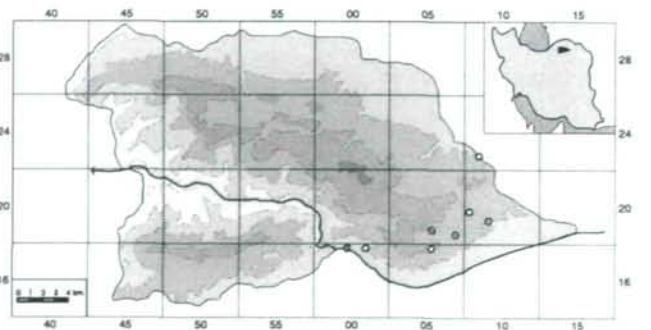
Map 365. *Astragalus xiphidioides* Freyn & Sint.



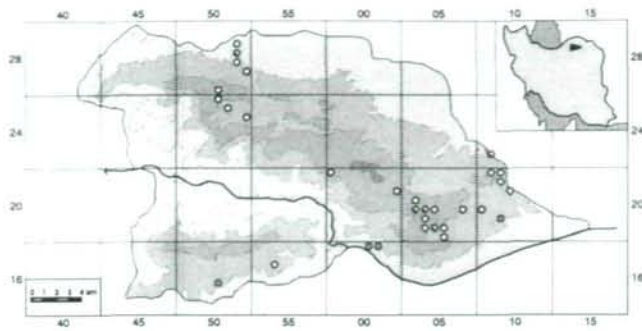
Map 366. *Astragalus glycyphyllos* L.



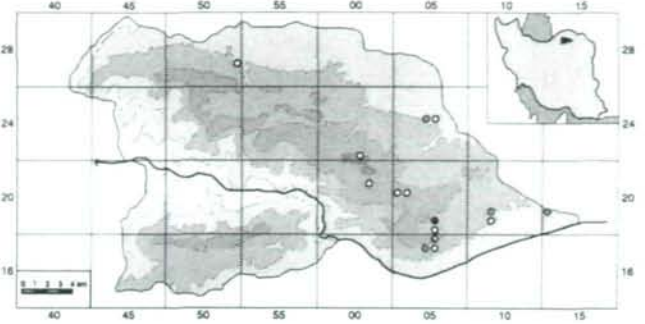
Map 367. *Astragalus jolderensis* B. Fedtsch.



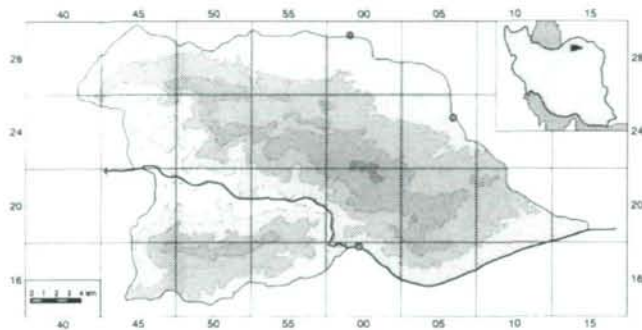
Map 368. *Astragalus rawlinsonianus* Aitch. & Baker



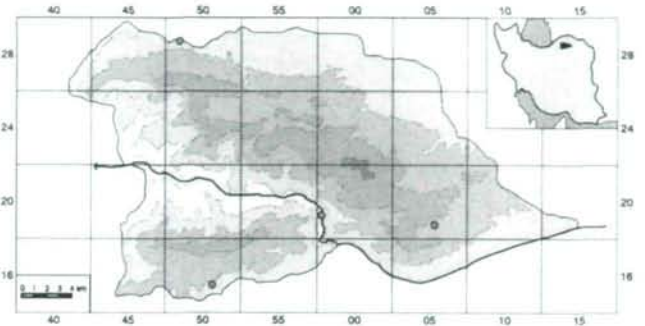
Map 369. *Astragalus brevidens* Freyn & Sint.



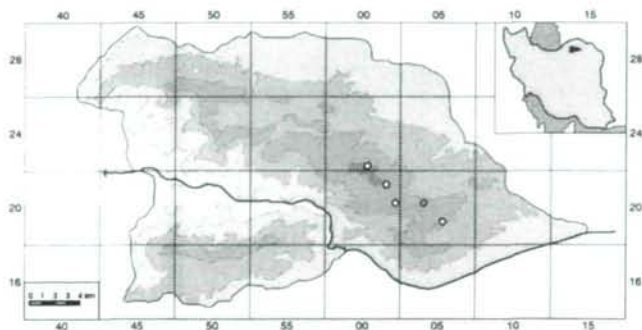
Map 370. *Astragalus verus* Oliv.



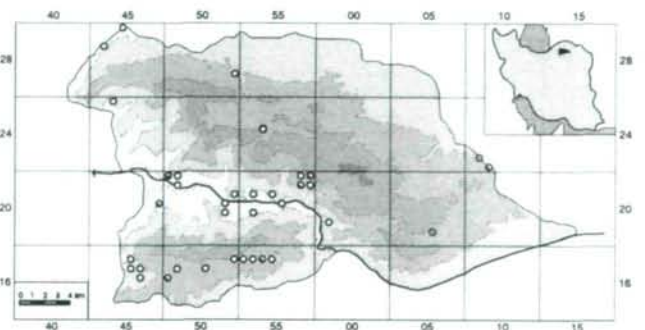
Map 371. *Astragalus asterias* Hohen.



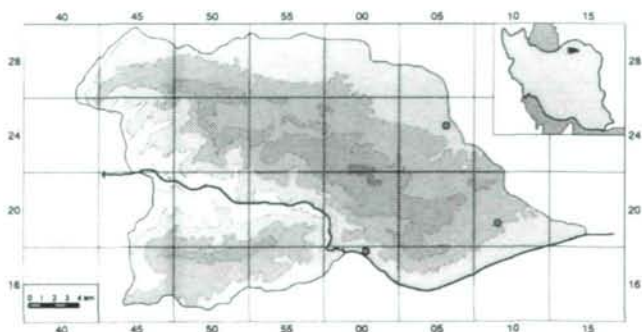
Map 372. *Astragalus brachypetalus* Trautv.



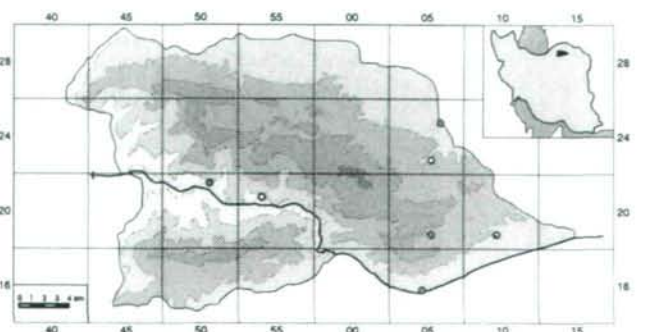
Map 373. *Astragalus testiculatus* Pall.



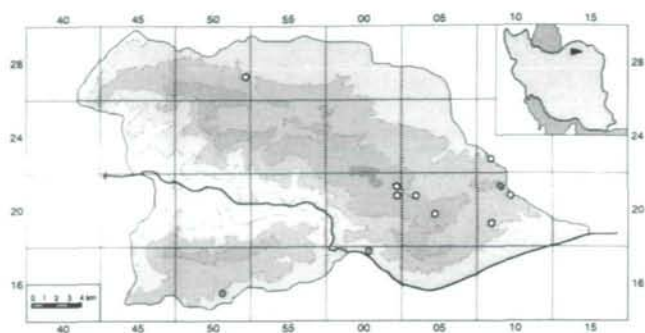
Map 374. *Colutea buhsei* (Boiss.) Shap.



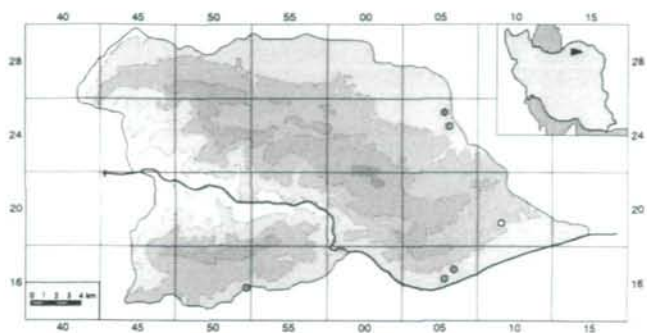
Map 375. *Colutea porphyrogramma* Rech. f.



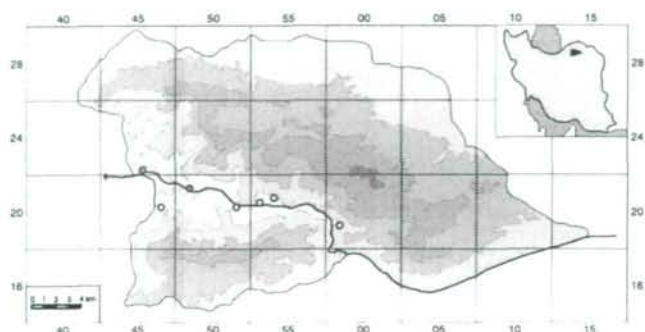
Map 376. *Glycyrrhiza glabra* L.



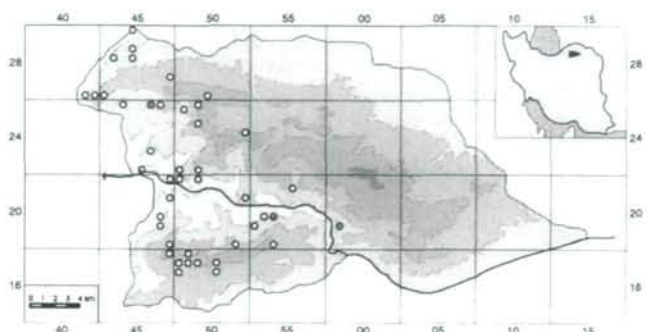
Map 377. *Hedysarum kopetdaghi* Boriss.



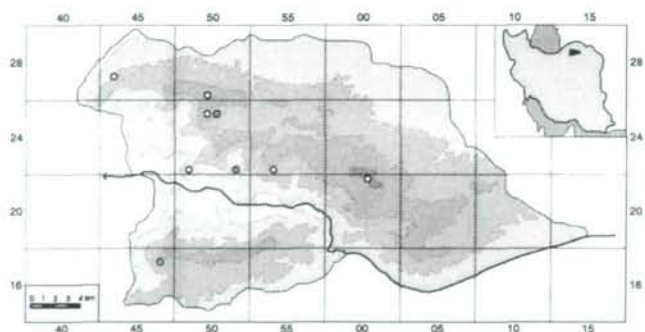
Map 378. *Hedysarum micropterum* Bunge ex Boiss.



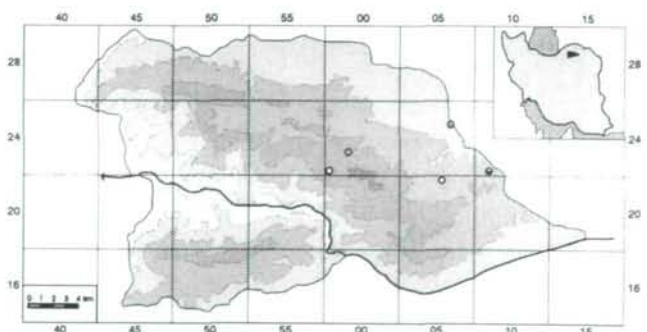
Map 379. *Lathyrus aphaca* L.



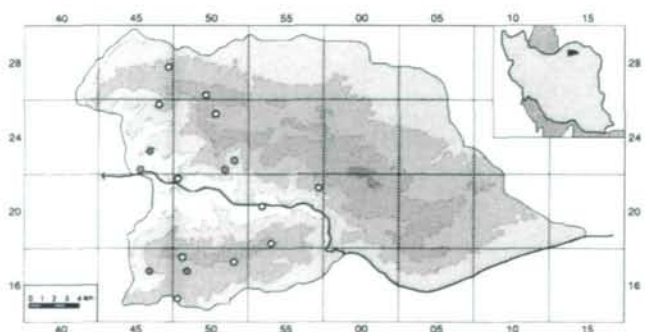
Map 380. *Lathyrus laxiflorus* (Desf.) Kuntze



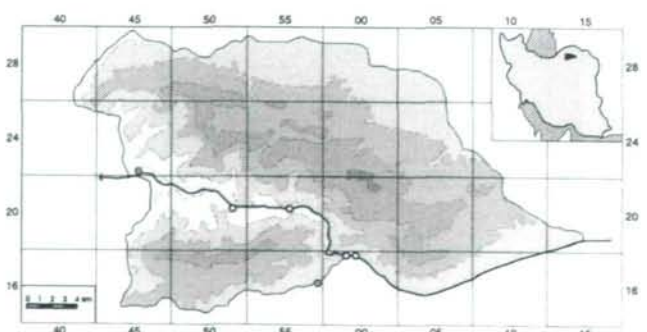
Map 381. *Lathyrus pratensis* L.



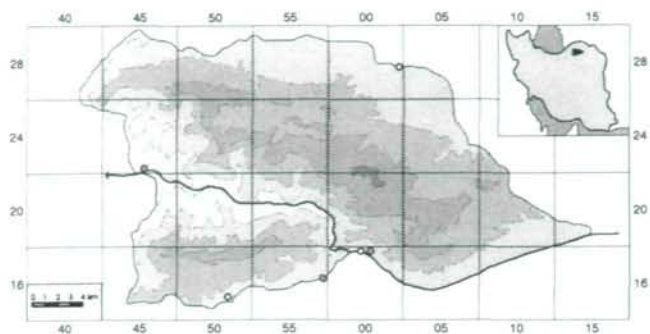
Map 382. *Lotus corniculatus* L.



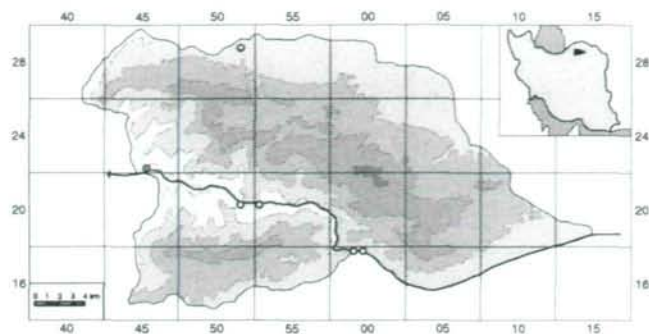
Map 383. *Medicago lupulina* L.



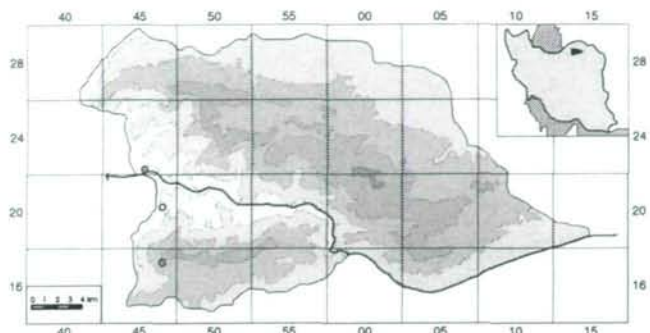
Map 384. *Medicago minima* (L.) L.



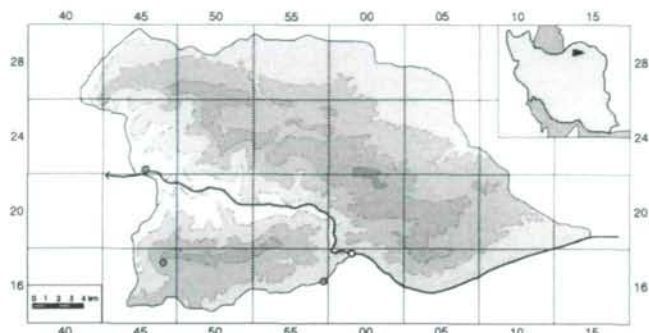
Map 385. *Medicago monantha* (C. A. Mey.) Trautv.



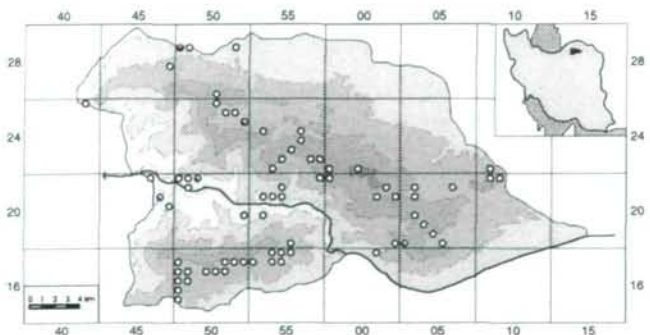
Map 386. *Medicago monspeliaca* (L.) Trautv.



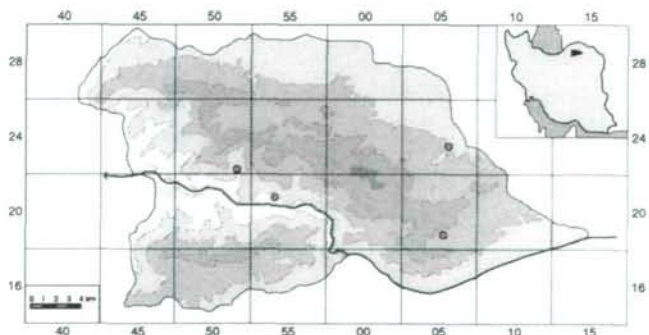
Map 387. *Medicago orbicularis* (L.) Bartal.



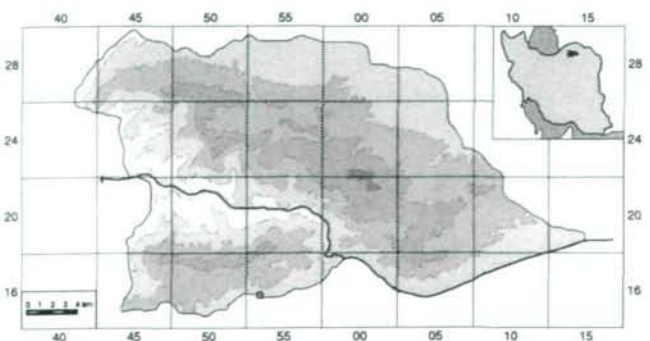
Map 388. *Medicago rigiduloides* E. Small



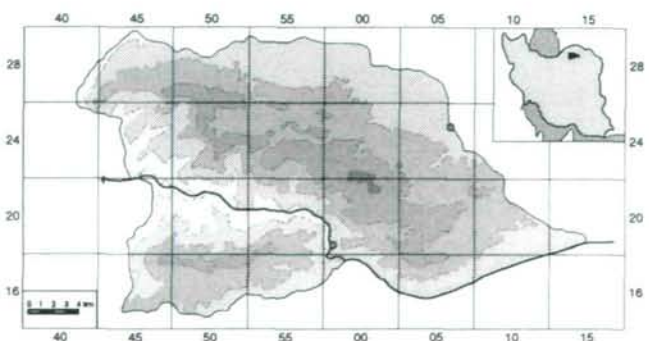
Map 389. *Medicago sativa* L.



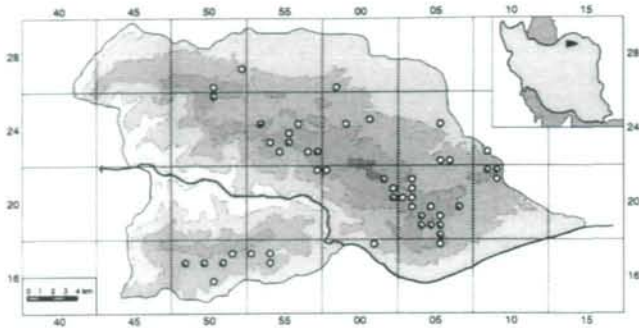
Map 390. *Melilotus albus* Medicus



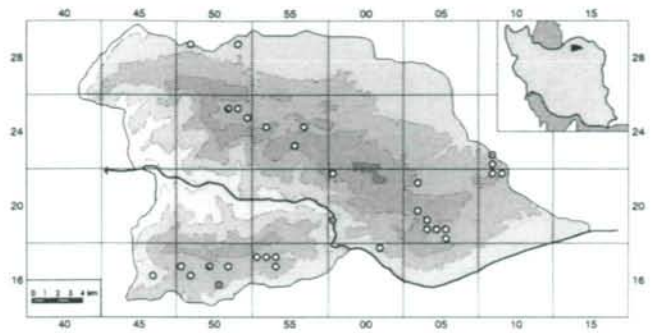
Map 391. *Melilotus dentatus* (Waldst. & Kit) Pers.



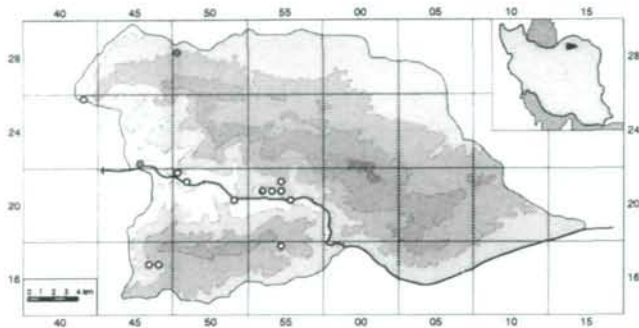
Map 392. *Meristotropis xanthioides* Vassilcz.



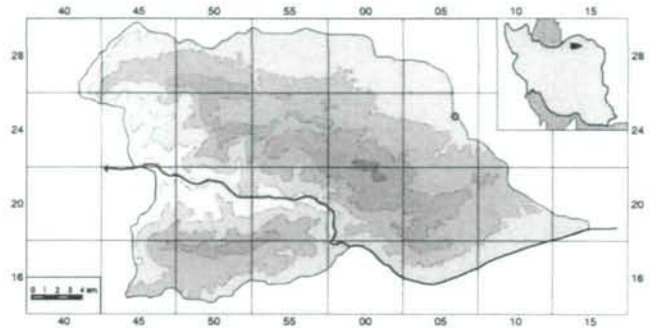
Map 393. *Onobrychis cornuta* (L.) Desv.



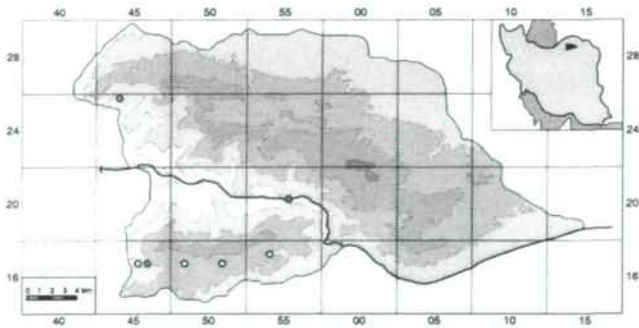
Map 394. *Onobrychis sintenisii* Bornm.



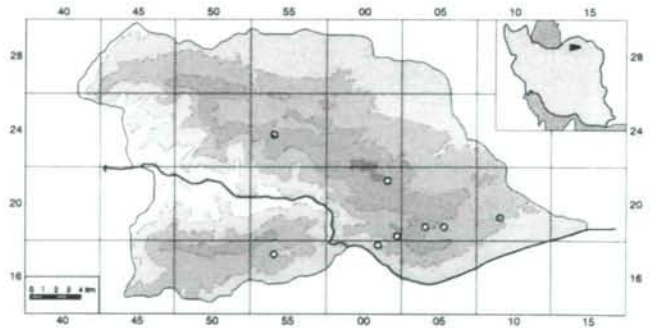
Map 395. *Onobrychis transcaspica* V. Nikitin



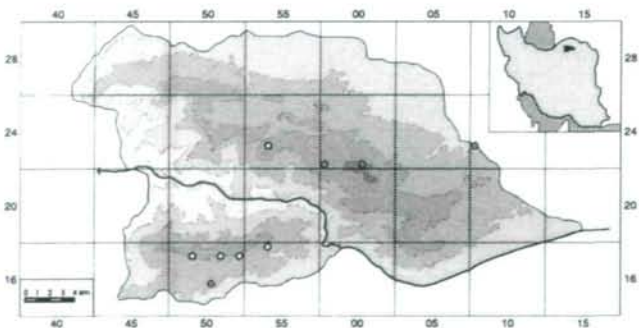
Map 396. *Ononis spinosa* L. subsp. *antiquorum* (L.) Arcang.



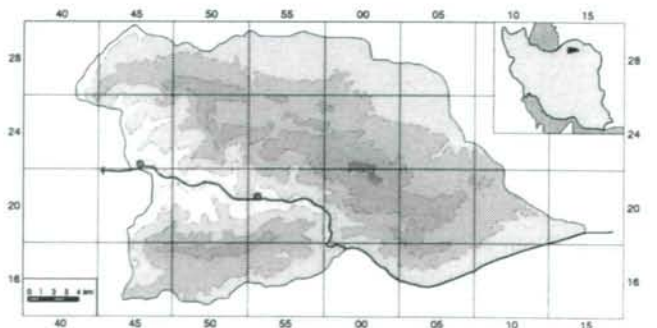
Map 397. *Ononis pusilla* L.



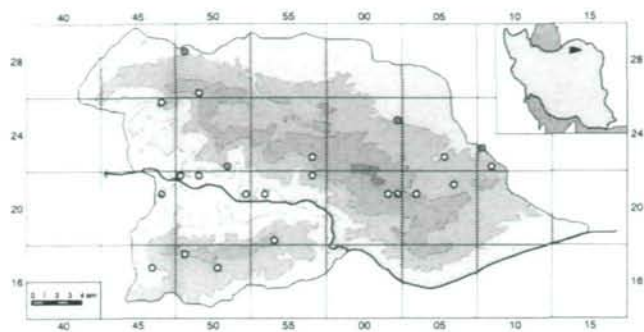
Map 398. *Oxytropis kopetdaghensis* Gontsch.



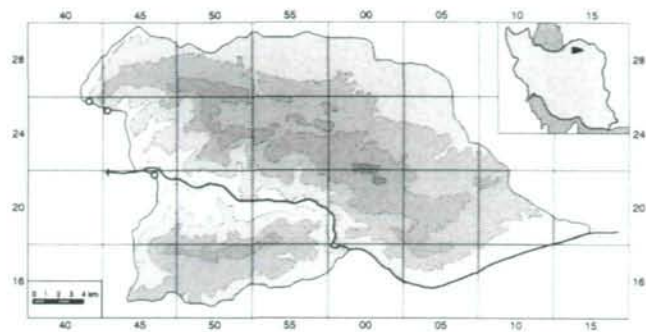
Map 399. *Oxytropis suavis* Boriss.



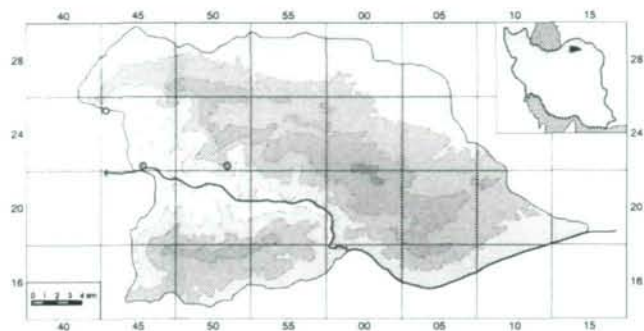
Map 400. *Securigera securidaca* (L.) Degen & Dörfel.



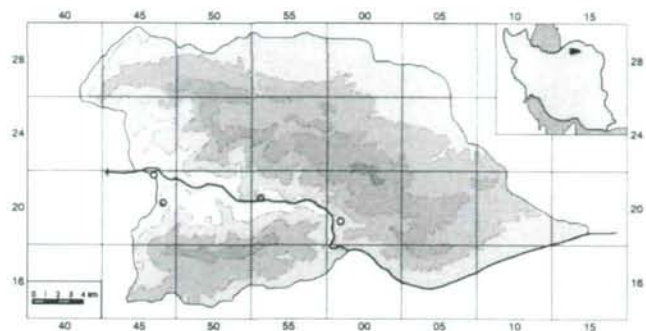
Map 401. *Securigera varia* (L.) Lassen



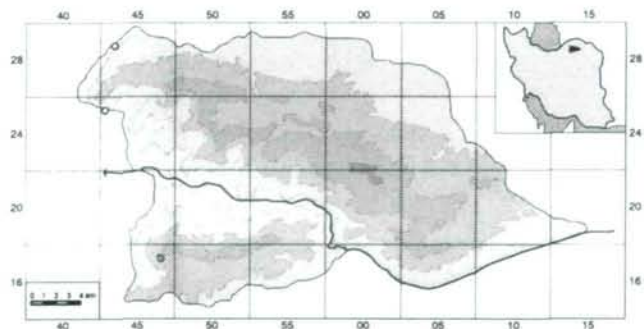
Map 402. *Trifolium angustifolium* L.



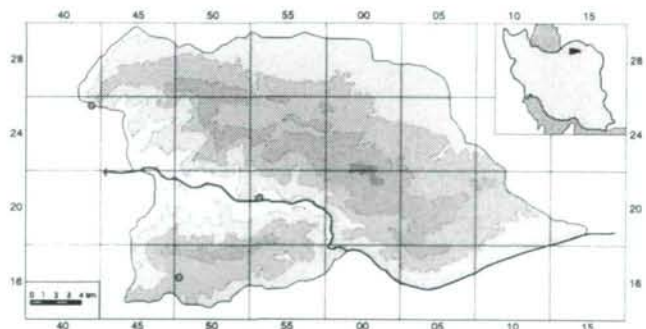
Map 403. *Trifolium arvense* L.



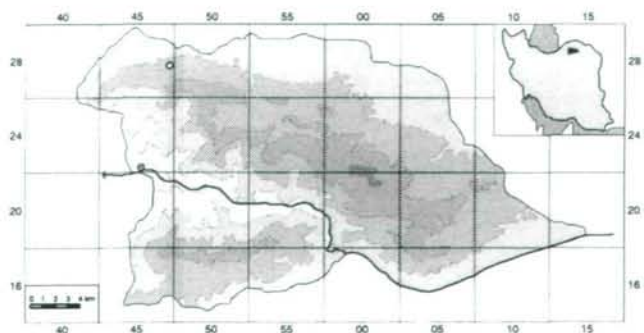
Map 404. *Trifolium campestre* Schreb.



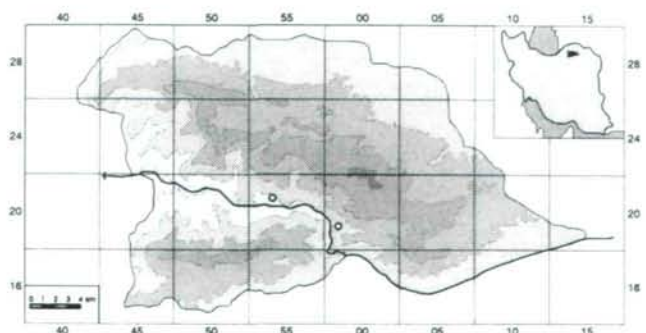
Map 405. *Trifolium ochroleucum* Huds.



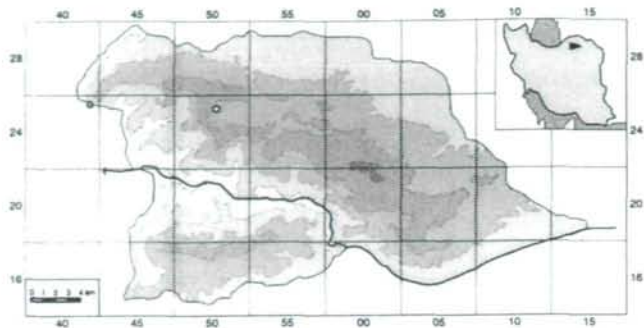
Map 406. *Trifolium pratense* L.



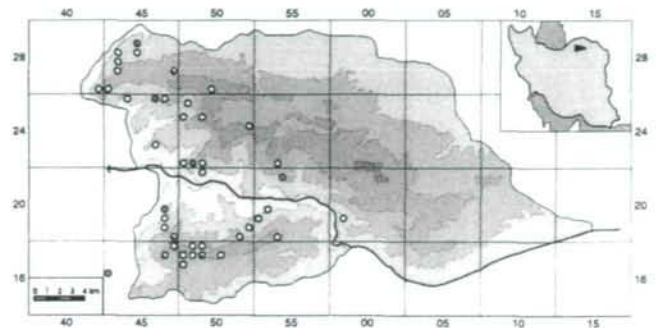
Map 407. *Trifolium tumens* Steven ex M. Bieb.



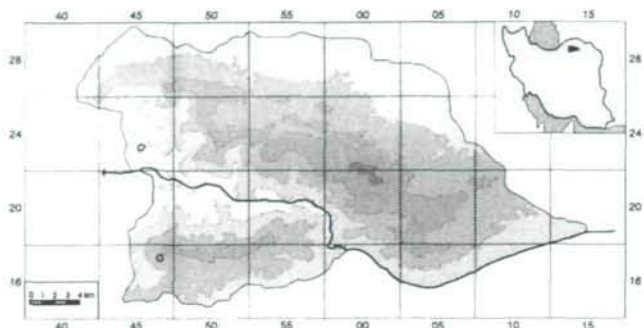
Map 408. *Trigonella foenum-graceum* L.



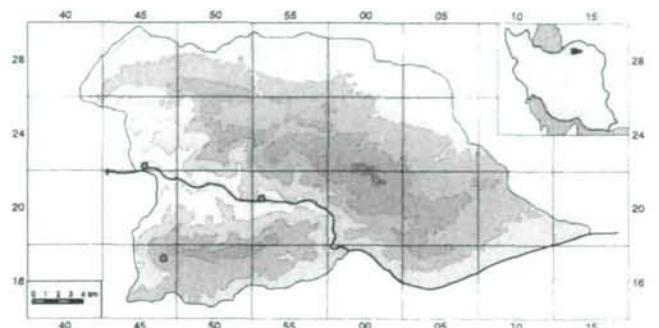
Map 409. *Vicia cassubica* L.



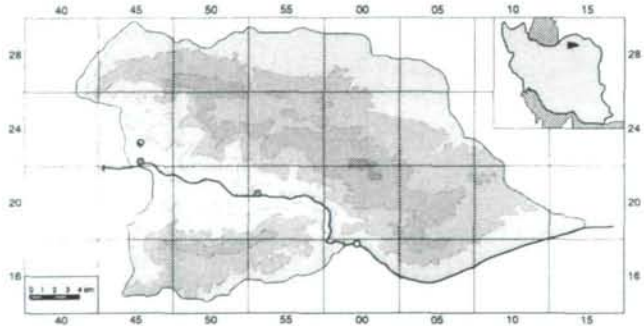
Map 410. *Vicia crocea* (Desf.) B. Fedtsch.



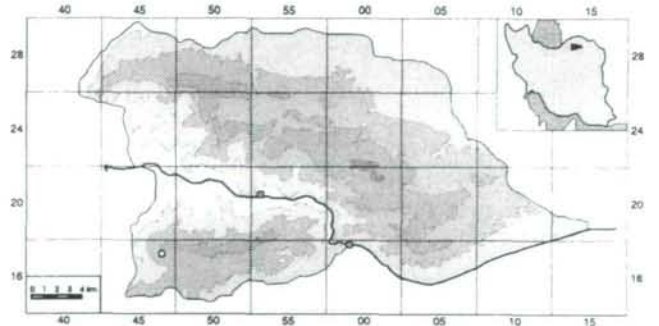
Map 411. *Vicia grandiflora* Scop.



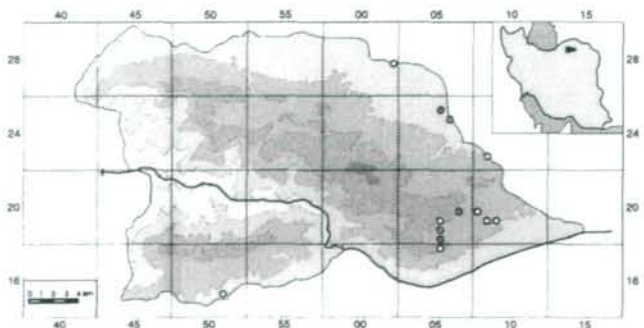
Map 412. *Vicia hirsuta* (L.) S. F. Gray



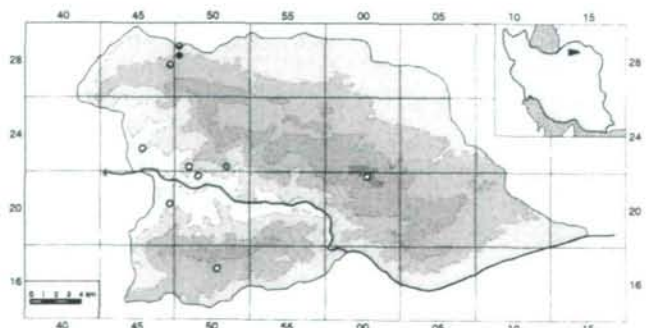
Map 413. *Vicia lutea* L.



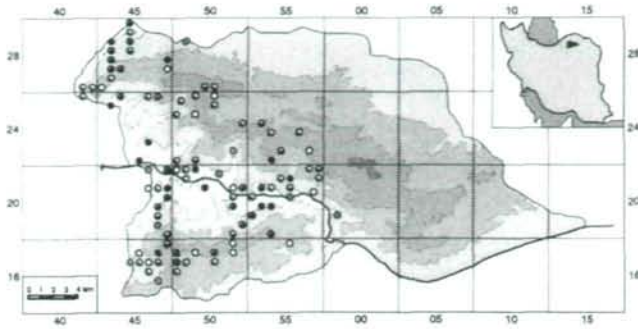
Map 414. *Vicia pannonica* Crantz



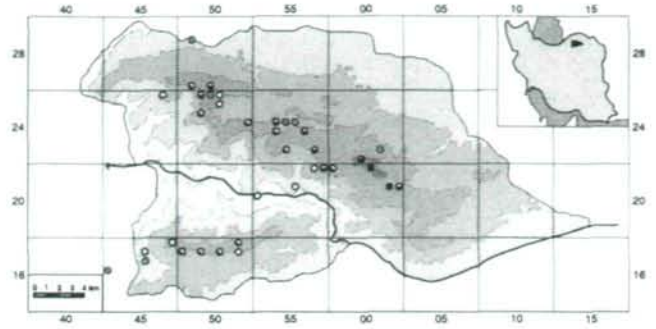
Map 415. *Vicia subvillosa* (Ledeb.) Trautv.



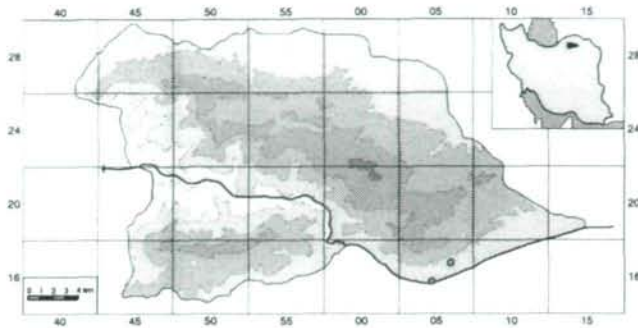
Map 416. *Vicia variabilis* Freyn & Sint.



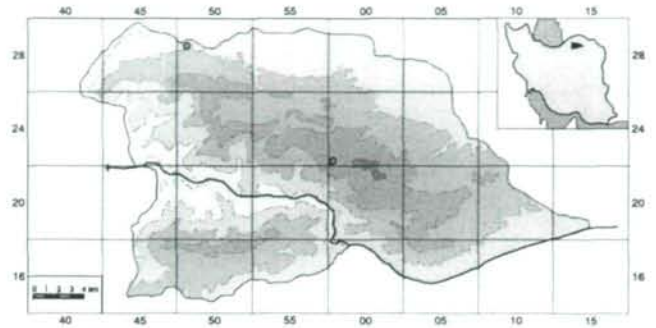
Map 417. *Quercus castaneifolia* C. A. Mey.



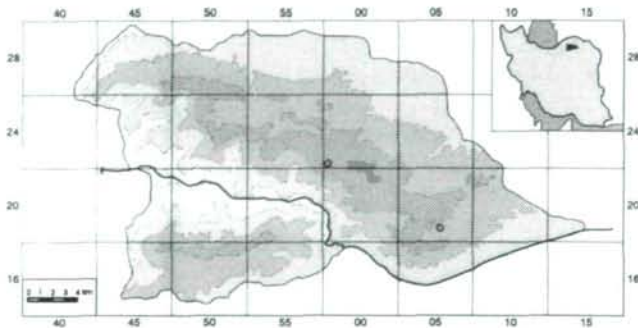
Map 418. *Quercus macranthera* Fisch. & C. A. Mey.



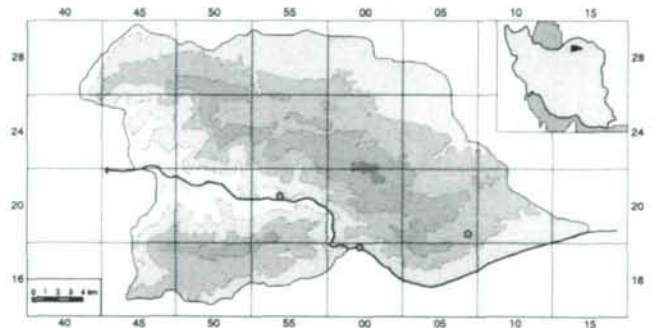
Map 419. *Frankenia hirsuta* L.



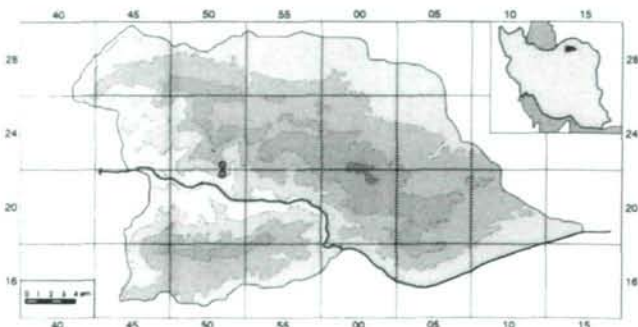
Map 420. *Corydalis angustifolia* (M. Bieb.) DC.



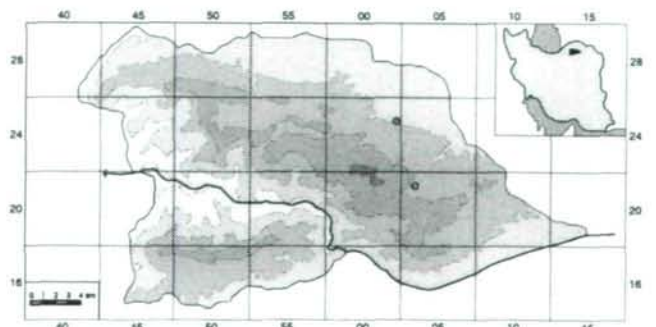
Map 421. *Corydalis chionophila* Czerniak.



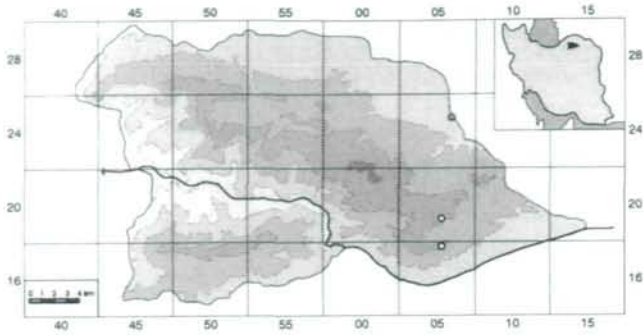
Map 422. *Fumaria vaillantii* Loisel.



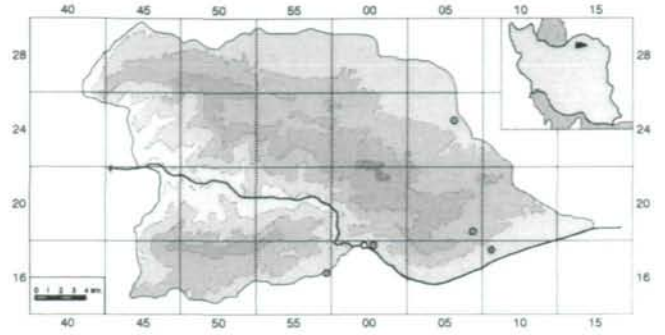
Map 423. *Centaureum erythraea* Rafn subsp. *erythraea*



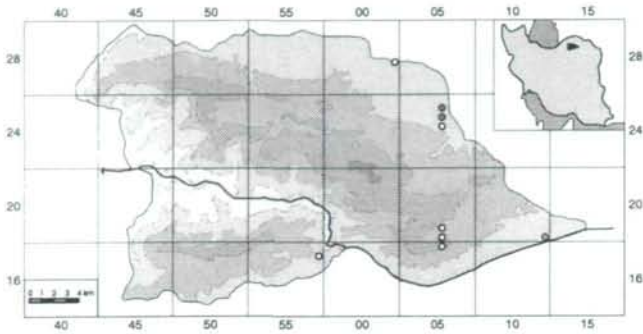
Map 424. *Centaureum erythraea* Rafn subsp. *turcicum* (Velen.) Melderis



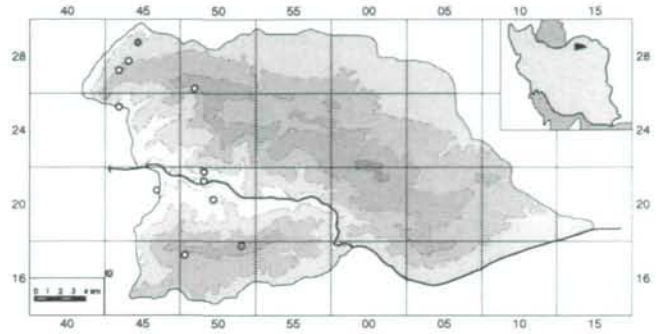
Map 425. *Biebersteinia multifida* DC.



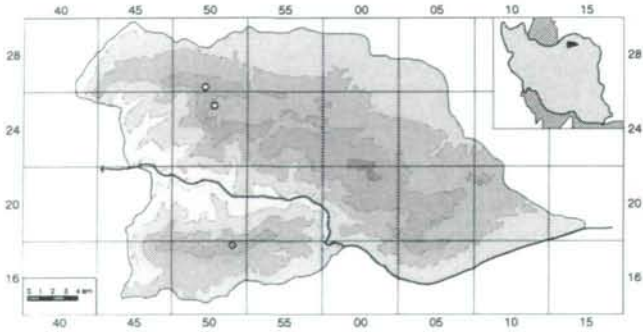
Map 426. *Erodium cicutarium* (L.) L'Hér.



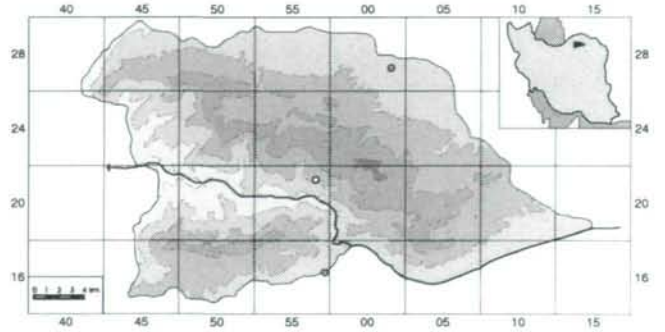
Map 427. *Geranium kotschyi* Boiss.



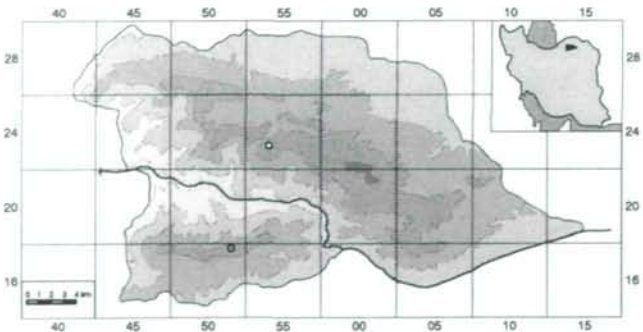
Map 428. *Geranium purpureum* Vill.



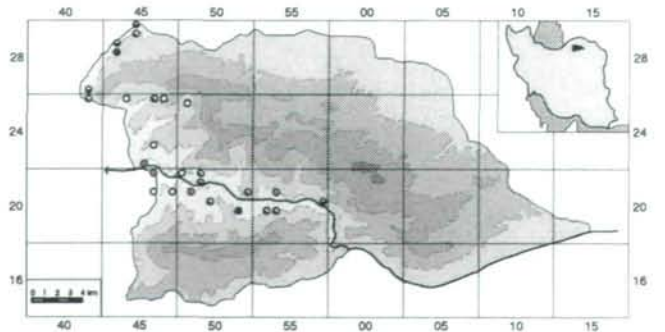
Map 429. *Geranium pyrenaicum* Burm. f.



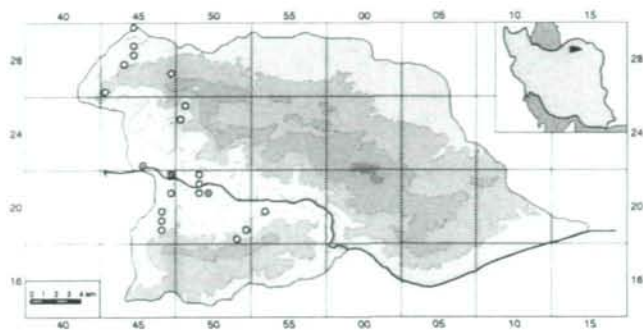
Map 430. *Geranium rotundifolium* L.



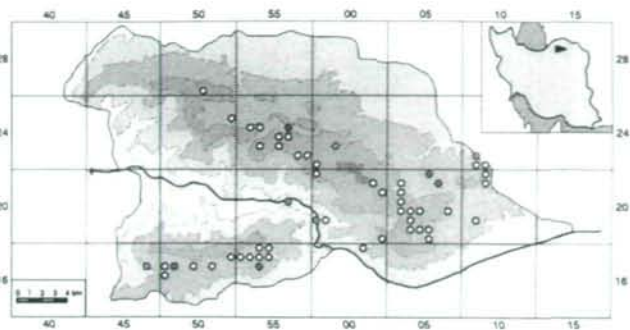
Map 431. *Ribes melananthum* Boiss. & Hohen. (Quadrant: 2455); *Ribes* spec. (Quadrant: 1650)



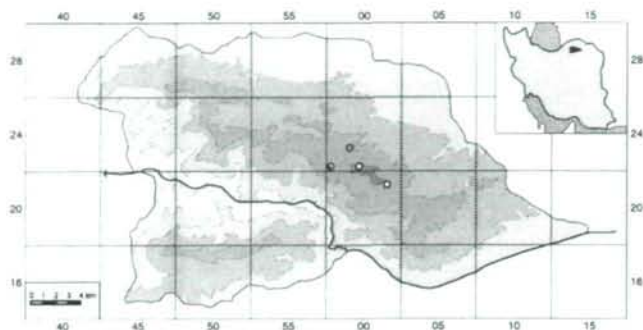
Map 432. *Parrotia persica* (DC.) C. A. Mey.



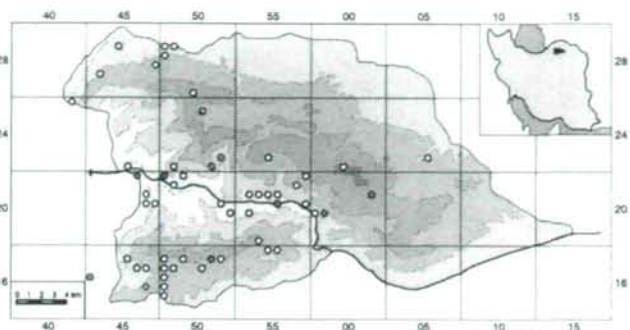
Map 433. *Hypericum androsaemum* L.



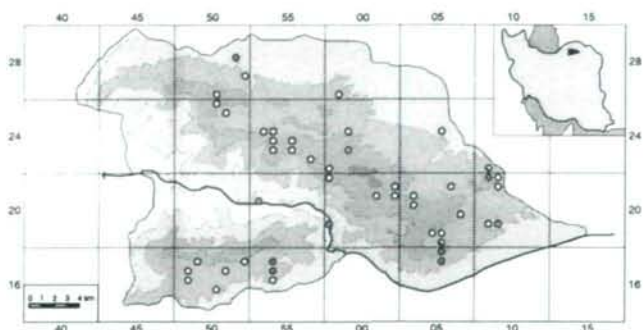
Map 434. *Hypericum elongatum* Ledeb. subsp. *elongatum*



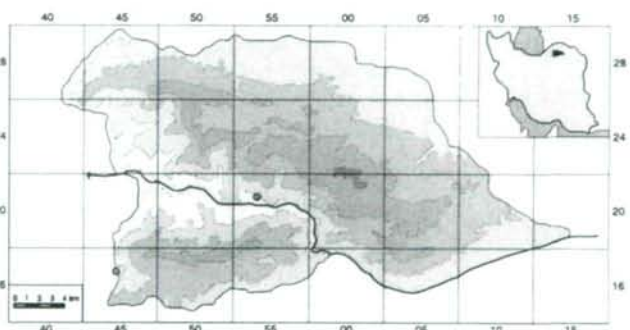
Map 435. *Hypericum linarioides* Bosse



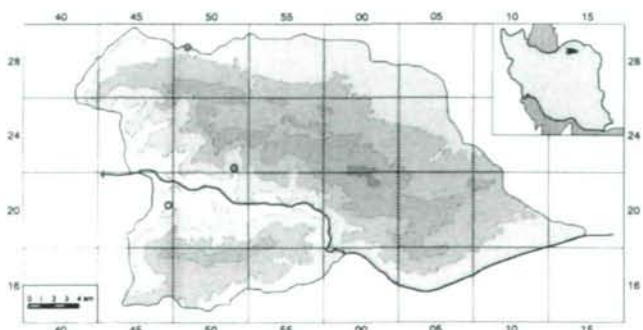
Map 436. *Hypericum perforatum* L.



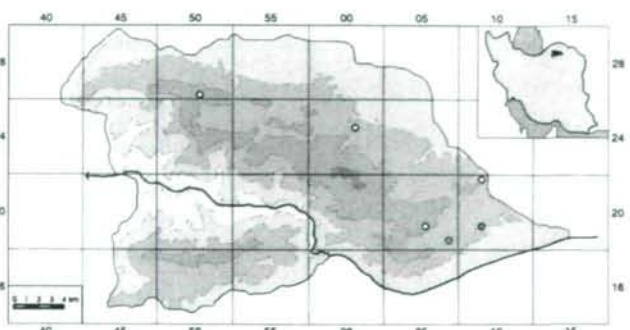
Map 437. *Hypericum scabrum* L.



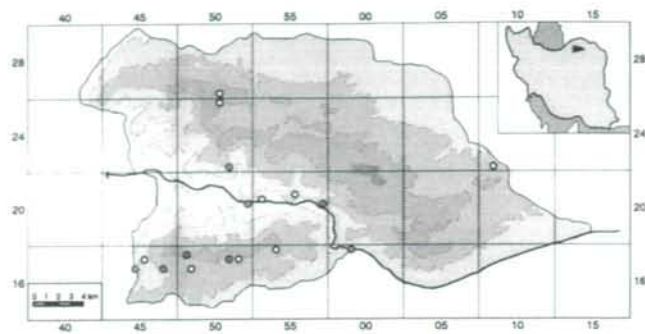
Map 438. *Hypericum tetrapterum* Fries



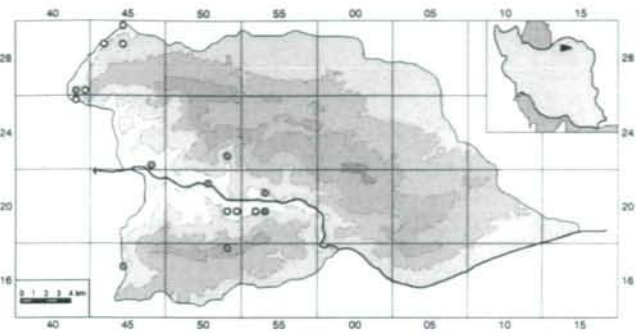
Map 439. *Juglans regia* L. (incomplete)



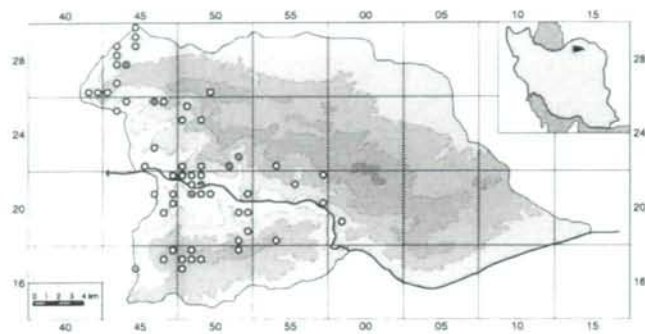
Map 440. *Acinos rotundifolius* Pers.



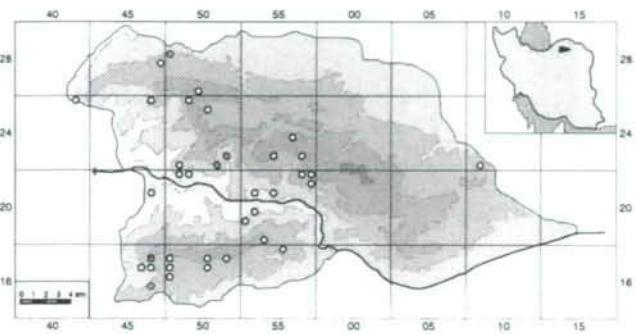
Map 441. *Ajuga commata* Stapf



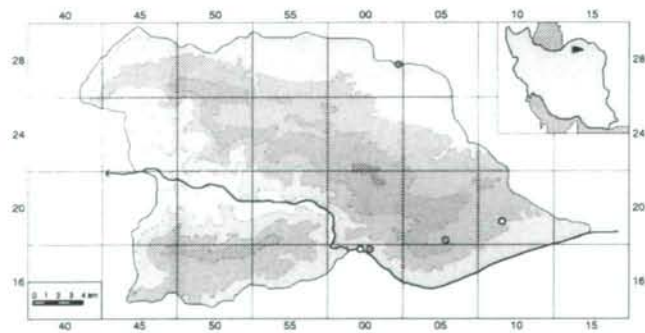
Map 442. *Calamintha nepeta* (L.) Savi



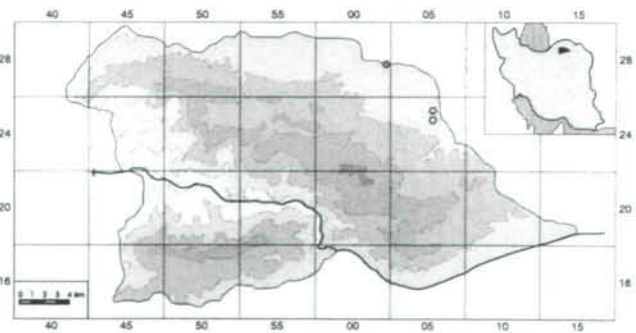
Map 443. *Clinopodium umbrosum* (M. Bieb.) K. Koch



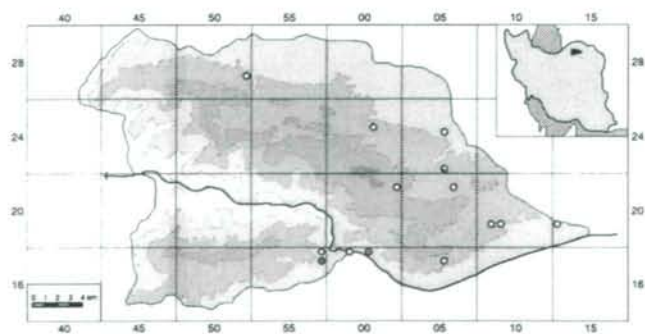
Map 444. *Clinopodium vulgare* L.



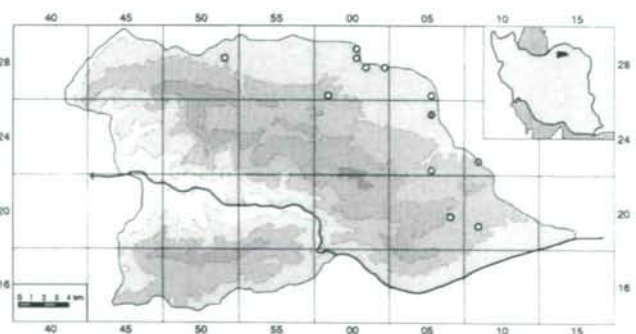
Map 445. *Eremostachys labiosiformis* (Popov) Knorring



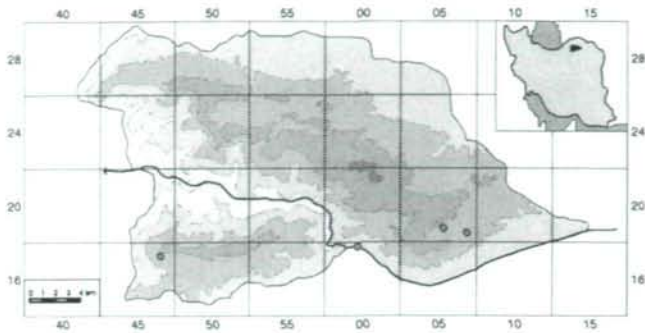
Map 446. *Eremostachys moluccelleoides* Bunge



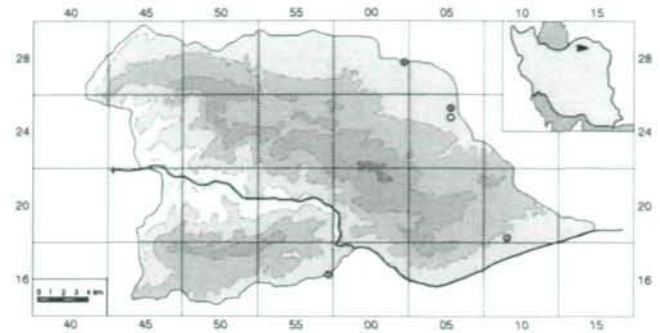
Map 447. *Hymenocrater calycinus* (Boiss.) Benth.



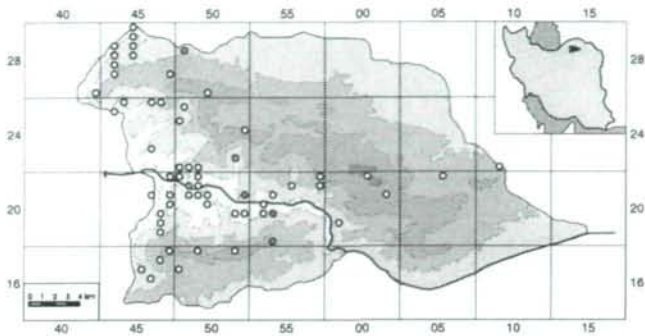
Map 448. *Lagochilus aucheri* Boiss.



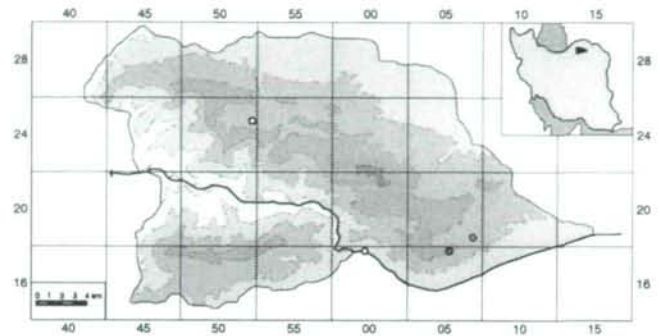
Map 449. *Lallelantia iberica* (Steven) Fisch. & C. A. Mey.



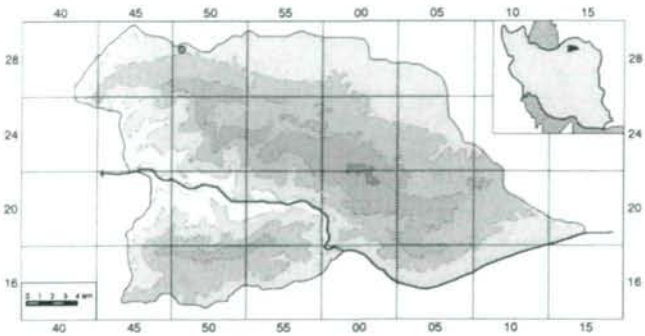
Map 450. *Lallelantia royleana* (Benth.) Benth.



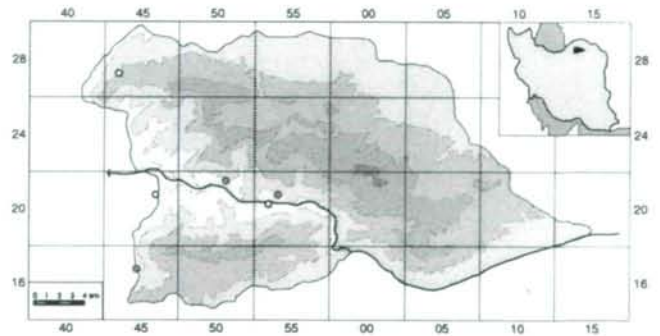
Map 451. *Lamium album* L., s. l.



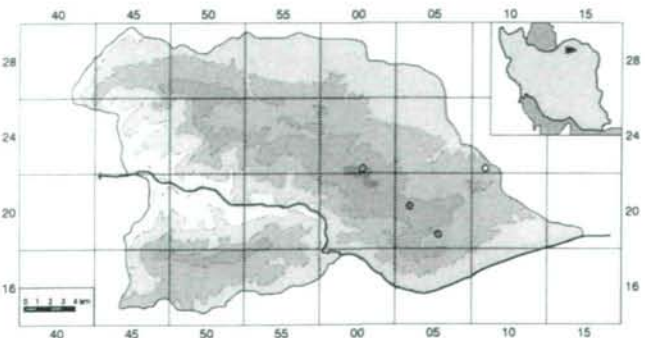
Map 452. *Lamium amplexicaule* L.



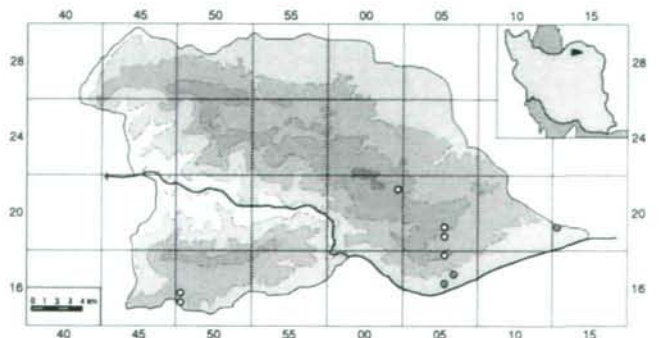
Map 453. *Lamium purpureum* L.



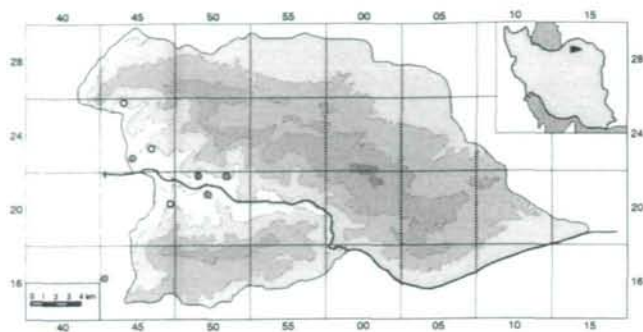
Map 454. *Lycopodium europaeus* L.



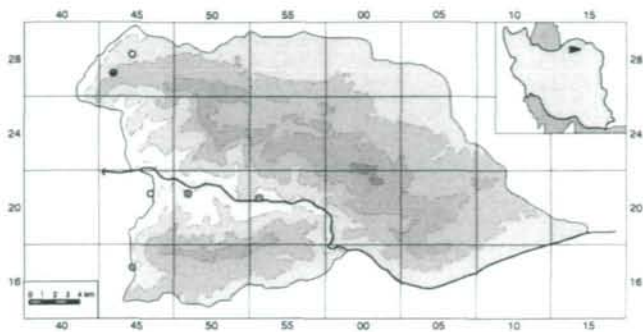
Map 455. *Marrubium astracanicum* Jacq.



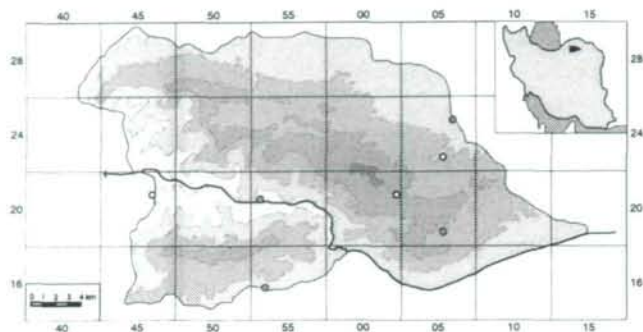
Map 456. *Marrubium parviflorum* Fisch. & C. A. Mey.



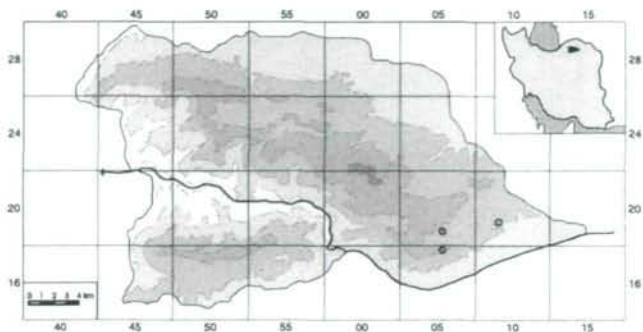
Map 457. *Melissa officinalis* L.



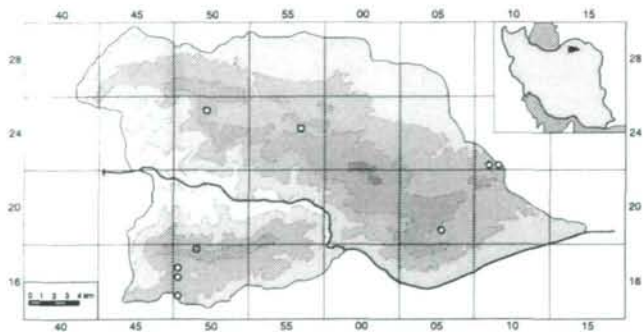
Map 458. *Mentha aquatica* L.



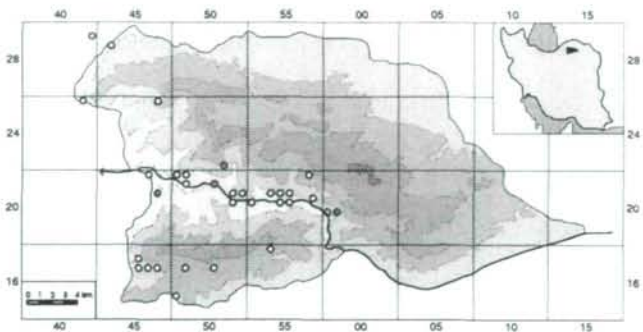
Map 459. *Mentha longifolia* (L.) Huds.



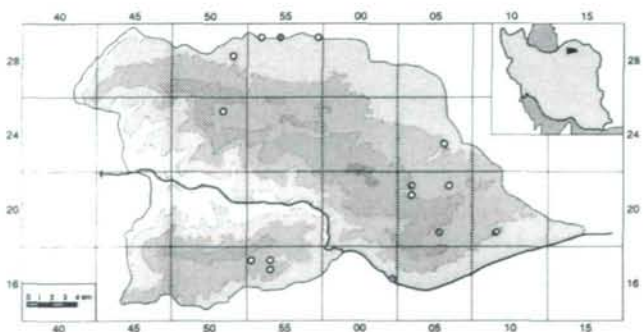
Map 460. *Nepeta pungens* (Bunge) Benth.



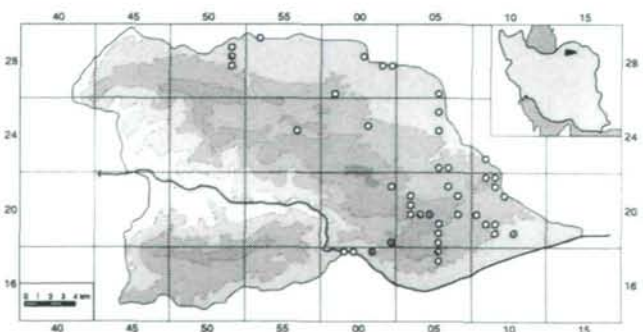
Map 461. *Nepeta sintenisii* Bornm.



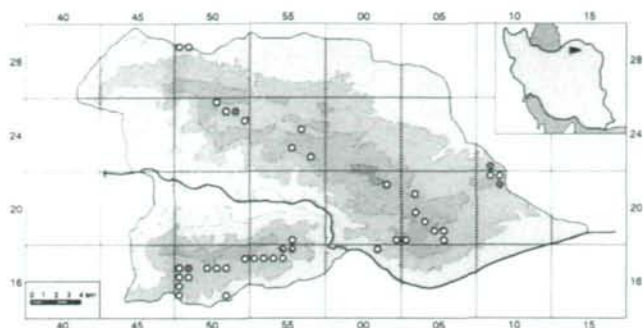
Map 462. *Origanum vulgare* L., s. l.



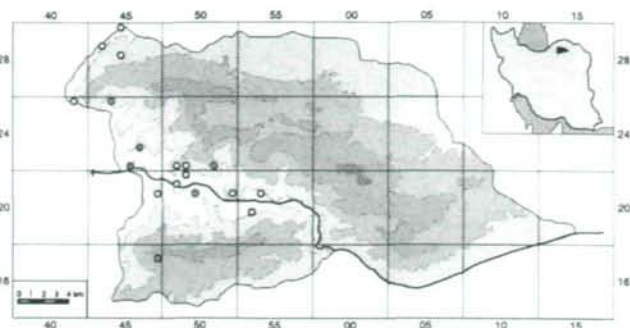
Map 463. *Perovskia abrotanoides* Karel.



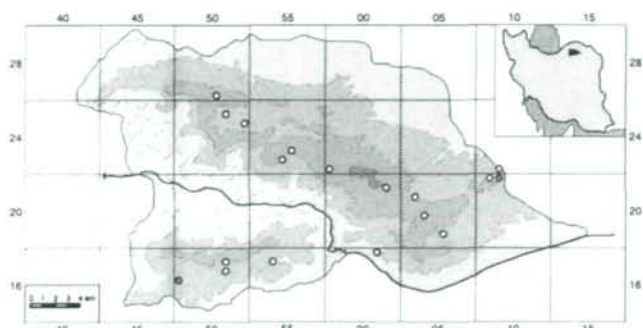
Map 464. *Phlomis cancellata* Bunge



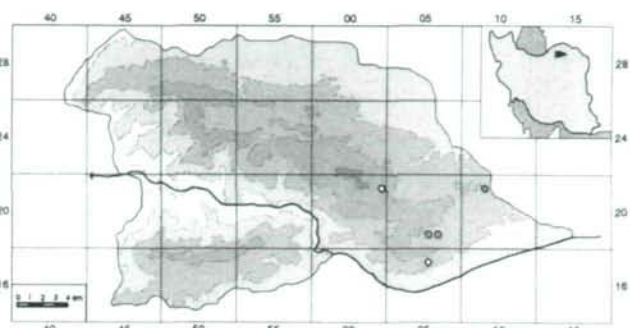
Map 465. *Phlomis herba-venti* L. subsp. *kopetdaghensis* (Knorring) Rech. f.



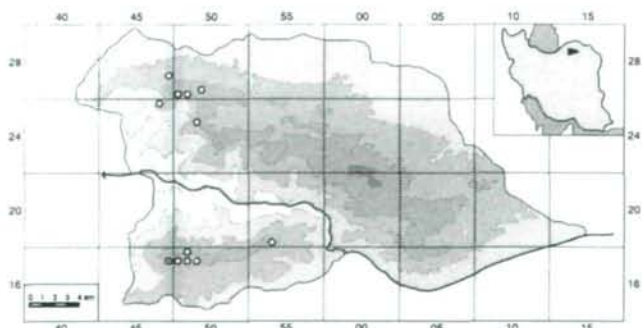
Map 466. *Prunella vulgaris* L.



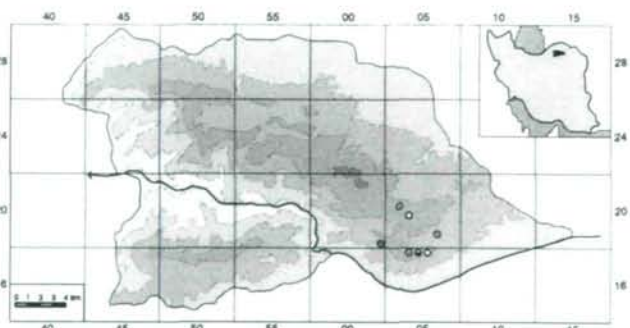
Map 467. *Salvia atropatana* Bunge



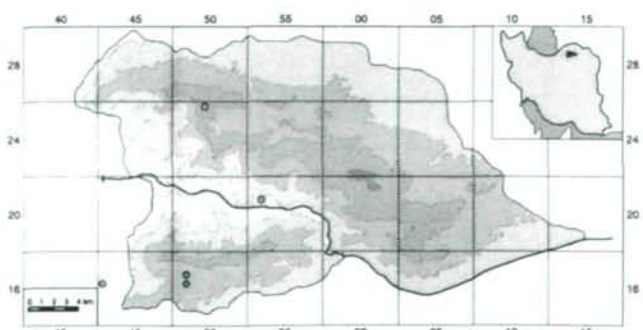
Map 468. *Salvia chloroleuca* Rech. f. & Aellen



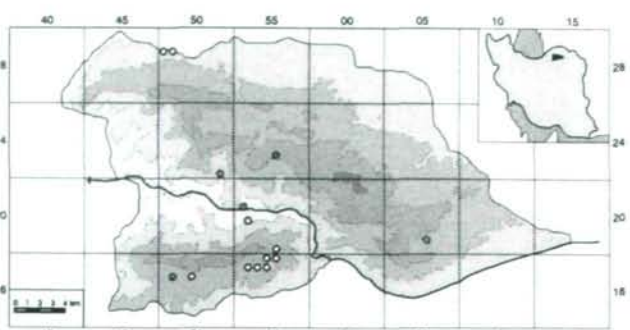
Map 469. *Salvia glutinosa* L.



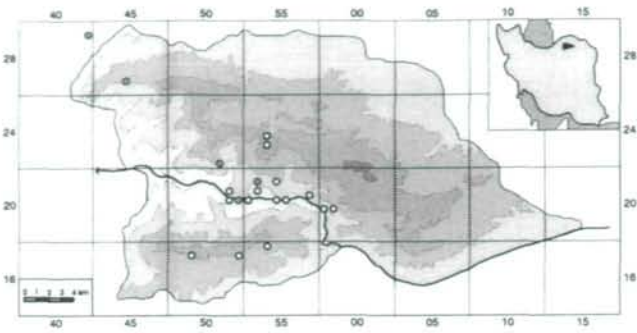
Map 470. *Salvia* aff. *rhytidea* Benth.



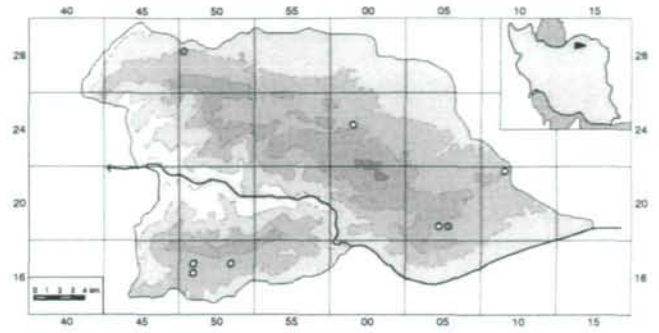
Map 471. *Salvia sclarea* L.



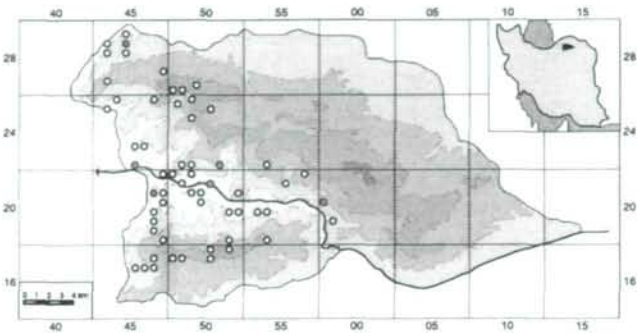
Map 472. *Salvia virgata* Jacq.



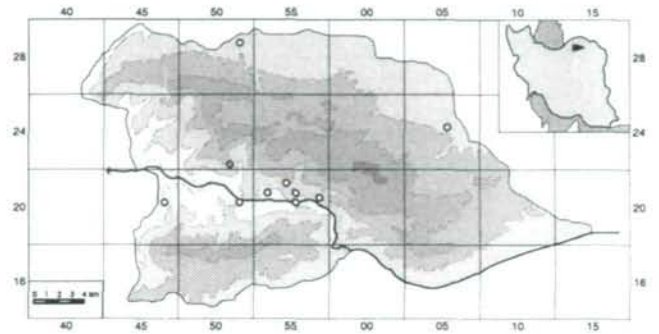
Map 473. *Satureja mutica* Fisch. & C. A. Mey.



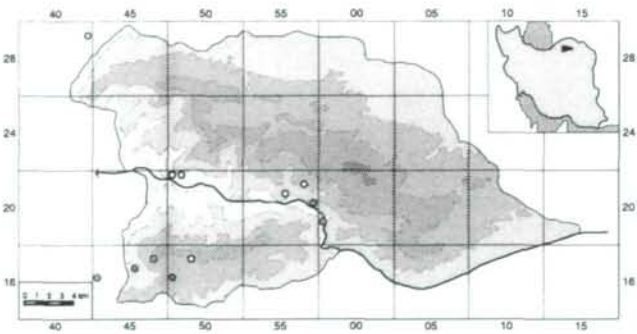
Map 474. *Scutellana pinnatifida* A. Hamilt. subsp. *alpina* (Bornm.) Rech. f.



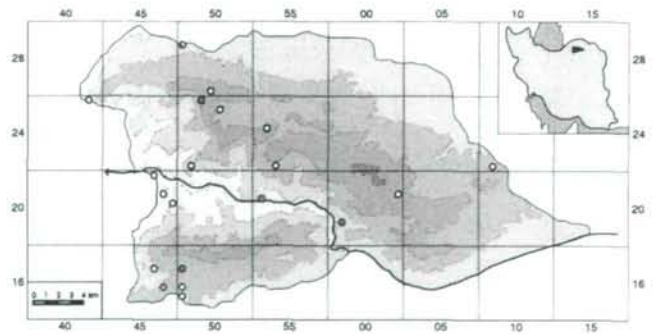
Map 475. *Scutellaria tournefortii* Benth.



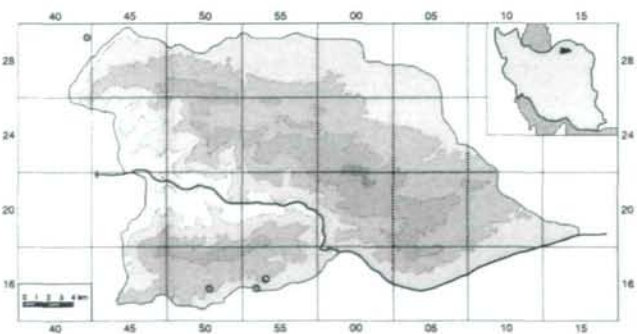
Map 476. *Sideritis montana* L.



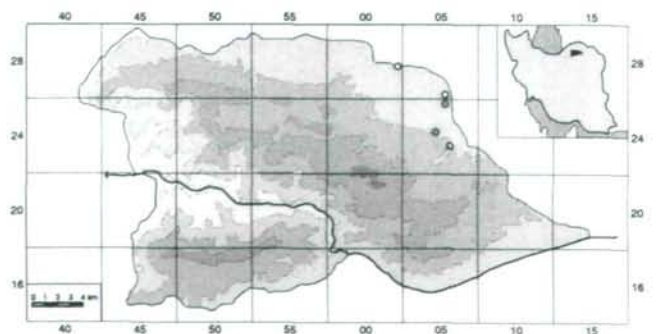
Map 477. *Stachys annua* (L.) L.



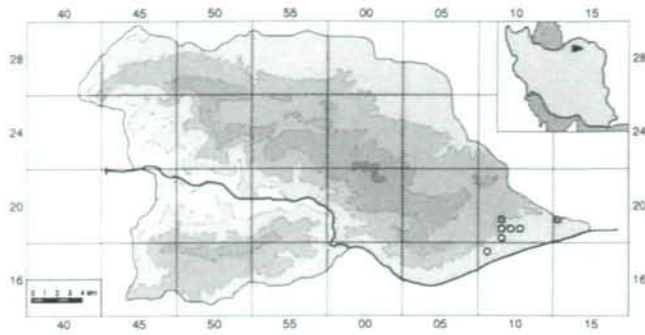
Map 478. *Stachys byzantina* K. Koch



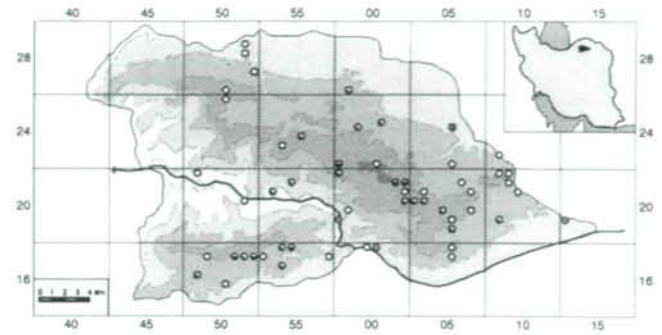
Map 479. *Stachys laxa* Boiss. & Buhse



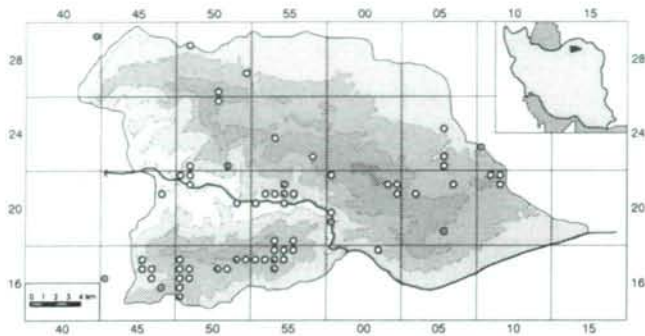
Map 480. *Stachys subaphylla* Rech. f.



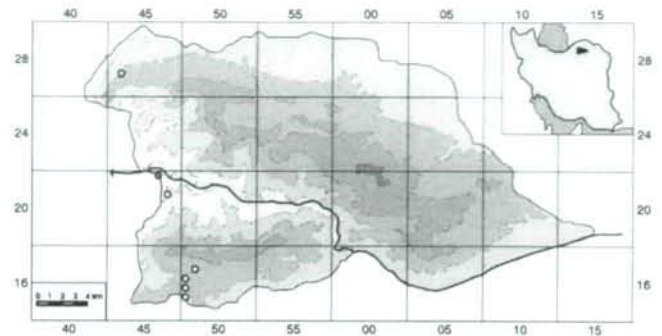
Map 481. *Stachys trinervia* Aitch. & Hemsl.



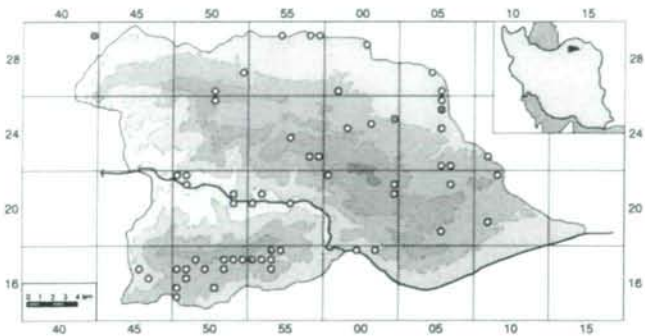
Map 482. *Stachys turcomanica* Trautv.



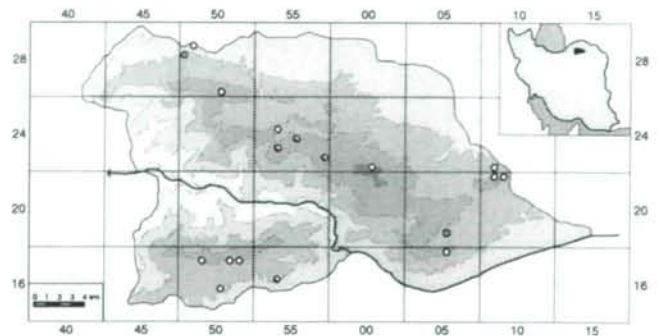
Map 483. *Teucrium chamaedrys* L., s. l.



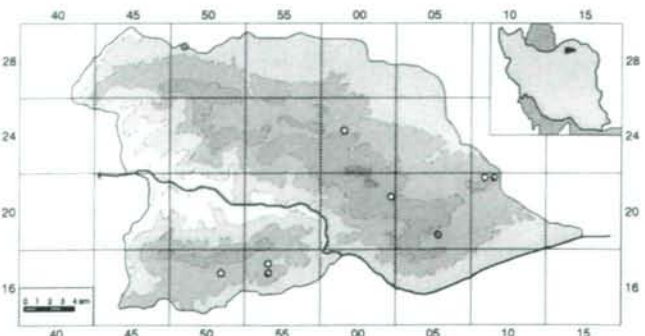
Map 484. *Teucrium hyrcanicum* L.



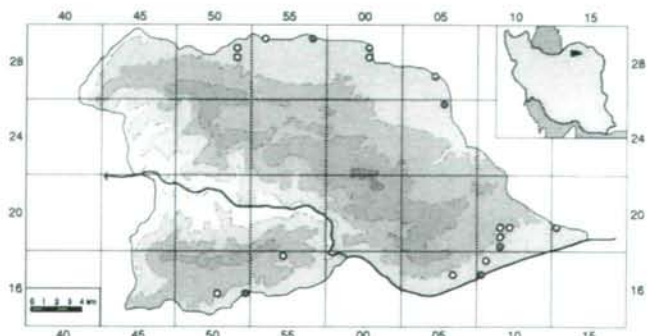
Map 485. *Teucrium polium* L.



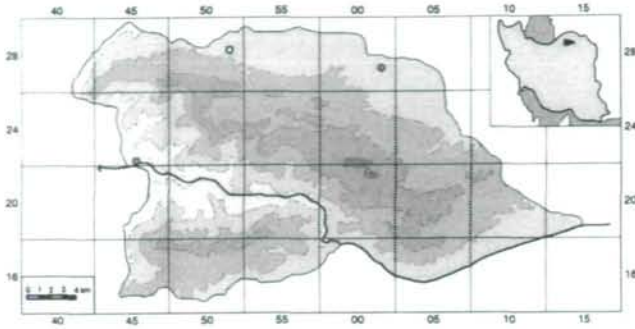
Map 486. *Thymus kotschyanus* Boiss. & Hohen.



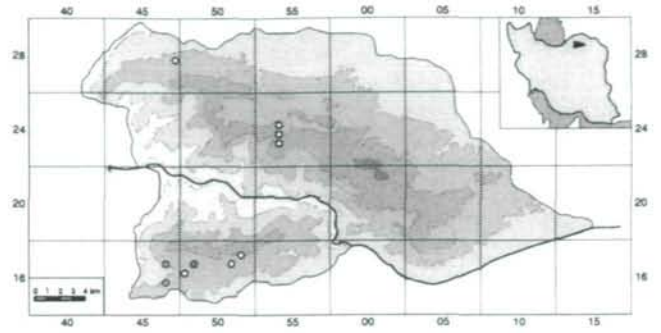
Map 487. *Ziziphora clinopodioides* Lam.



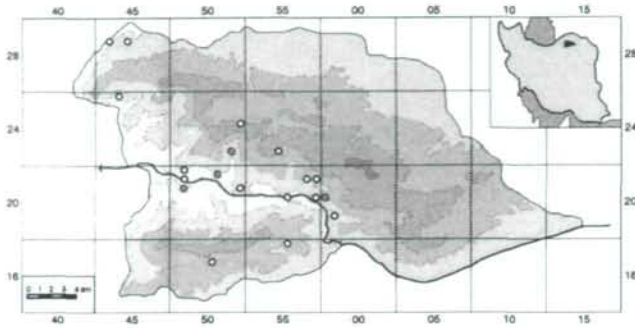
Map 488. *Ziziphora tenuior* L.



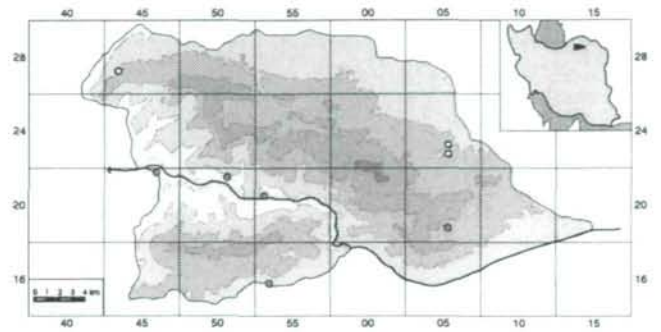
Map 489. *Linum corymbosum* Rchb.



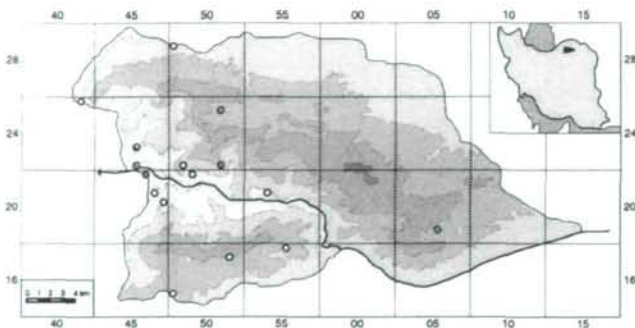
Map 490. *Linum nervosum* Waldst. & Kit.



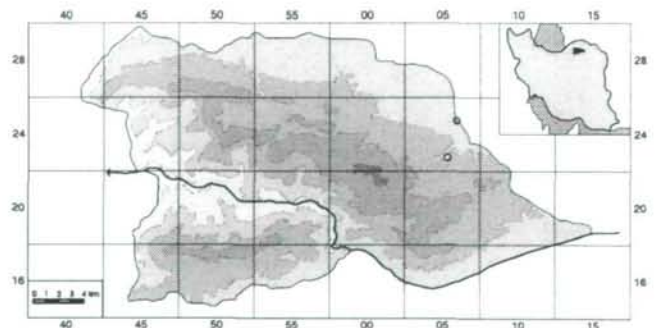
Map 491. *Viscum album* L.



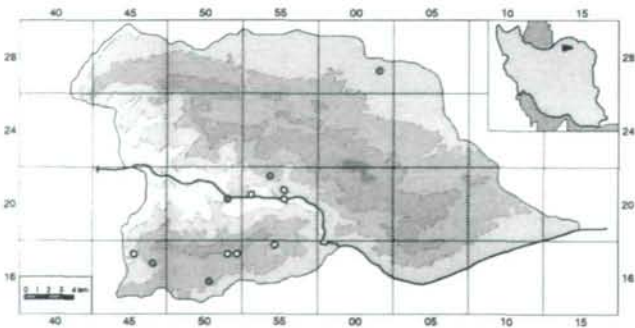
Map 492. *Lythrum salicaria* L.



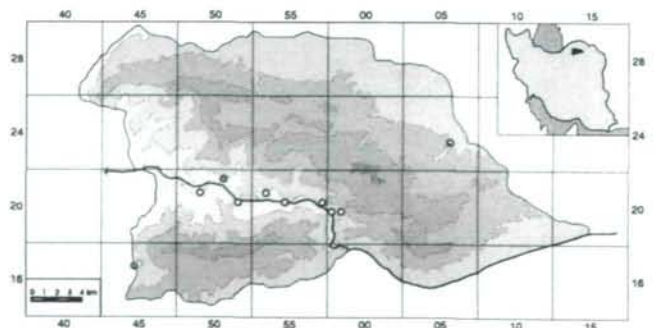
Map 493. *Alcea gorganica* (Rech. f., Aellen & Esfand.) Zohary



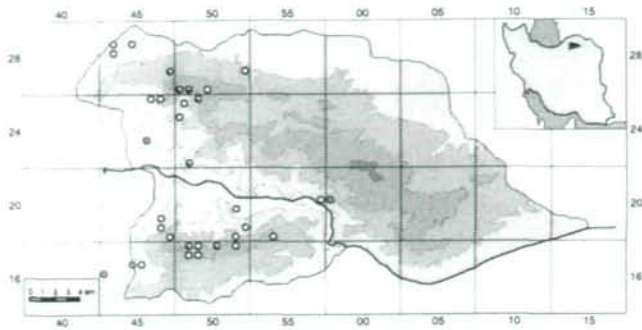
Map 494. *Althaea armeniaca* Ten.



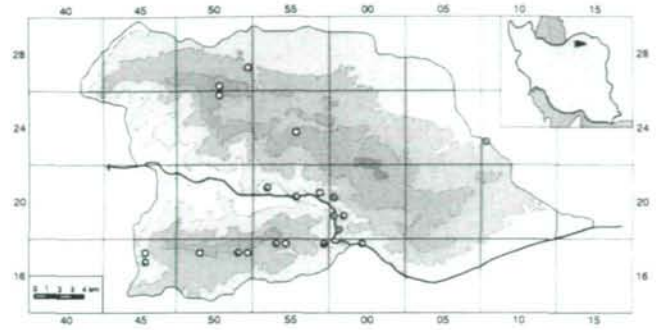
Map 495. *Althaea hirsuta* L.



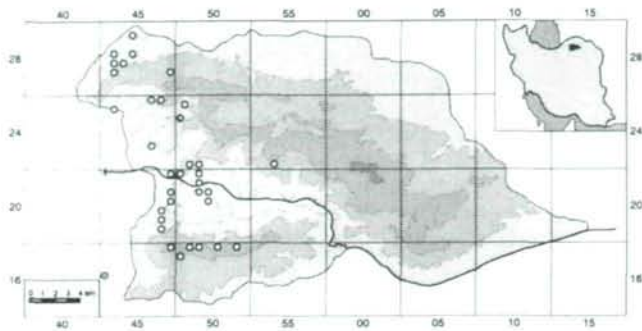
Map 496. *Ficus carica* L. subsp. *carica*



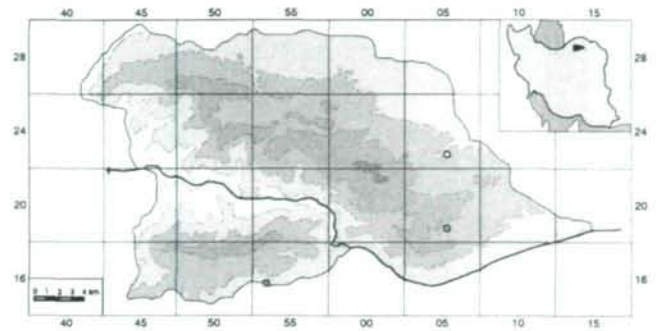
Map 497. *Fraxinus excelsior* L.



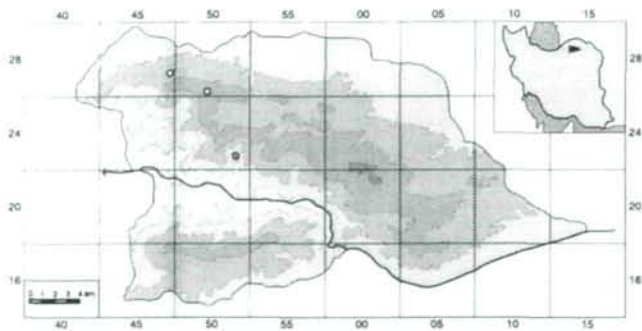
Map 498. *Jasminum fruticans* L.



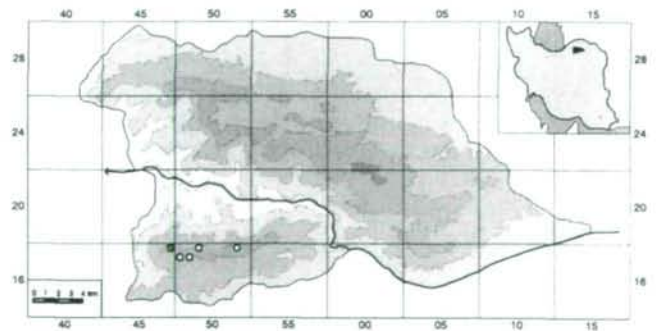
Map 499. *Circaea lutetiana* L.



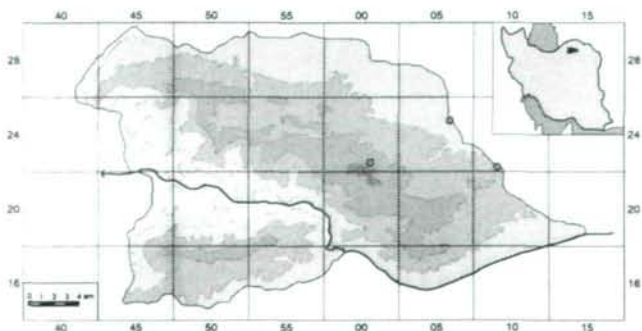
Map 500. *Epilobium hirsutum* L.



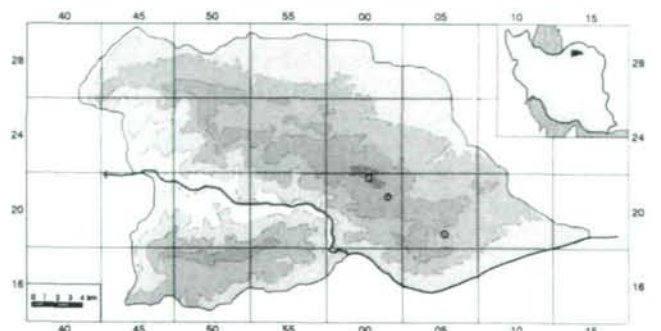
Map 501. *Epilobium montanum* L.



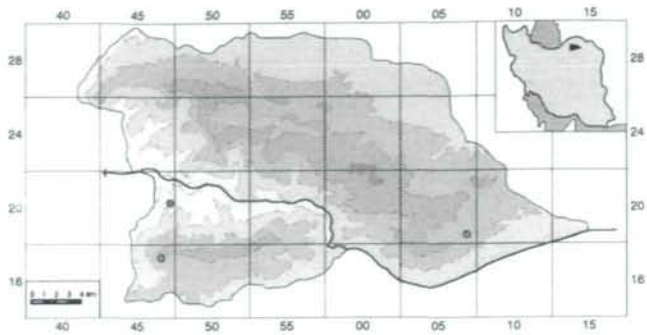
Map 502. *Epilobium rechingeri* P. H. Raven



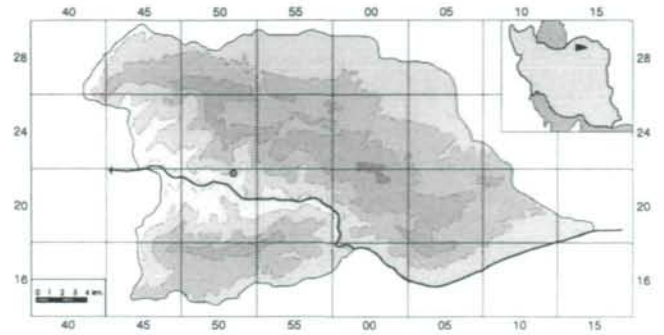
Map 503. *Orobanche alba* Stephan



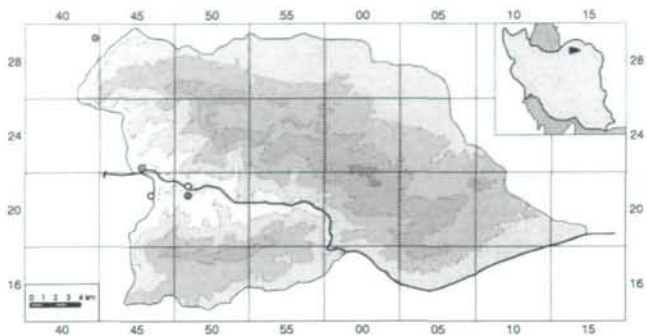
Map 504. *Orobanche coelestis* (Reuter) G. Beck



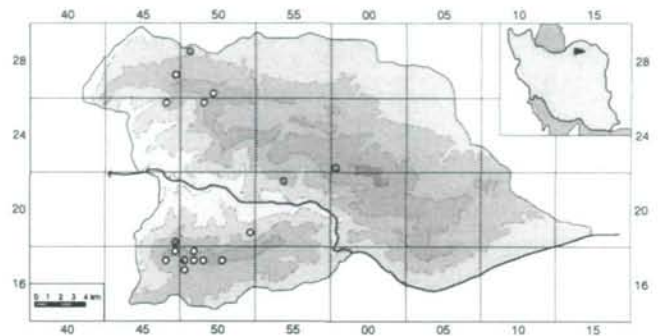
Map 505. *Orobanche mutellii* F. Schultz



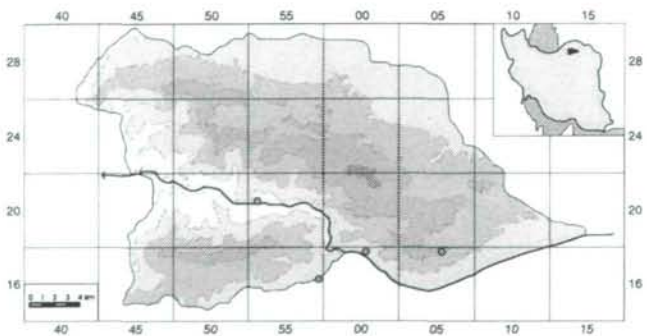
Map 506. *Orobanche orientalis* G. Beck



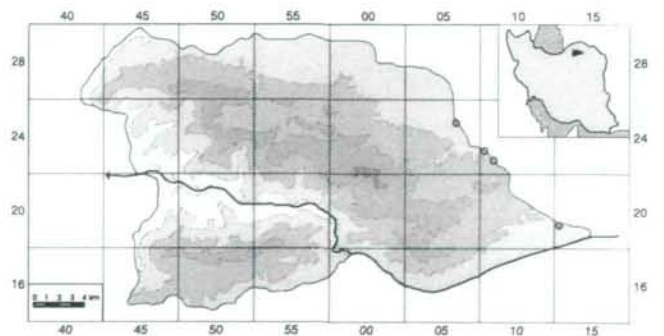
Map 507. *Oxalis corniculata* L.



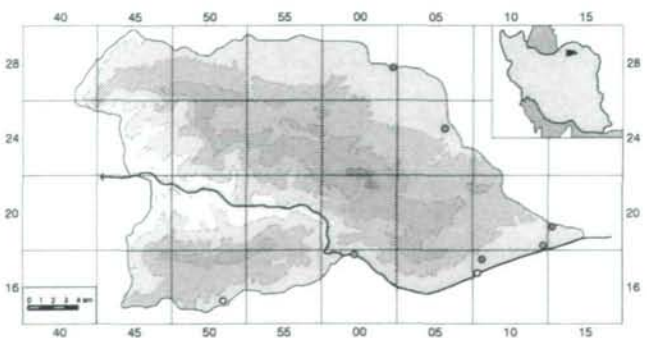
Map 508. *Paeonia wittmanniana* Hartwiss ex Lindl.



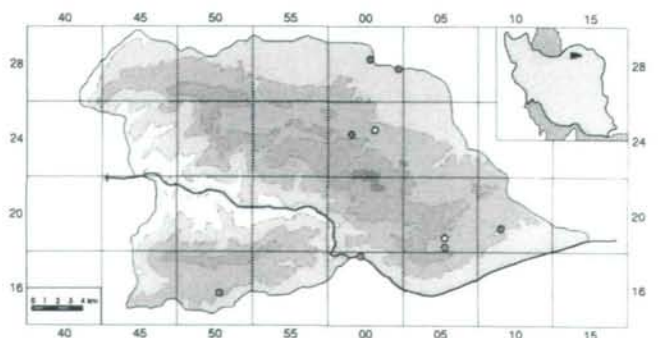
Map 509. *Glaucium elegans* Fisch. & C. A. Mey.



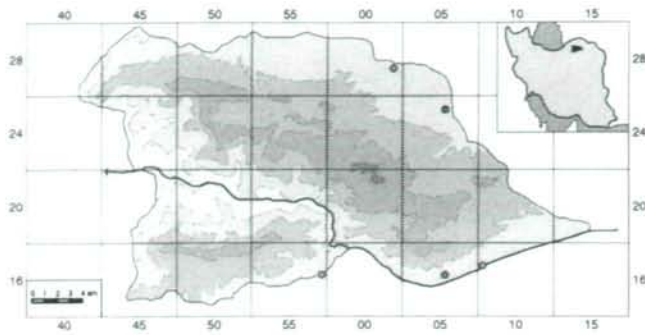
Map 510. *Glaucium oxylobum* Boiss. & Buhse, s. l.



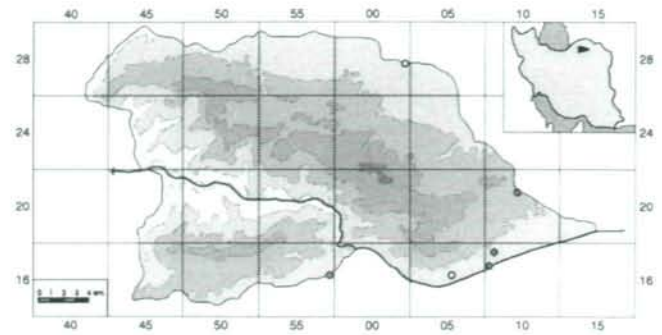
Map 511. *Hypecoum pendulum* L.



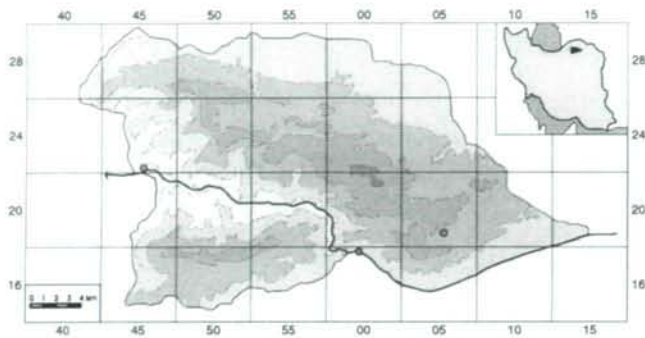
Map 512. *Papaver dubium* L. subsp. *erosum* (Litv.) Kadereit



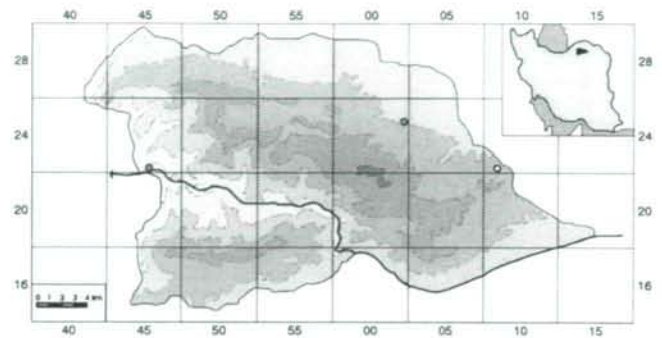
Map 513. *Papaver pavonicum* Fisch. & C. A. Mey.



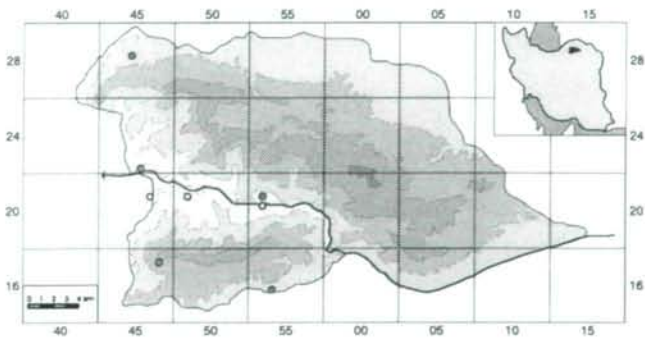
Map 514. *Roemeria hybrida* (L.) DC. subsp. *dodecandra* (Forssk.) Maire



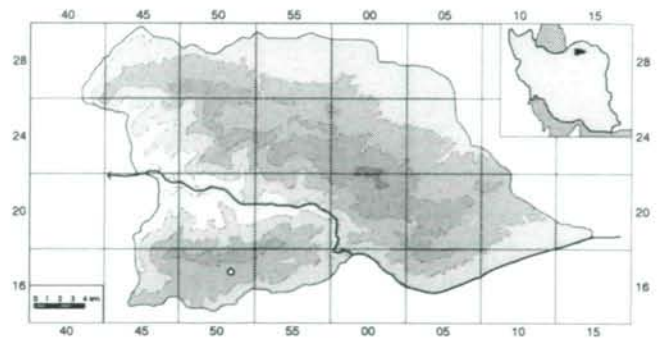
Map 515. *Roemeria refracta* DC., s. l.



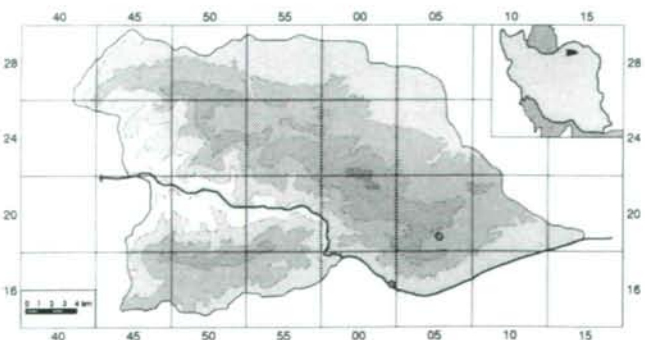
Map 516. *Plantago lanceolata* L.



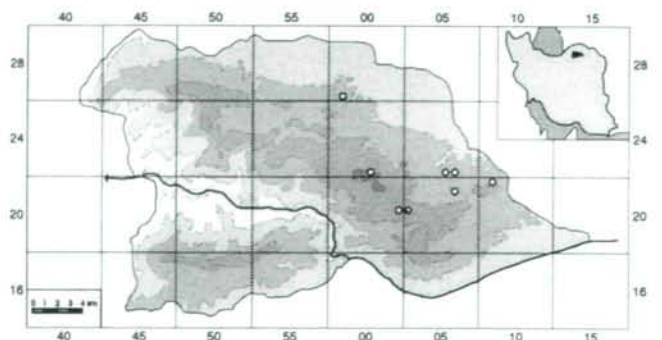
Map 517. *Plantago major* L.



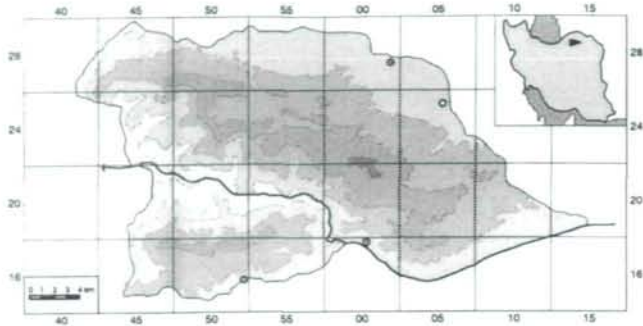
Map 518. *Plantago podlechii* Akhani



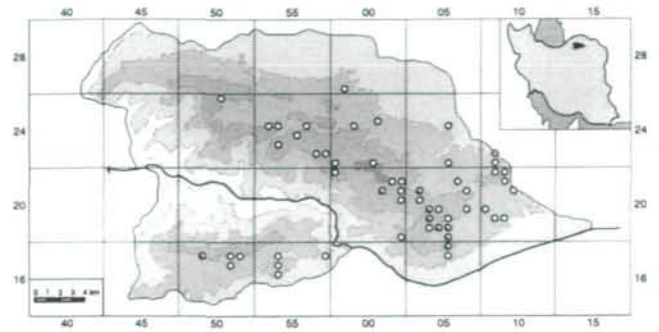
Map 519. *Acantholimon edmondsonii* Rech. f. & Schiman-Czeika



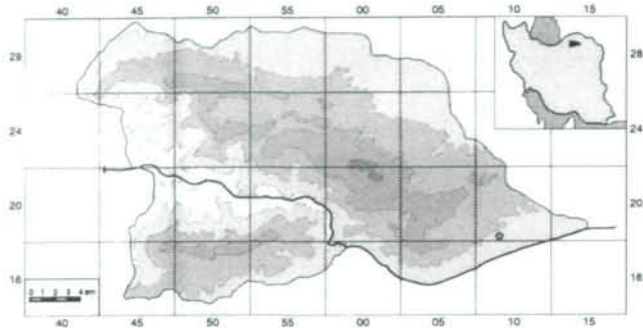
Map 520. *Acantholimon embergeri* Mobayen



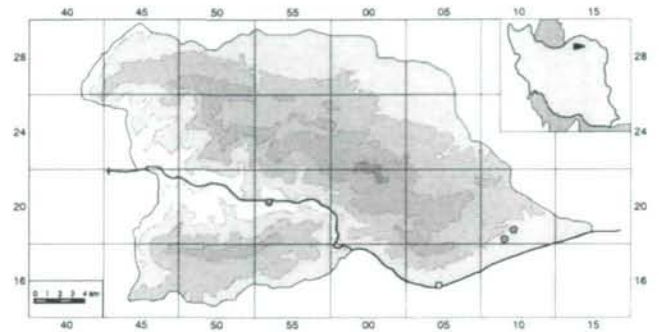
Map 521. *Acantholimon pterostegium* Bunge



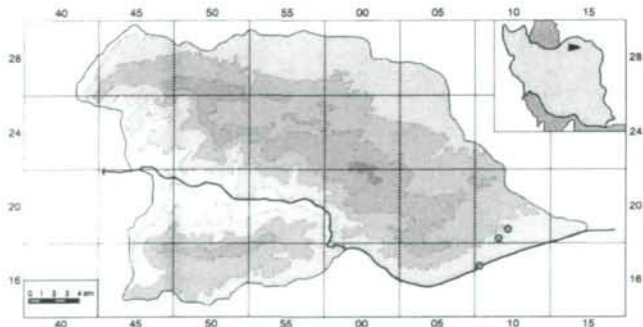
Map 522. *Acantholimon raddeanum* Czerniak.



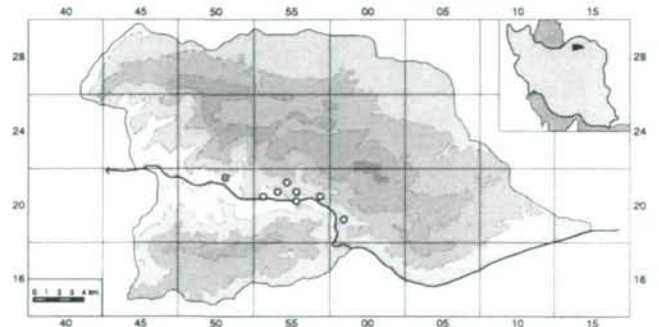
Map 523. *Acantholimon rudbaricum* (Bornm.) Bornm.



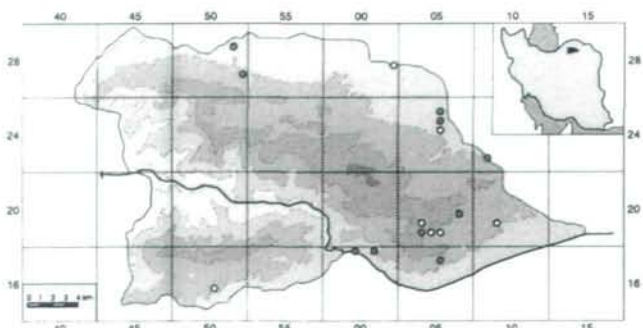
Map 524. *Limonium gmelinii* (Willd.) Kuntze



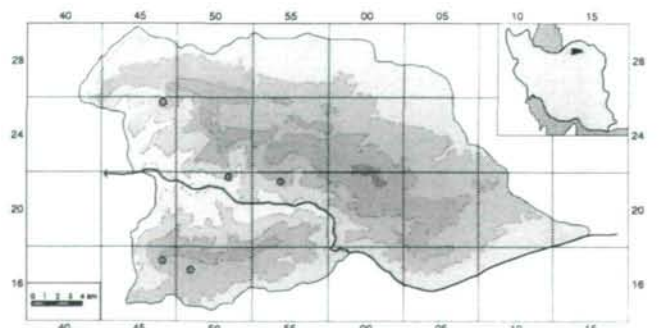
Map 525. *Limonium suffruticosum* (L.) Kuntze



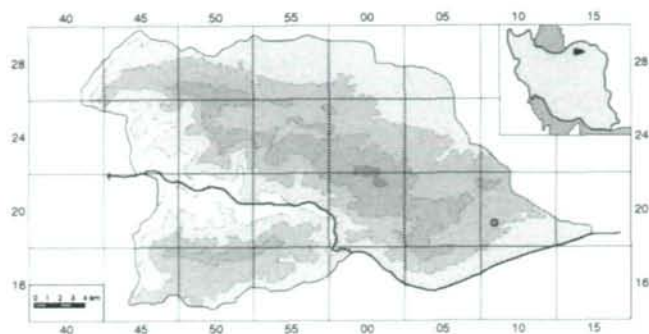
Map 526. *Plumbago europaea* L.



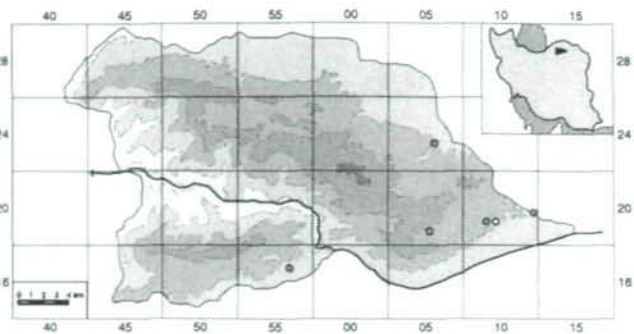
Map 527. *Bongardia chrysogonum* (L.) Spach



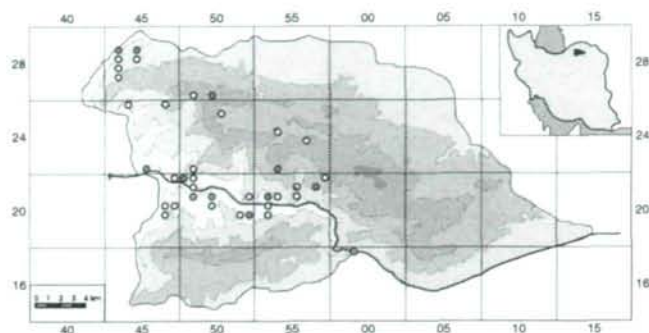
Map 528. *Polygala anatolica* Boiss. & Heldr.



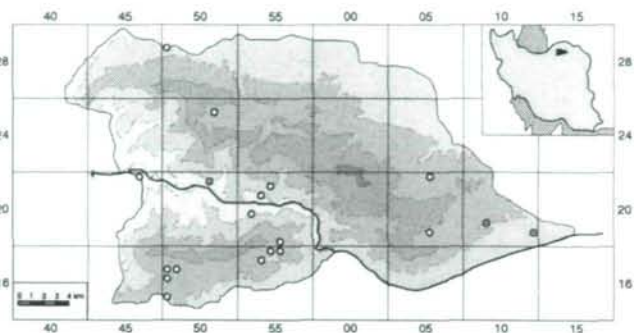
Map 529. *Atraphaxis seravschanica* Pavlov



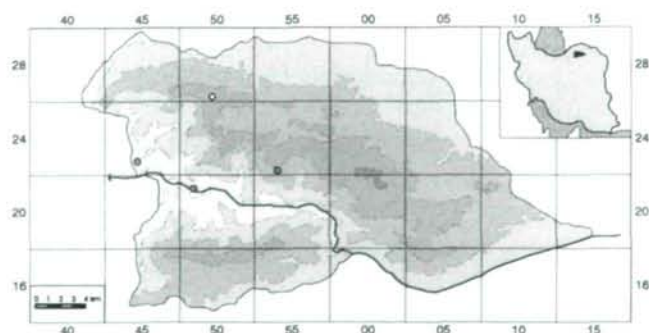
Map 530. *Atraphaxis spinosa* L.



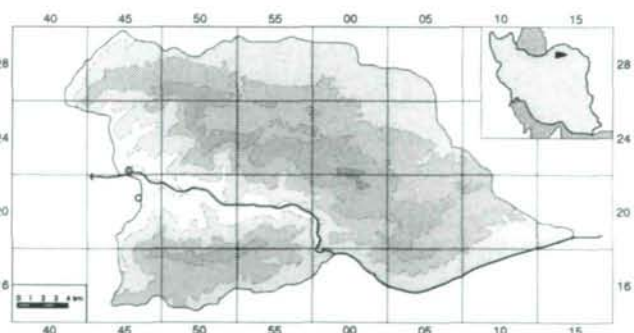
Map 531. *Polygonum convolvulus* L.



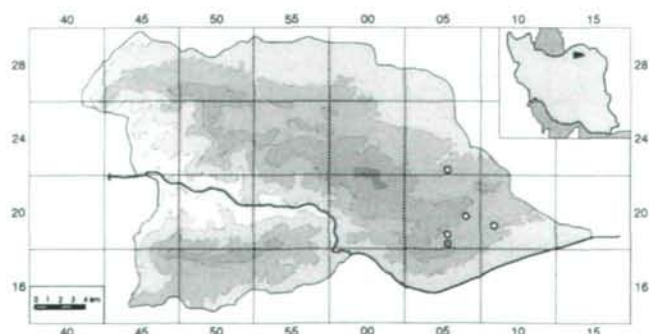
Map 532. *Polygonum hyrcanicum* Rech. f.



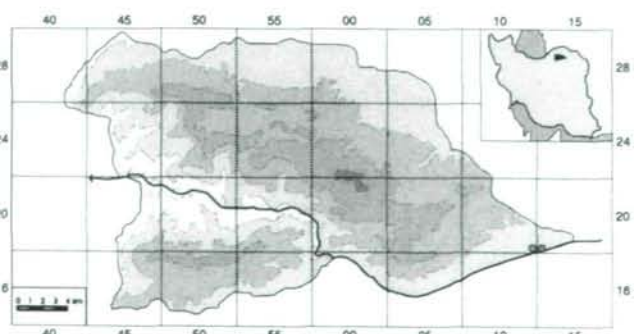
Map 533. *Polygonum patulum* M. Bieb.



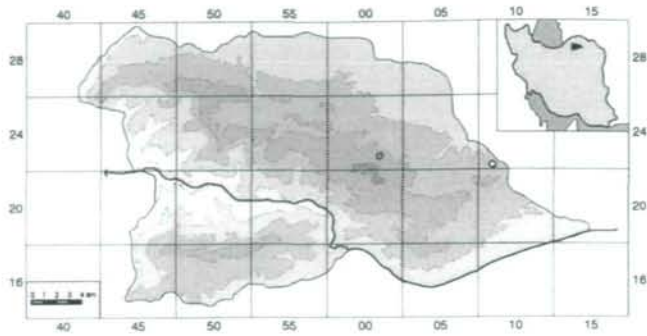
Map 534. *Polygonum persicaria* L.



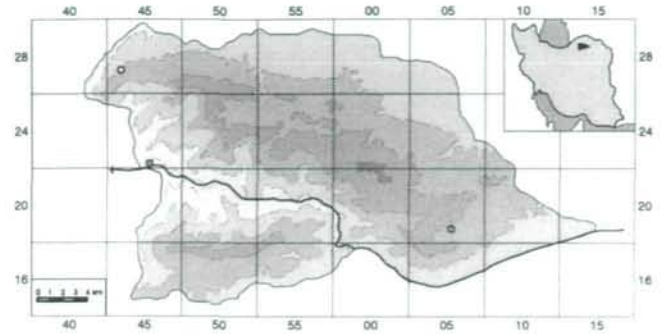
Map 535. *Polygonum thymifolium* Jaub. & Spach



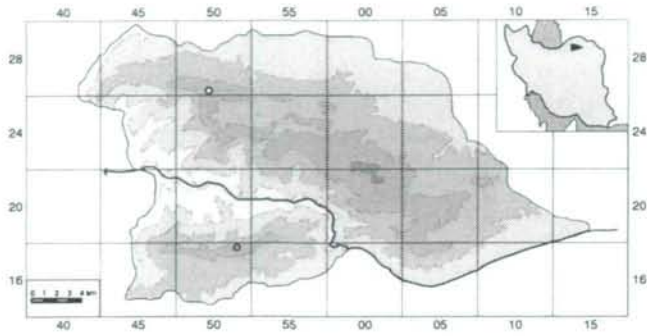
Map 536. *Rheum turkestanicum* Janisch.



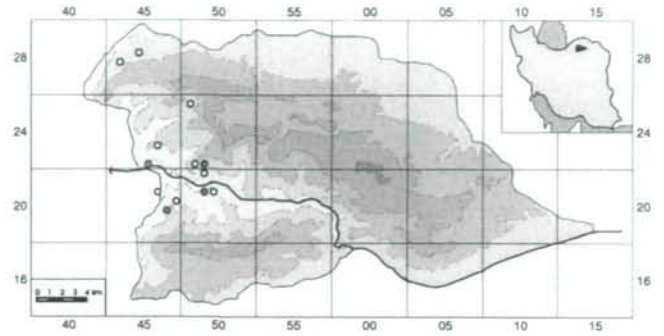
Map 537. *Rumex caucasicus* Rech. f.



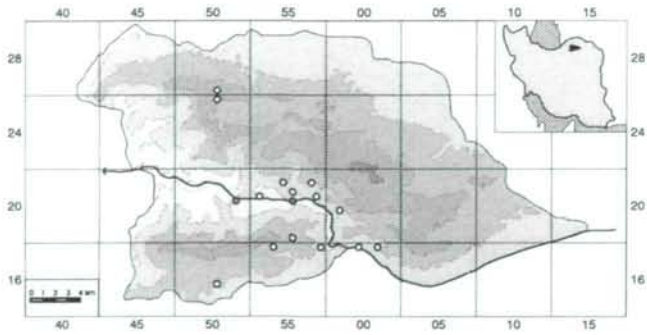
Map 538. *Rumex crispus* L.



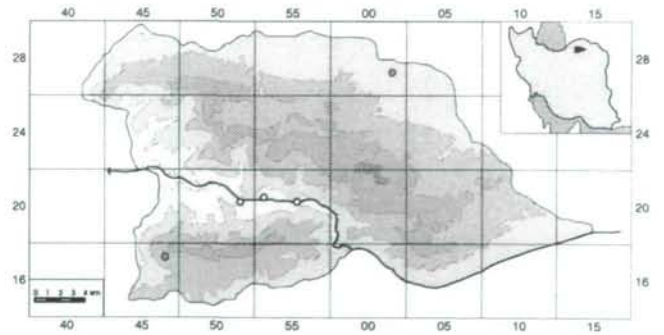
Map 539. *Rumex obtusifolius* L. subsp. *subalpinus* (Schur) Celak



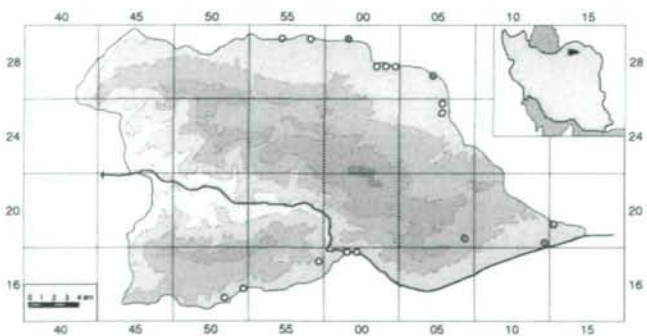
Map 540. *Rumex sanguinus* L.



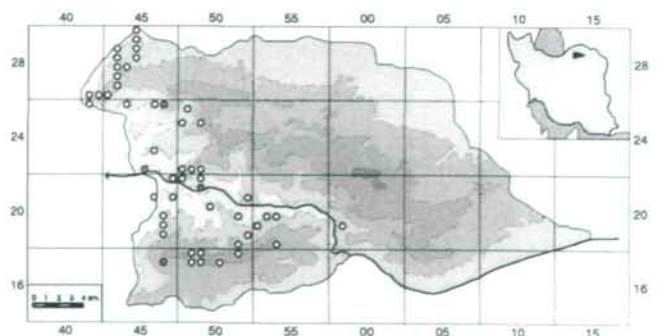
Map 541. *Rumex tuberosus* L. subsp. *turcomanicus* Rech. f.



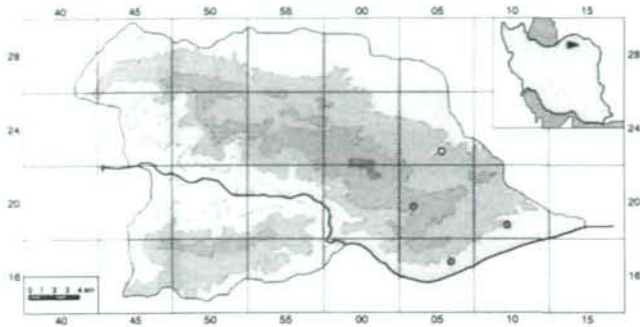
Map 542. *Anagallis arvensis* L.



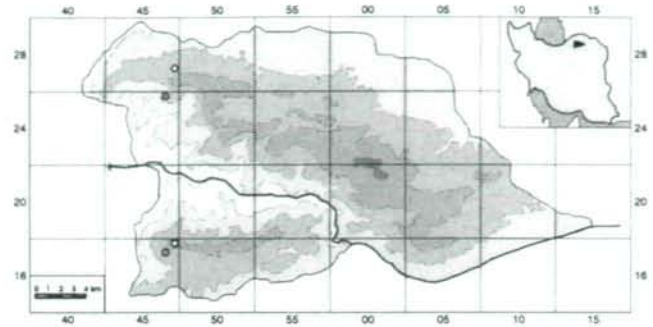
Map 543. *Androsace maxima* L.



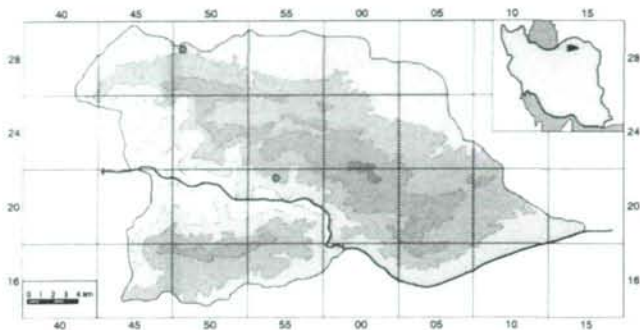
Map 544. *Primula heterochroma* Stapf



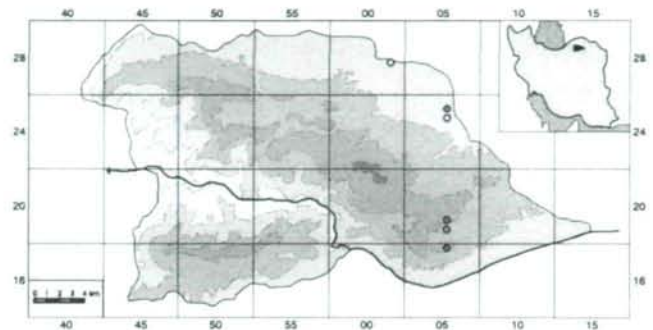
Map 545. *Samolus valerandi* L.



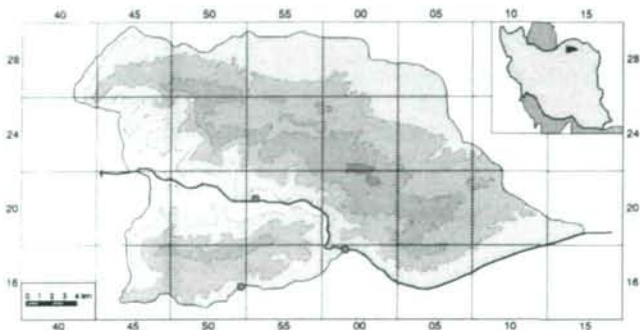
Map 546. *Actaea spicata* L.



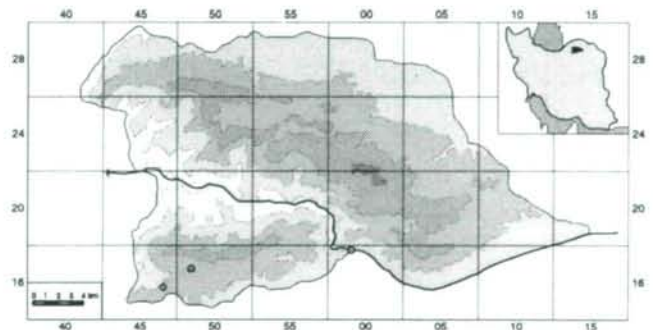
Map 547. *Anemone caucasica* Willd. ex Rupr.



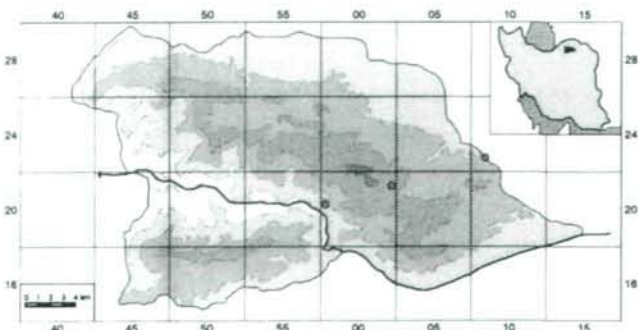
Map 548. *Ceratocephala falcata* (L.) Pers.



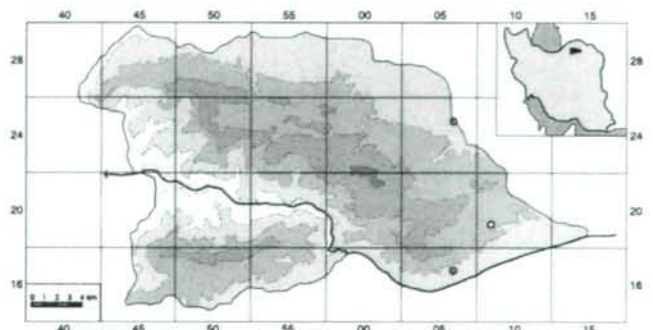
Map 549. *Consolida orientalis* (Gay) Schröd.



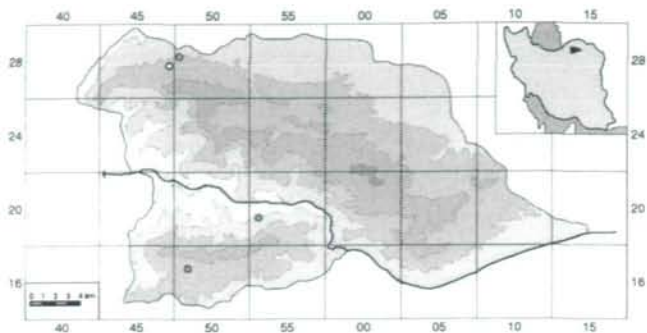
Map 550. *Consolida teheranica* (Boiss.) Rech. f.



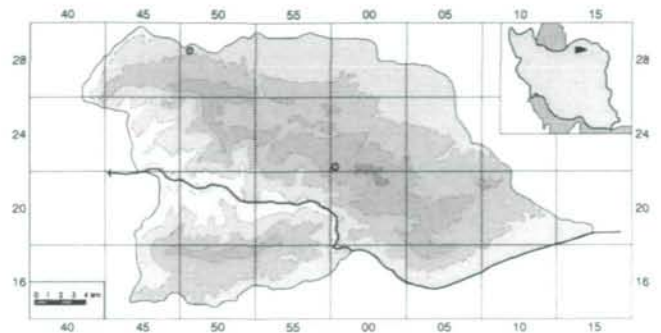
Map 551. *Delphinium biternatum* Huth



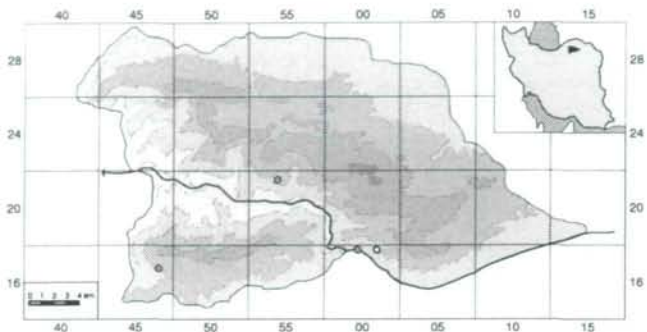
Map 552. *Delphinium turkmenum* Lipsky



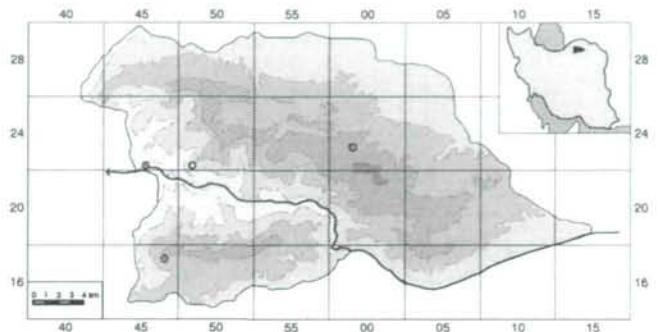
Map 553. *Delphinium ursinum* Rech. f.



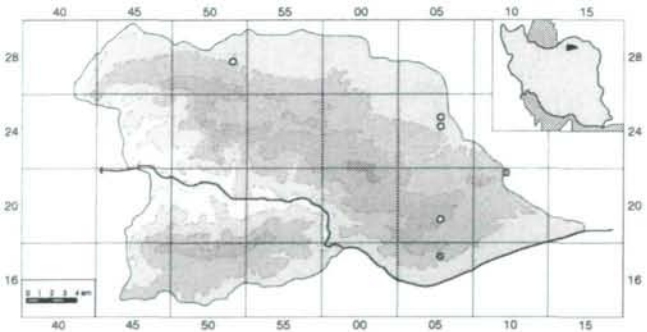
Map 554. *Ficaria kochii* (Ledeb.) Iranshahr & Rech. f.



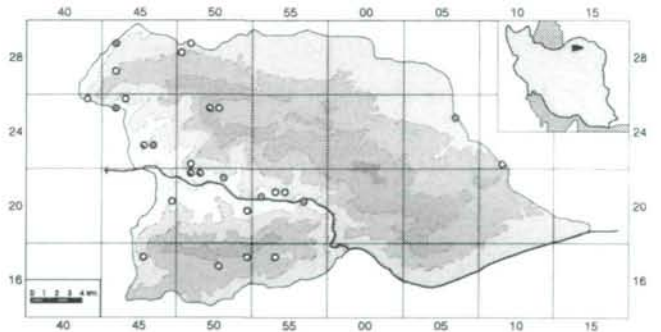
Map 555. *Ranunculus cicutarius* Schlttdl.



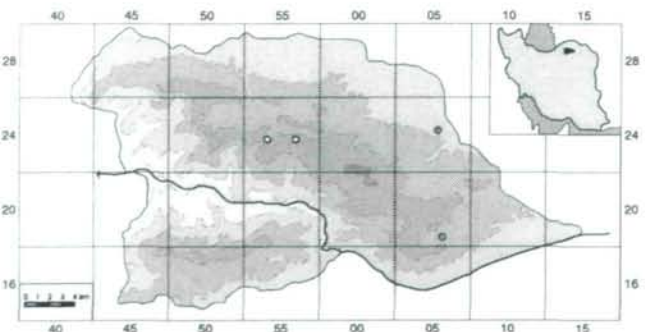
Map 556. *Ranunculus polyanthemus* L.



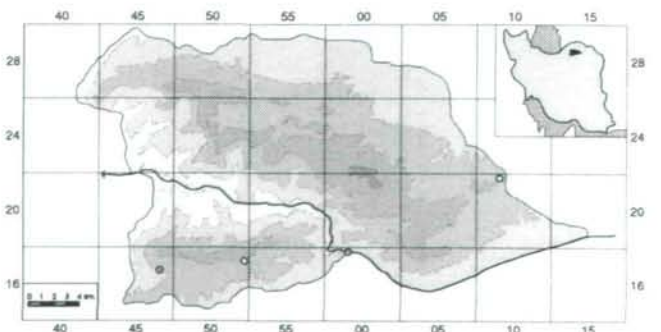
Map 557. *Thalictrum isopyroides* C. A. Mey.



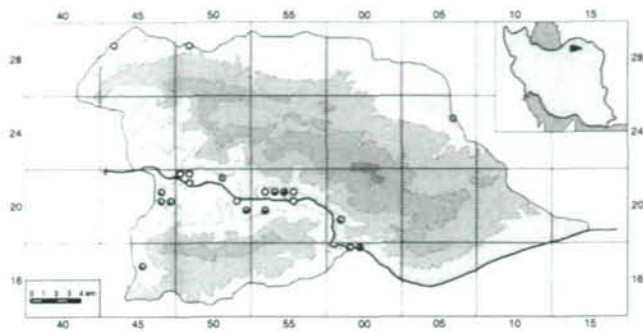
Map 558. *Thalictrum minus* L.



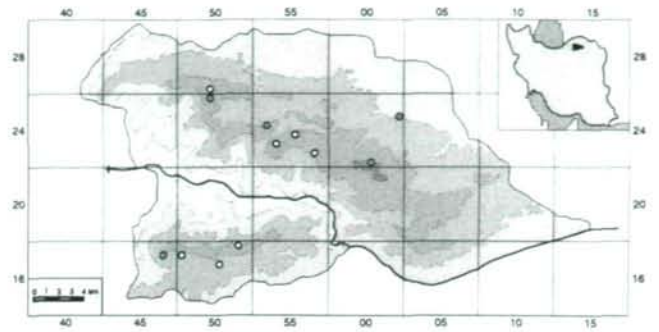
Map 559. *Thalictrum sultanabadense* Stapf



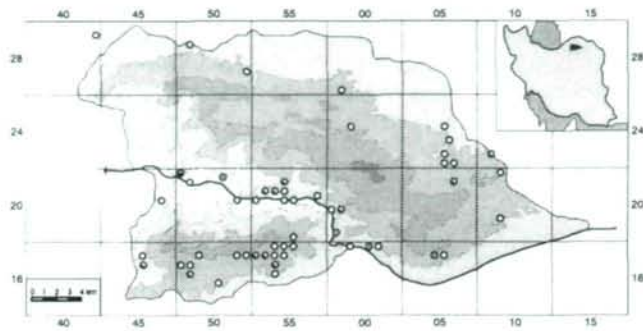
Map 560. *Reseda lutea* L.



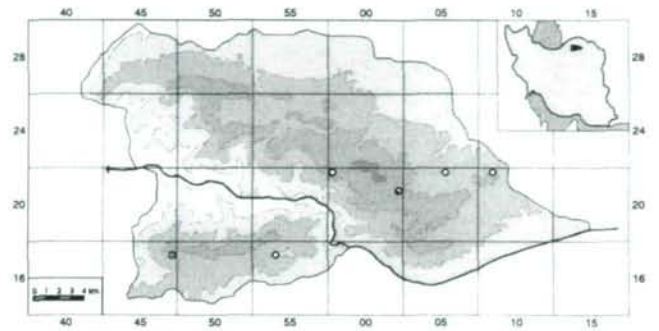
Map 561. *Paliurus spina-christi* Mill.



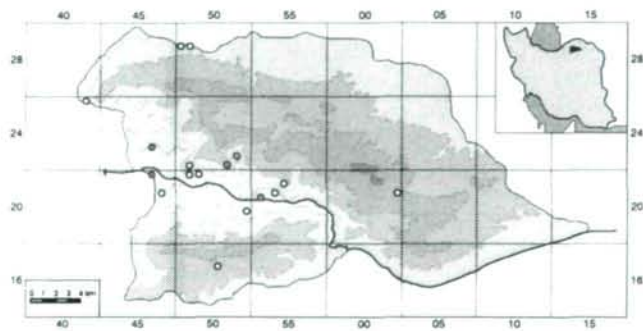
Map 562. *Rhamnus cathartica* L.



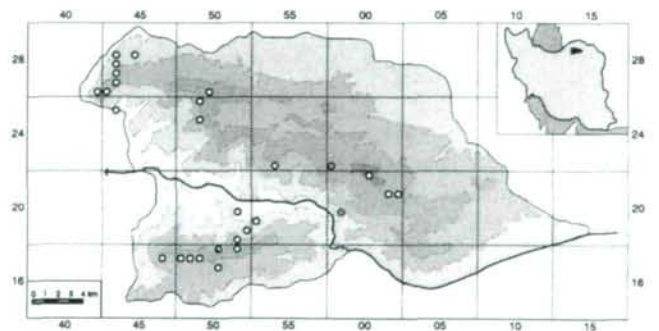
Map 563. *Rhamnus pallasii* Fisch. & C. A. Mey.



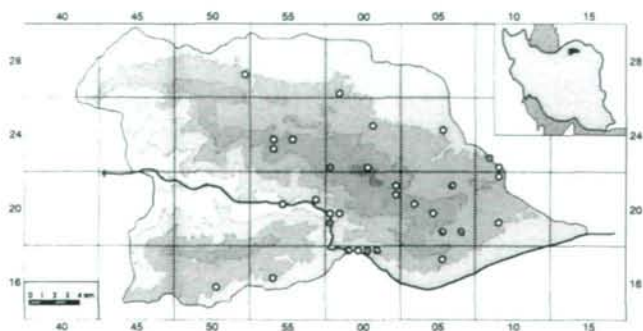
Map 564. *Rhamnus spathulifolia* Fisch. & C. A. Mey.



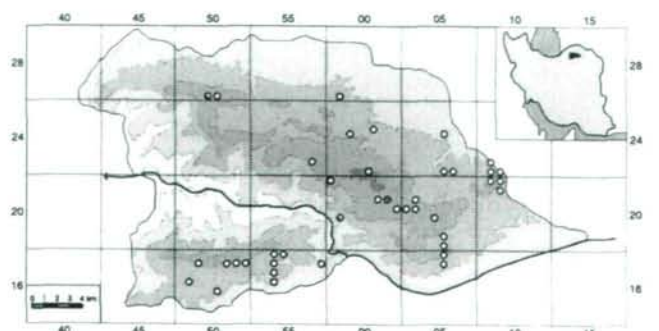
Map 565. *Agrimonia eupatoria* L.



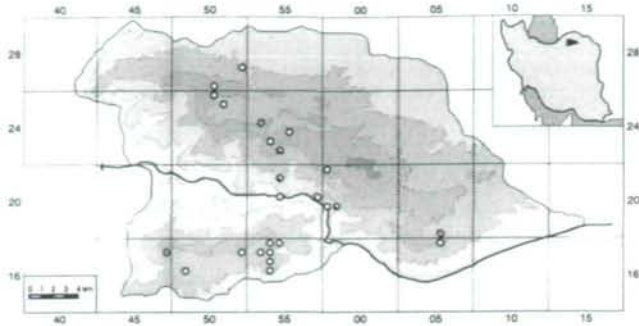
Map 566. *Cerasus avium* (L.) Moench



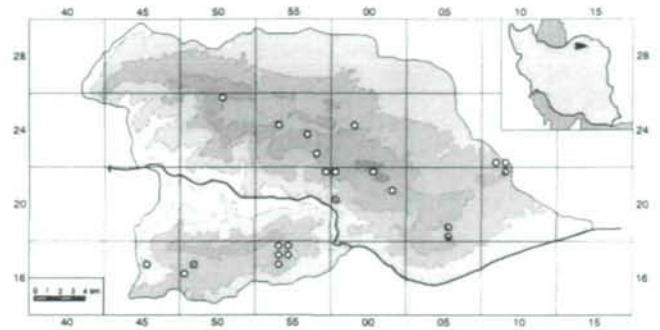
Map 567. *Cerasus microcarpa* (C. A. Mey.) Boiss.



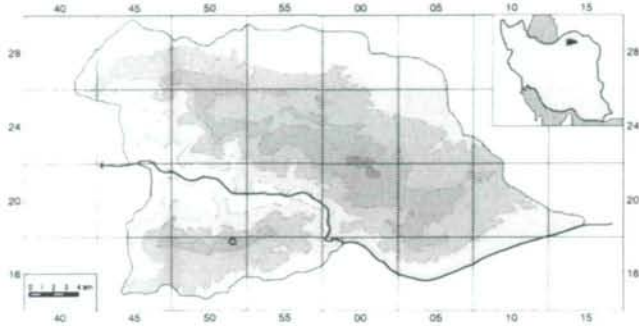
Map 568. *Cerasus pseudoprostrata* Pojark.



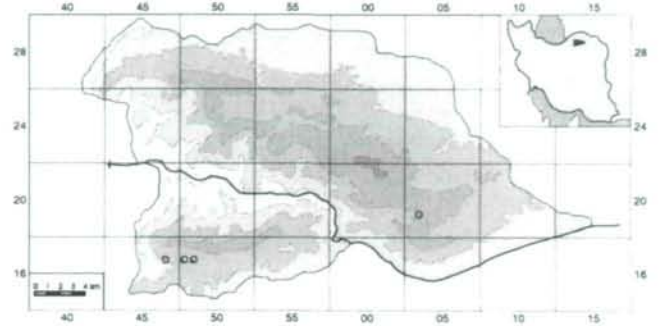
Map 569. *Cotoneaster nummularius* Fisch. & C. A. Mey.



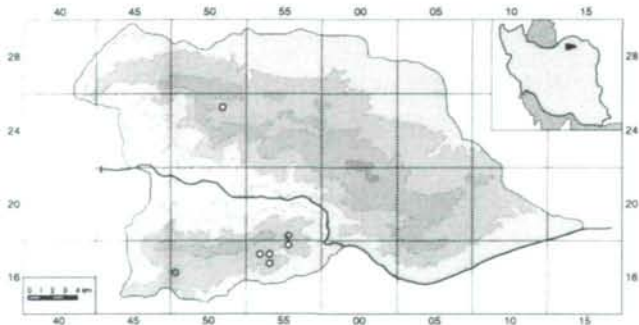
Map 570. *Cotoneaster ovatus* Pojark.



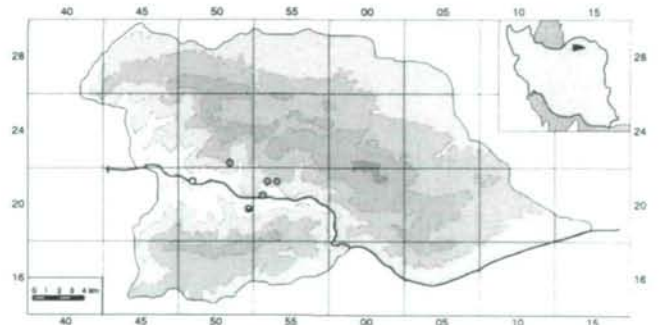
Map 571. *Cotoneaster multiflorus* Bunge



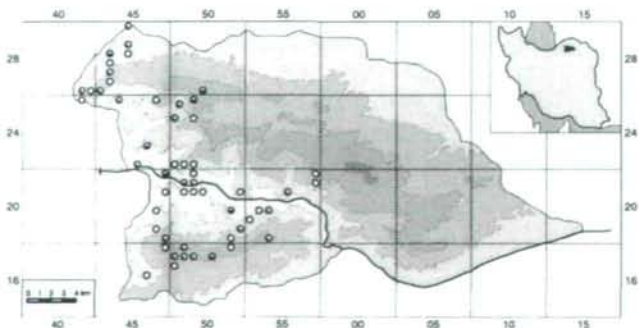
Map 572. *Crataegus ambigua* Meyer ex Becker subsp. *ambigua*



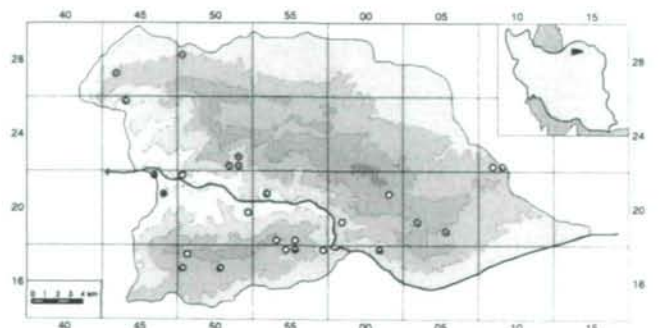
Map 573. *Crataegus azarolus* L. var. *pontica* (K. Koch) K. I. Chr.



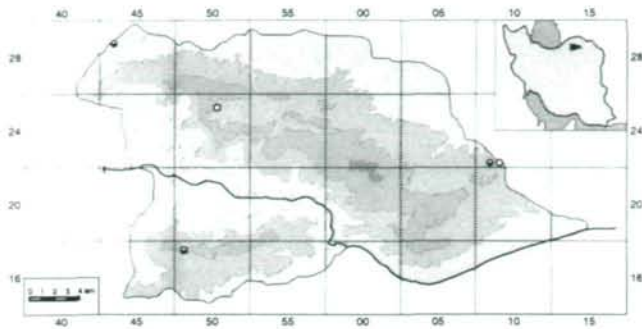
Map 574. *Crataegus kurdestanica* Hadac & Chrtek



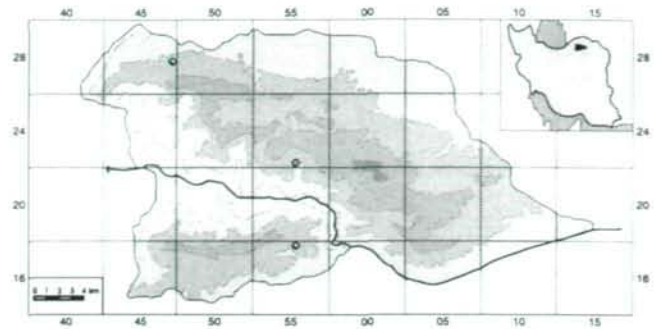
Map 575. *Crataegus microphylla* Koch (partly mixed with *C. pseudoheterophylla* and *C. kurdestanica*!)



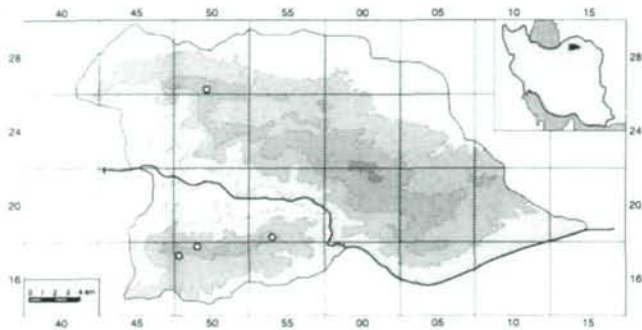
Map 576. *Crataegus pentagyna* Waldst. & Kit. ex Willd. subsp. *pentagyna*



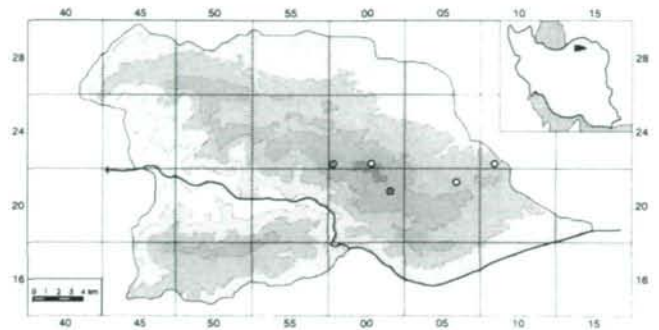
Map 577. *Crataegus pseudoheterophylla* Pojark. subsp. *pseudoheterophylla*



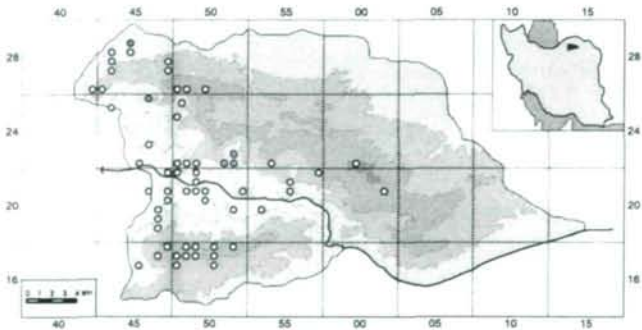
Map 578. *Crataegus pseudoheterophylla* Pojark. subsp. *turkestanica* (Pojark.) K. I. Chr.



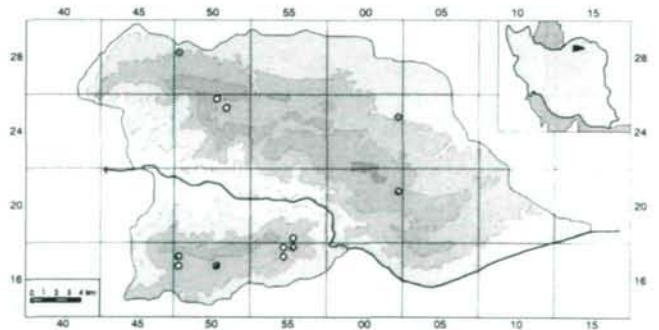
Map 579. *Fragaria vesca* L.



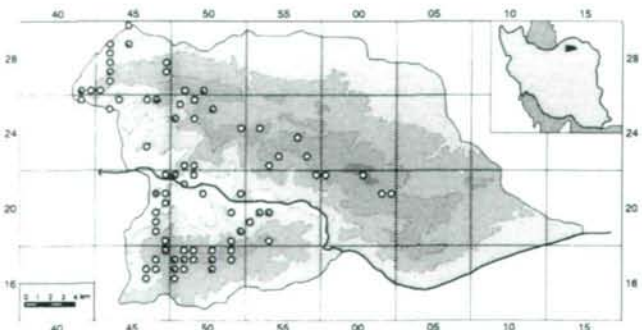
Map 580. *Geum heterocarpum* Boiss.



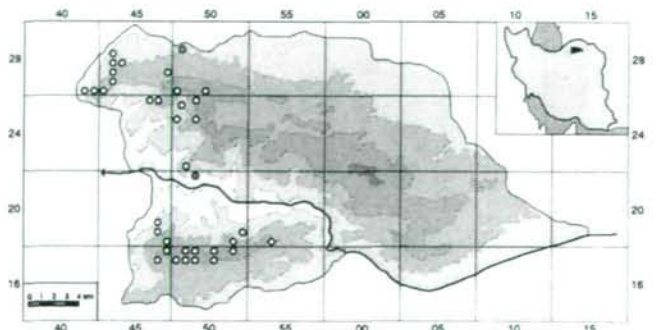
Map 581. *Geum urbanum* L.



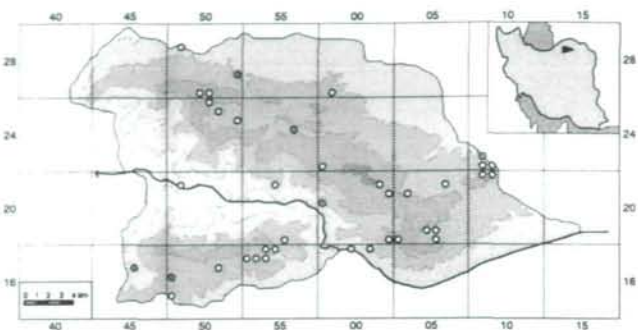
Map 582. *Malus orientalis* Uglitzk.



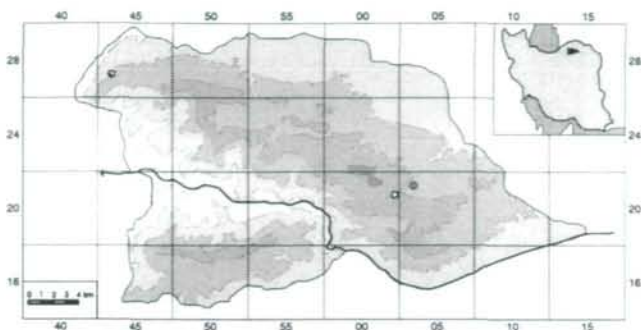
Map 583. *Mespilus germanica* L.



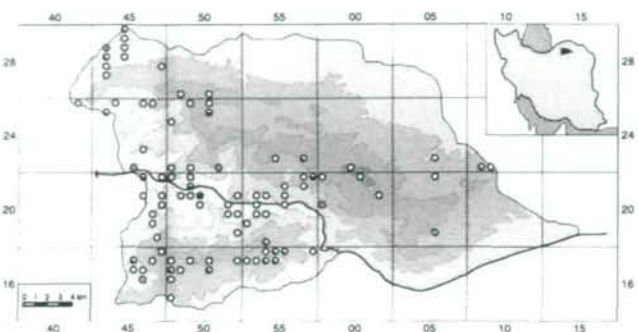
Map 584. *Potentilla micrantha* Ramond



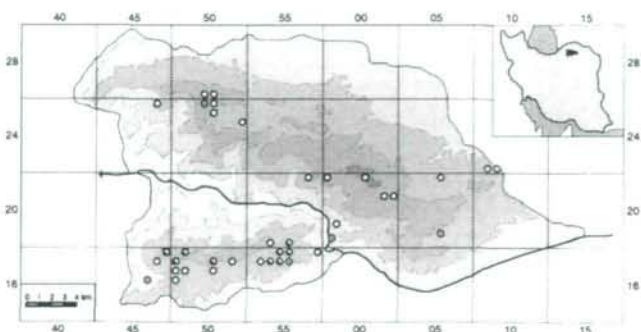
Map 585. *Potentilla recta* L., s. l.



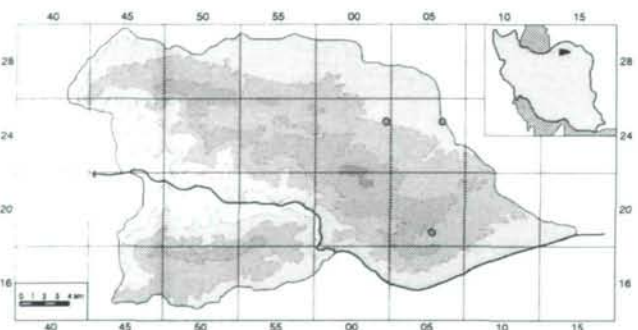
Map 586. *Potentilla reptans* L.



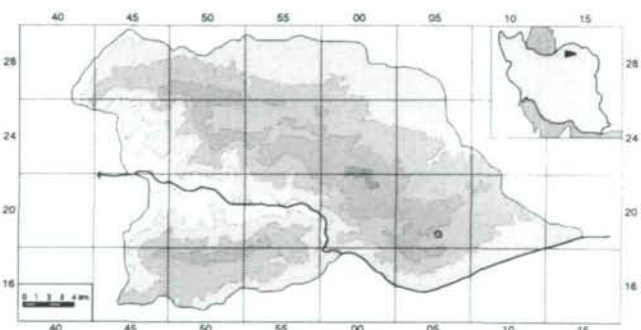
Map 587. *Prunus divaricata* Ledeb.



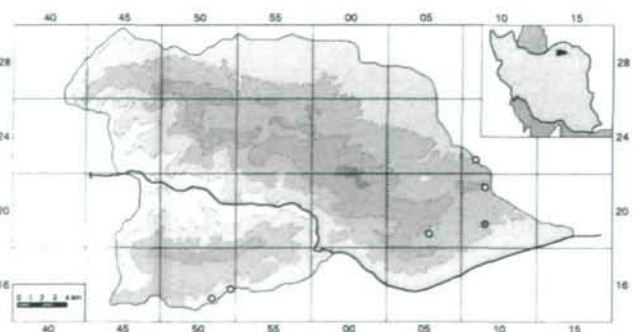
Map 588. *Pyrus boissieriana* Buhse



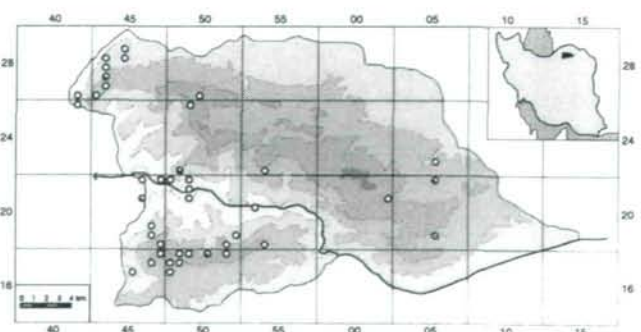
Map 589. *Rosa beggeriana* Schrenk



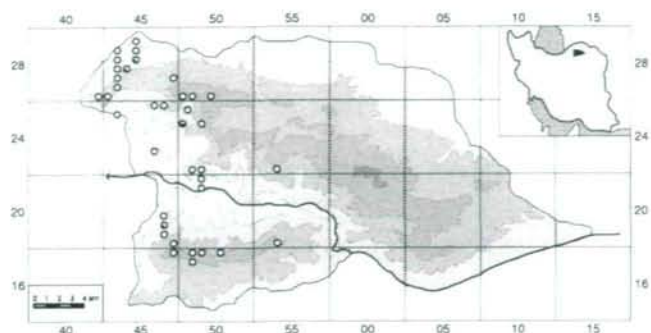
Map 590. *Rosa canina* L.



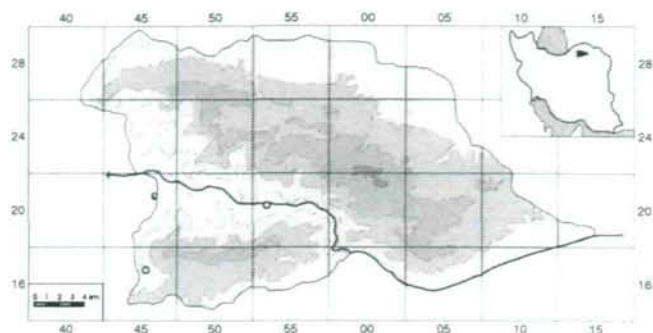
Map 591. *Rosa persica* Michx. ex Juss.



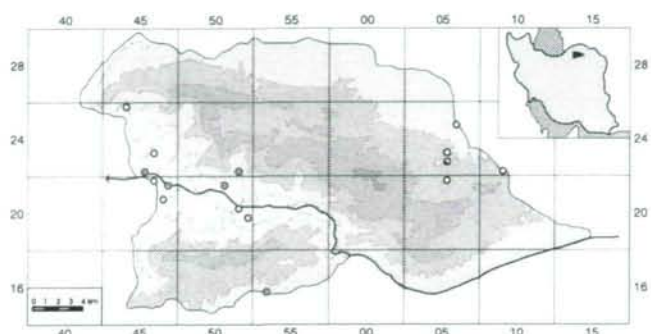
Map 592. *Rubus caesius* L.



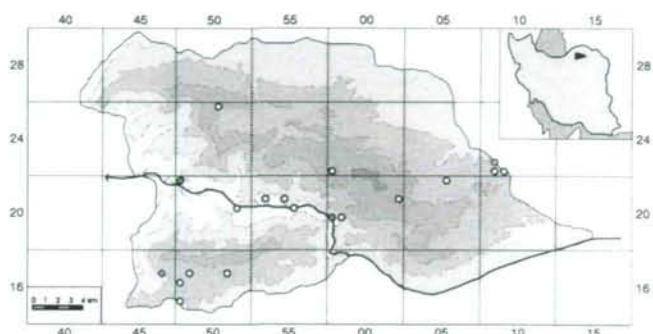
Map 593. *Rubus dolichocarpus* Juz.



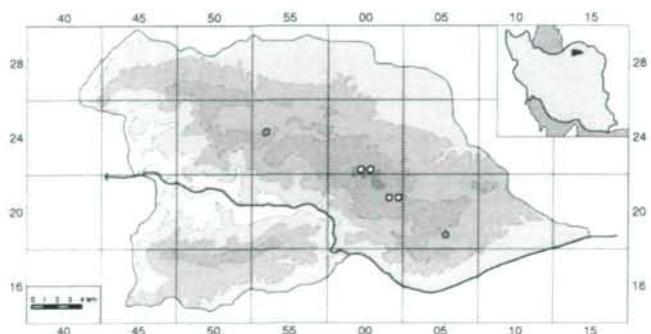
Map 594. *Rubus raddeanus* Focke



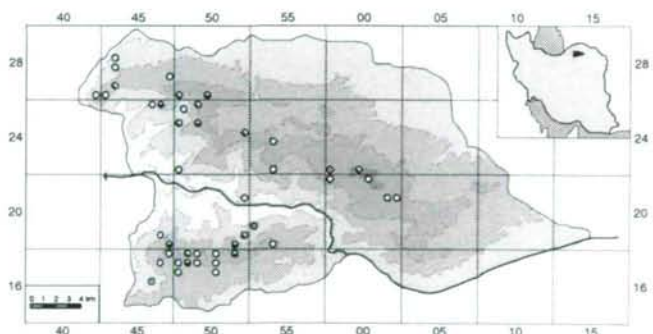
Map 595. *Rubus sanctus* Schreb.



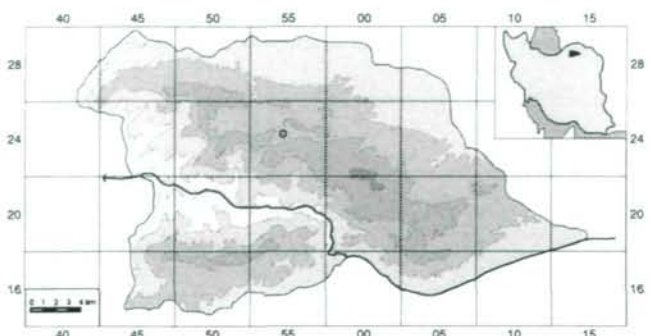
Map 596. *Sanguisorba minor* Scop.



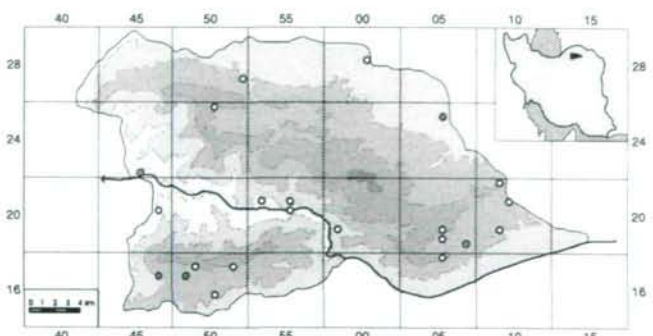
Map 597. *Sorbus persica* Hedl.



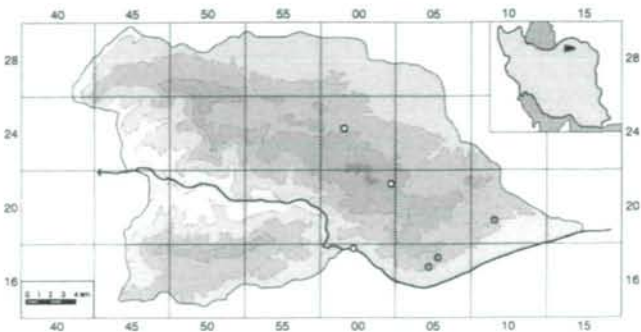
Map 598. *Sorbus torminalis* (L.) Crantz



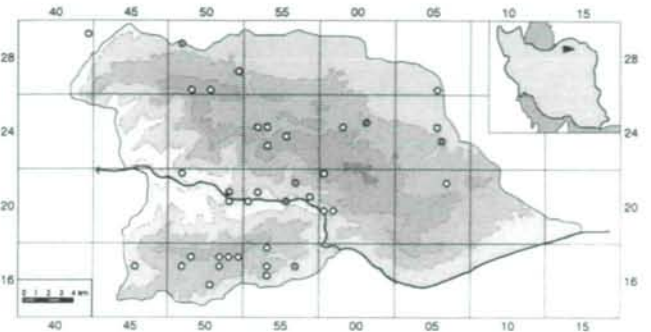
Map 599. *Spiraea hypericifolia* L.



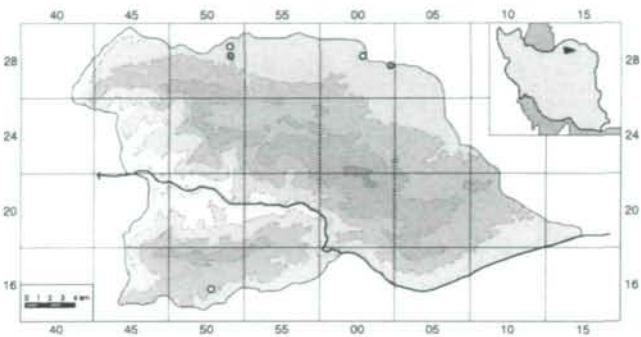
Map 600. *Asperula arvensis* L.



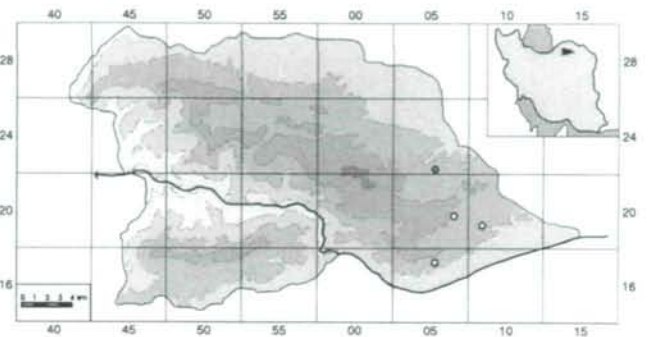
Map 601. *Asperula glomerata* (M. Bieb.) Griseb.



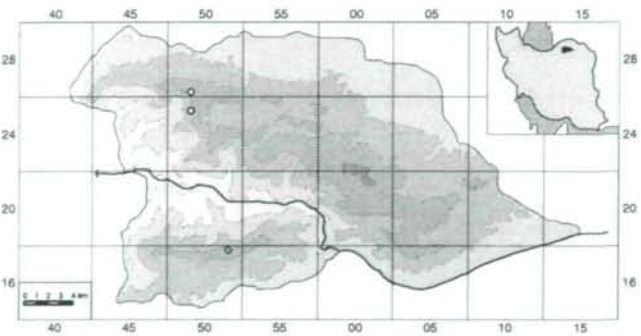
Map 602. *Asperula gorganica* Schönb.-Tem. & Ehrend.



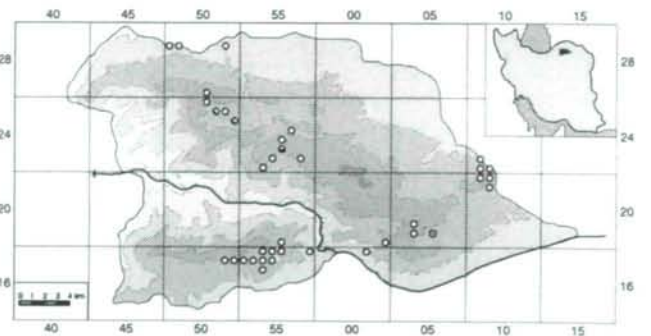
Map 603. *Callipeltis cucullaris* (L.) Rothm.



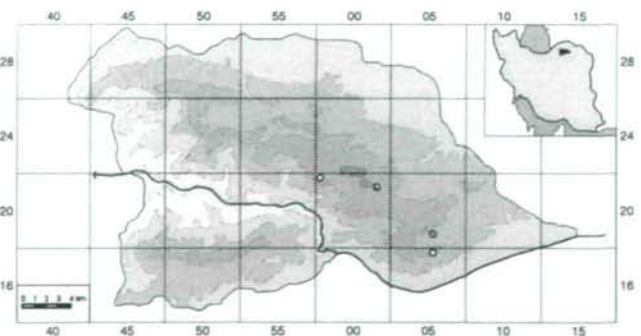
Map 604. *Crucianella gilanica* Trin. subsp. *transcaspica* (Ehrend.) Ehrend. & Schönb.-Tem.



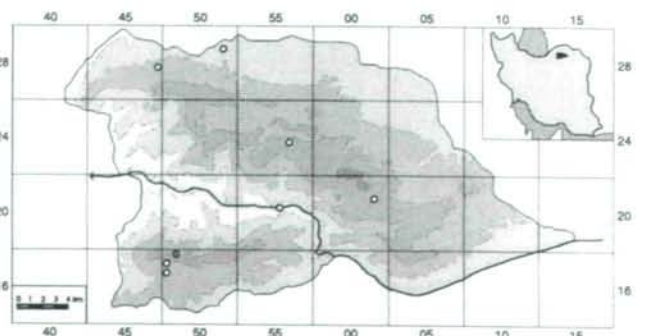
Map 605. *Crucianella platyphylla* Ehrend. & Schönb.-Tem.



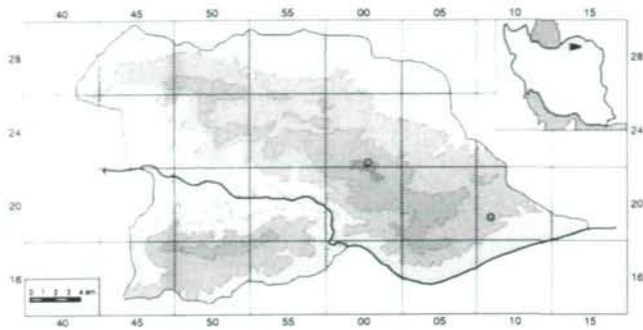
Map 606. *Crucianella sintenisii* Bornm.



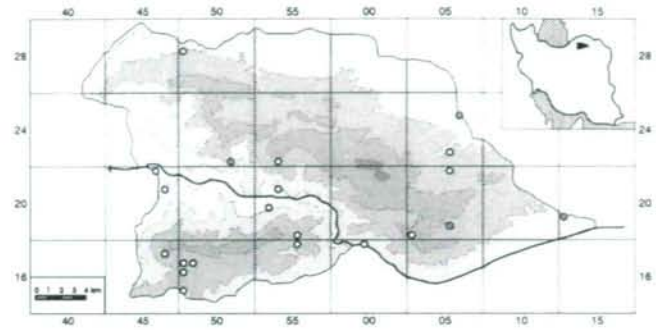
Map 607. *Cruciata taurica* (Pall. ex Willd.) Ehrend.



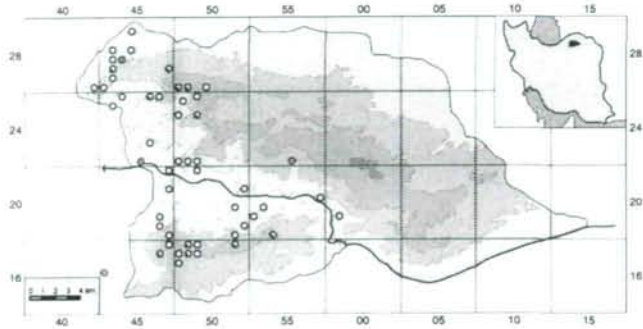
Map 608. *Galium aparine* L.



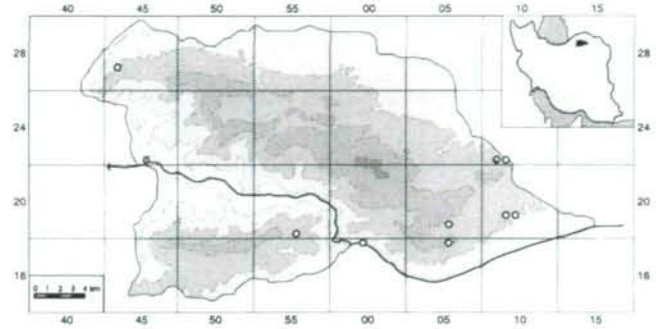
Map 609. *Galium decumbens* (Ehrend.) Ehrend. & Schönbr.-Tem.



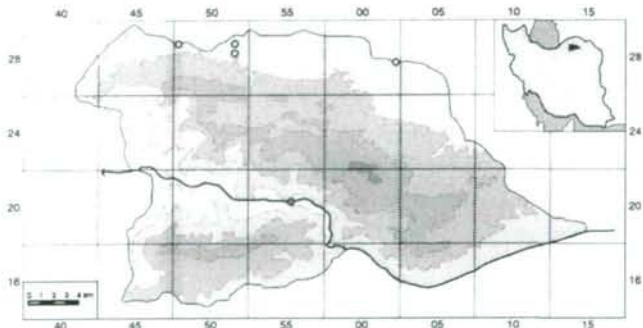
Map 610. *Galium humifusum* M. Bieb.



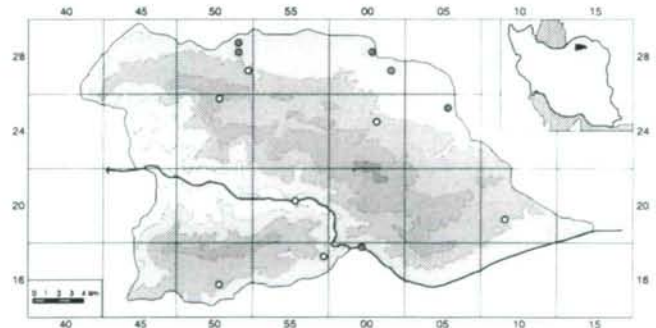
Map 611. *Galium odoratum* (L.) Scop.



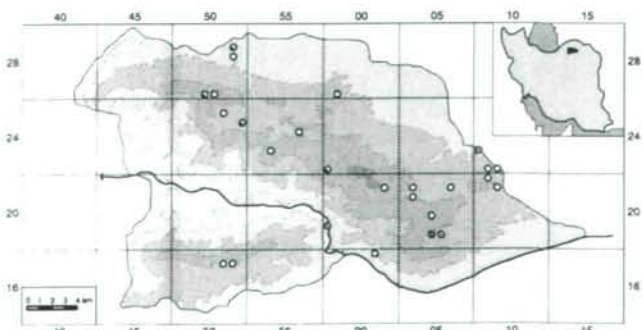
Map 612. *Galium spurium* L., s. l.



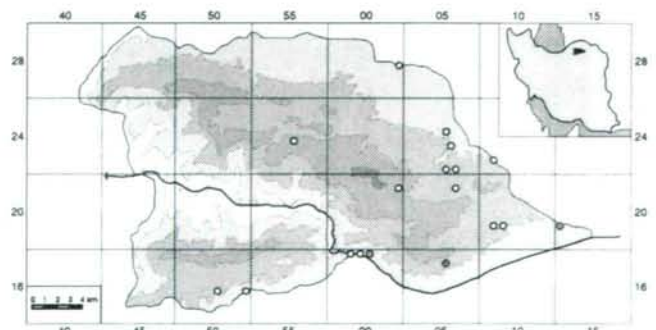
Map 613. *Galium tenuissimum* M. Bieb.



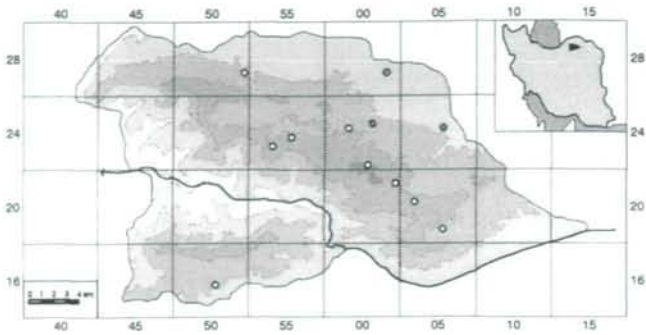
Map 614. *Galium verticillatum* Danth. ex Lam.



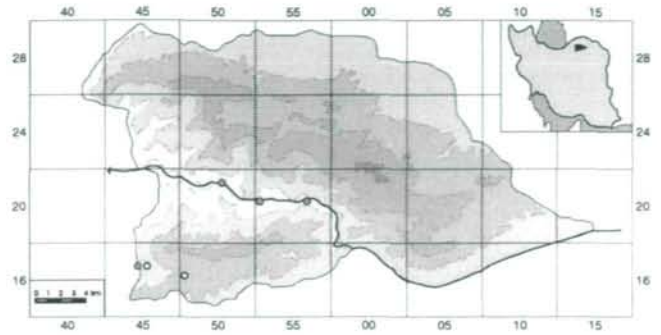
Map 615. *Galium verum* L.



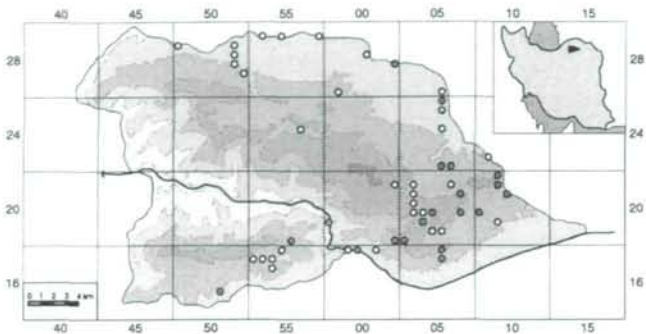
Map 616. *Rubia florida* Boiss.



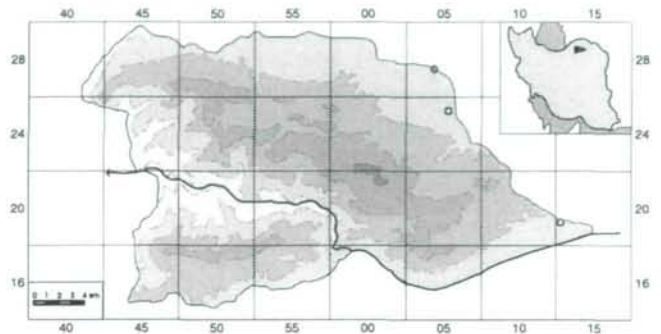
Map 617. *Rubia rechingeri* Ehrend.



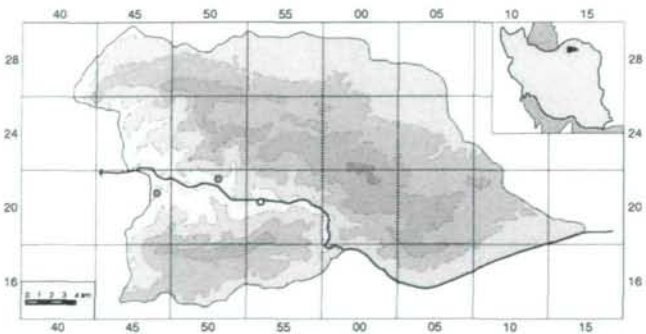
Map 618. *Dictamnus albus* L.



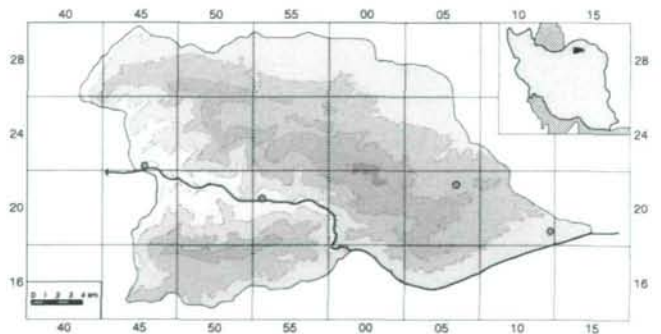
Map 619. *Haplophyllum acutifolium* (DC.) G. Don.



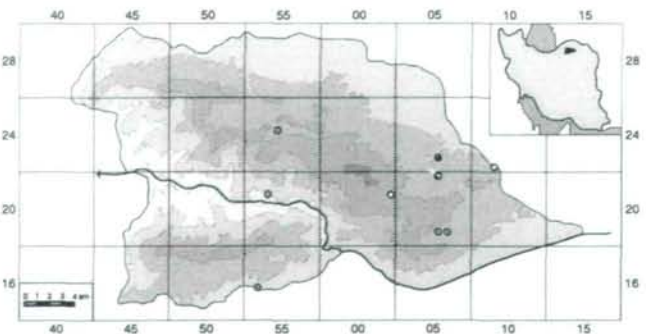
Map 620. *Haplophyllum obtusifolium* (Ledeb.) Ledeb.



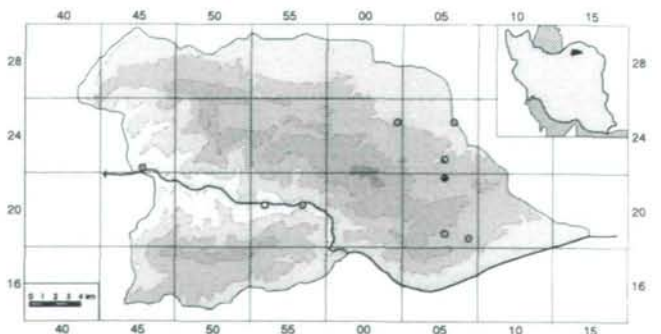
Map 621. *Populus caspica* Bornm.



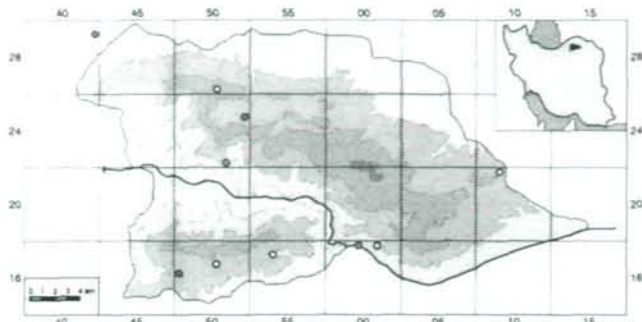
Map 622. *Populus nigra* L.



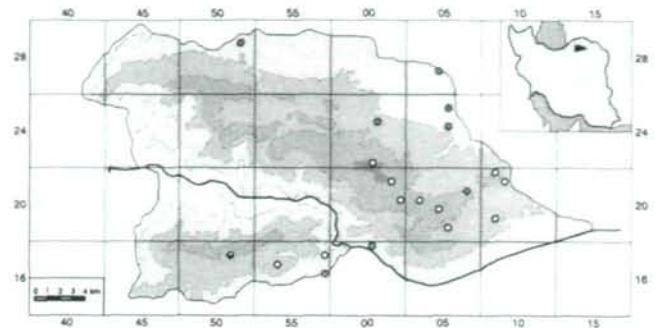
Map 623. *Salix aegyptiaca* L.



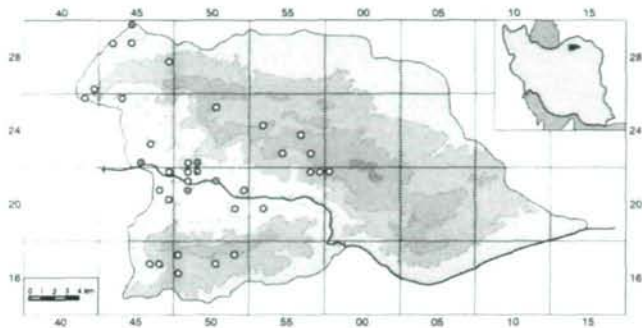
Map 624. *Salix alba* L.



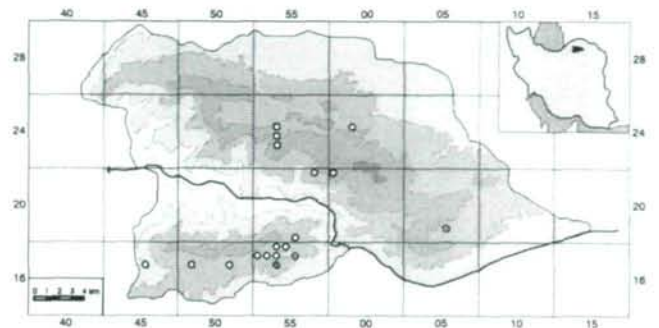
Map 625. *Thesium arvense* Horv.



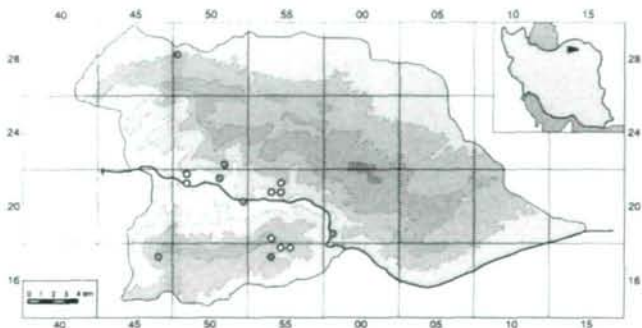
Map 626. *Thesium kotschyianum* Boiss.



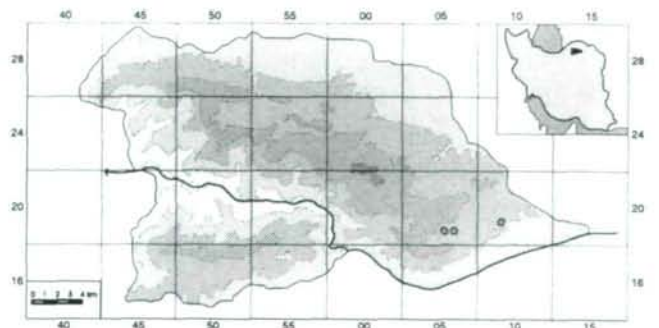
Map 627. *Digitalis nervosa* Steud. & Hochst. ex Benth.



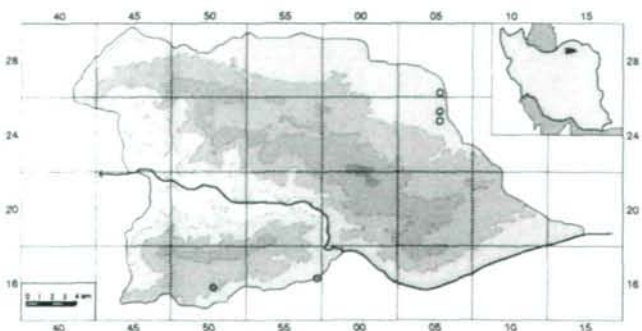
Map 628. *Leptorhabdos parviflora* (Benth.) Benth.



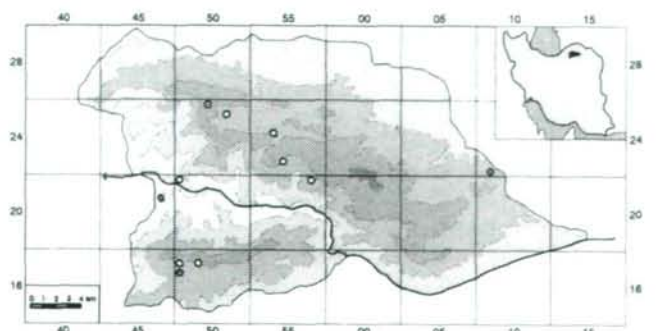
Map 629. *Linaria dalmatica* (L.) Mill.



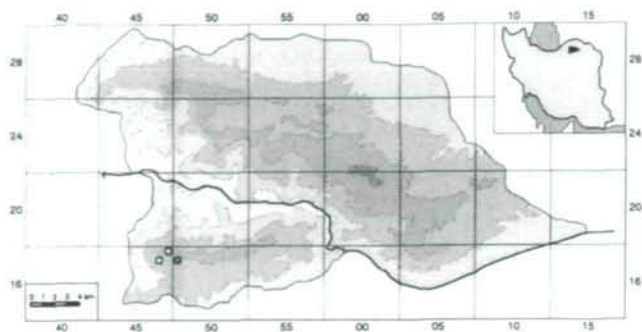
Map 630. *Linaria pyramidalis* (Vent.) F.G. Dietr. subsp. *kopetdaghensis* (Kuprian.) D. A. Sutton



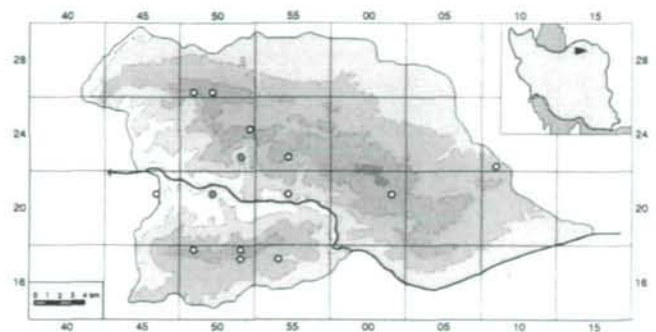
Map 631. *Linaria simplex* (Willd.) DC.



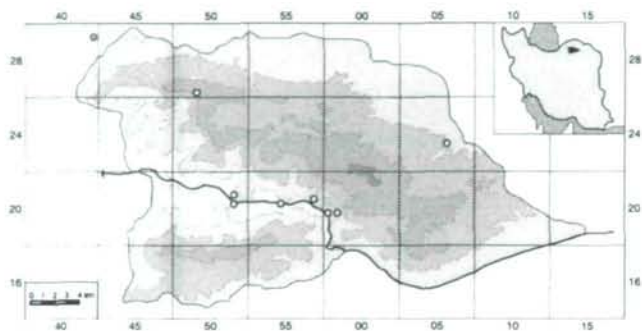
Map 632. *Linaria* spec. (aff. *grandiflora*)



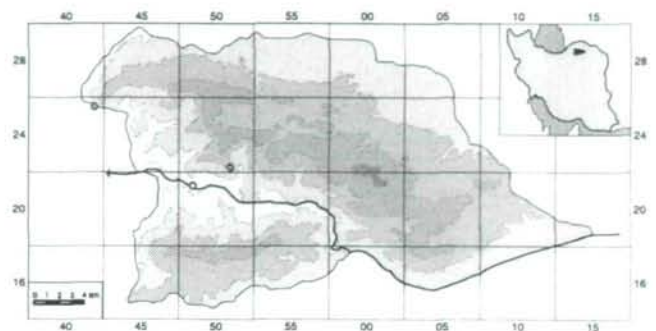
Map 633. *Rhynchosorys maxima* K. Richt.



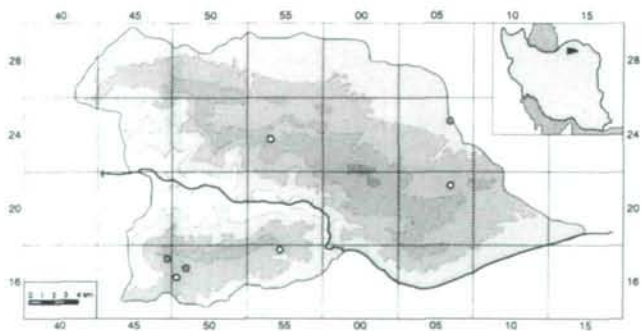
Map 634. *Scrophularia gaubae* Borrm.



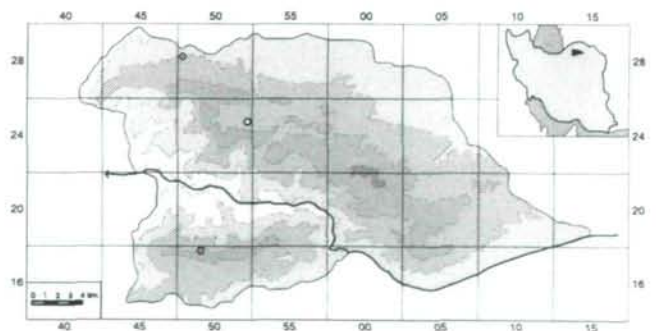
Map 635. *Scrophularia variegata* M. Bieb.



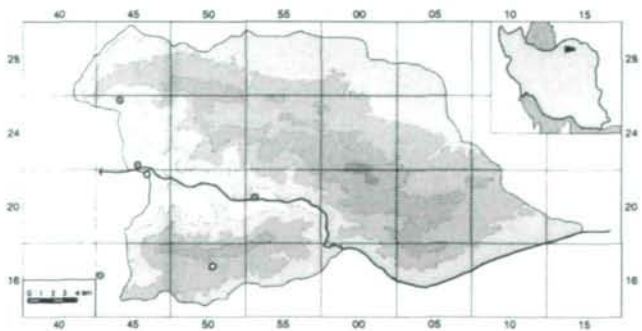
Map 636. *Verbascum blattaria* L.



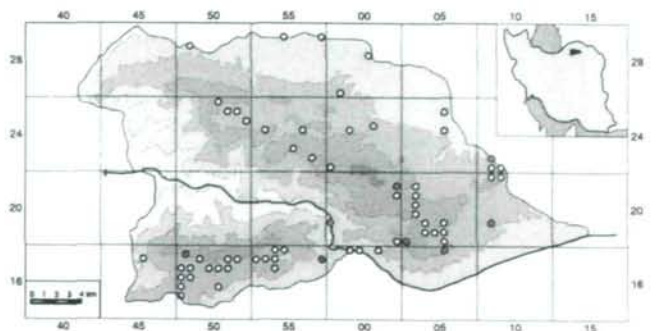
Map 637. *Verbascum cheiranthifolium* Boiss. var. *transcaspicum* Murb.



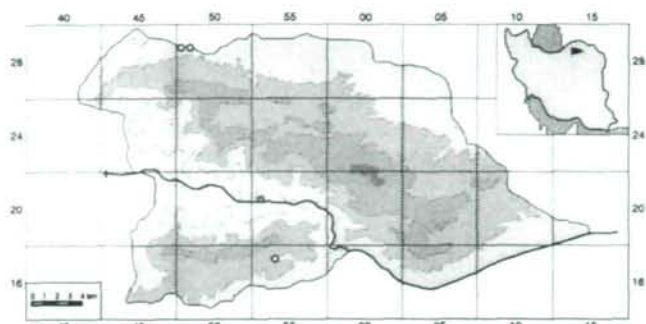
Map 638. *Verbascum gossypinum* M. Bieb.



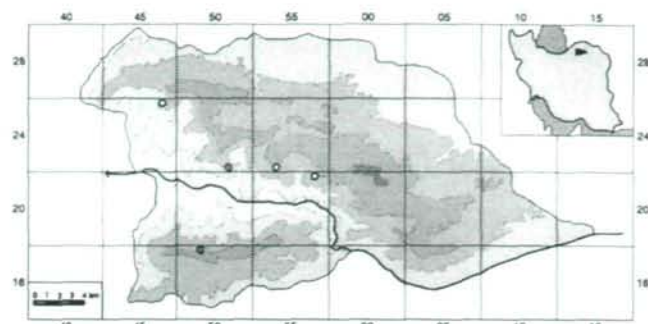
Map 639. *Verbascum sinuatum* L., s. l.



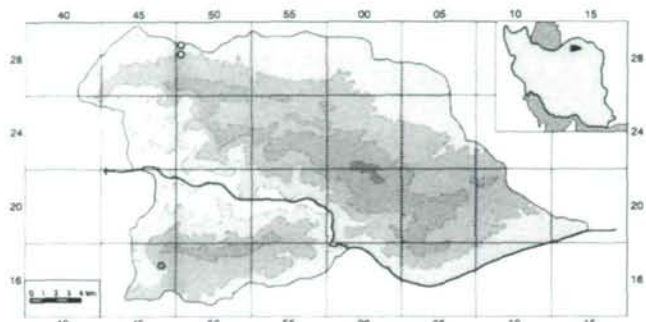
Map 640. *Verbascum speciosum* Schrad.



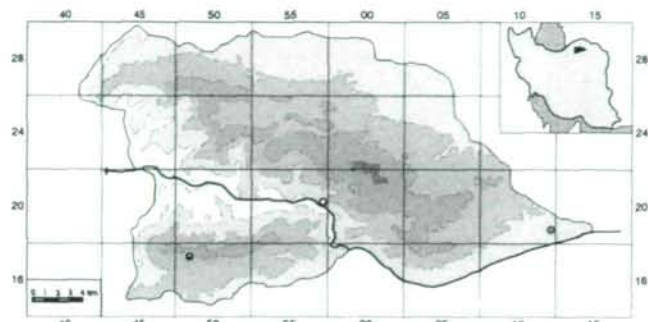
Map 641. *Verbascum sublobatum* Murb.



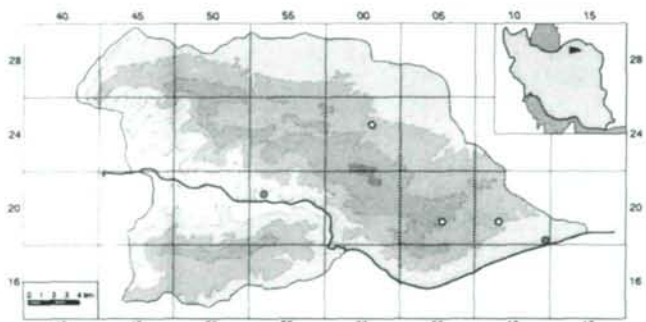
Map 642. *Verbascum thapsus* L.



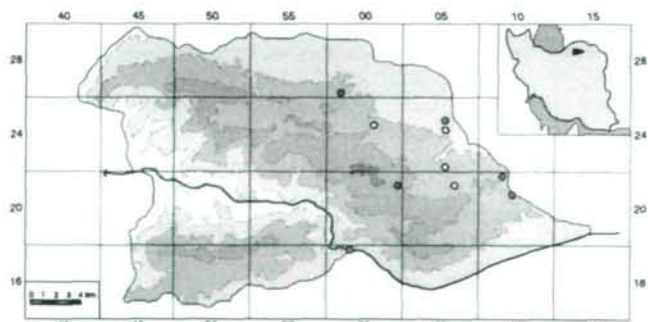
Map 643. *Veronica arvensis* L.



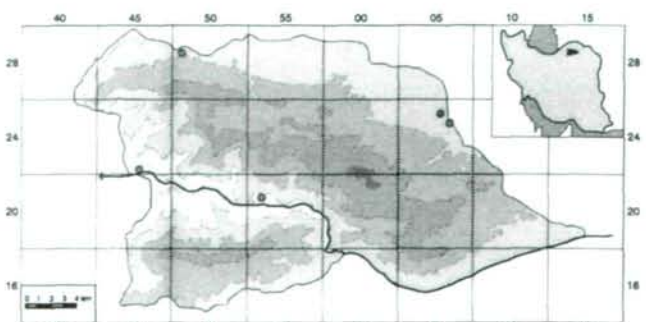
Map 644. *Veronica beccabunga* L. subsp. *muscosa* (Korsh.) A. Jelen.



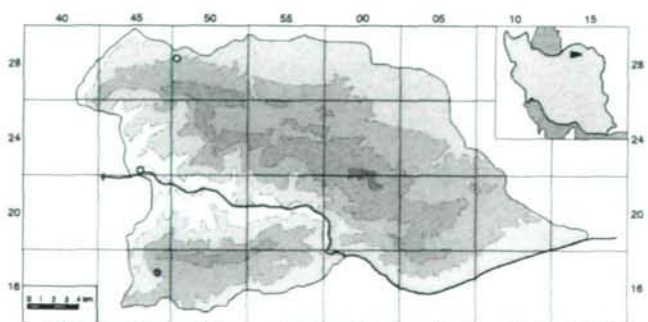
Map 645. *Veronica campylopoda* Boiss.



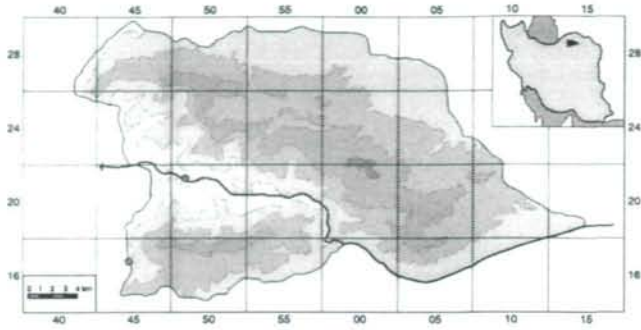
Map 646. *Veronica khorassanica* Czerniak.



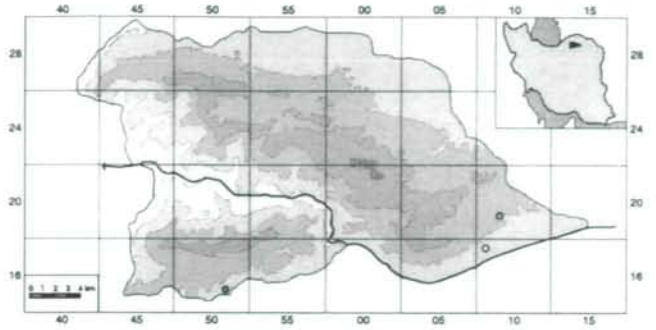
Map 647. *Veronica polita* Fries



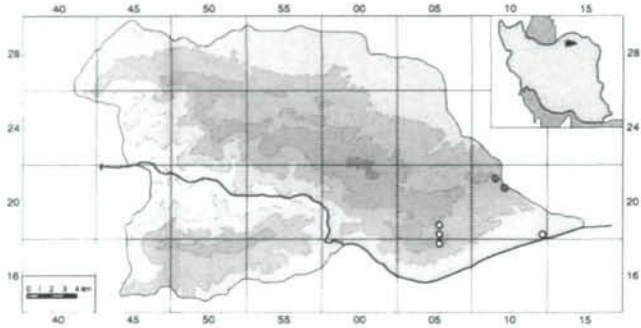
Map 648. *Veronica siaretensis* Lehm.



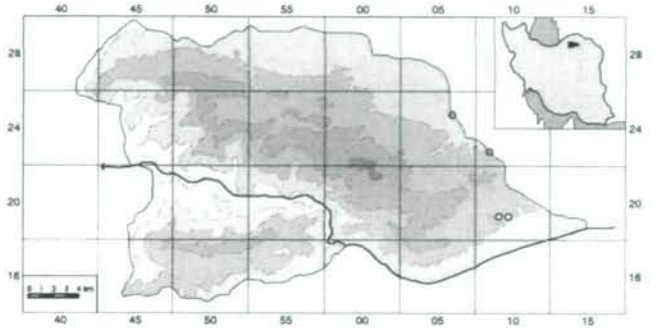
Map 649. *Atropa komarovii* Blin. ex Shal.



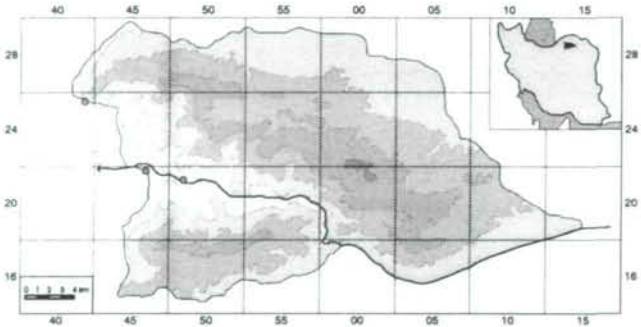
Map 650. *Hyoscyamus pusillus* L.



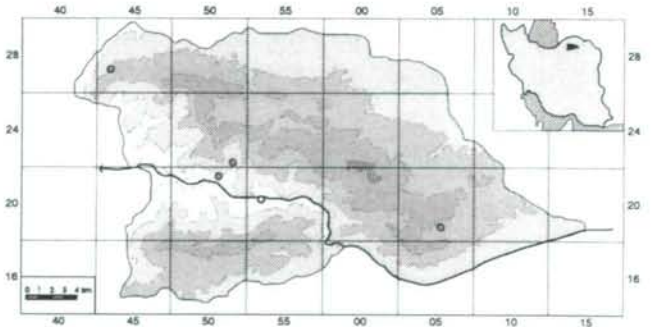
Map 651. *Hyoscyamus turcomanicus* Pojark.



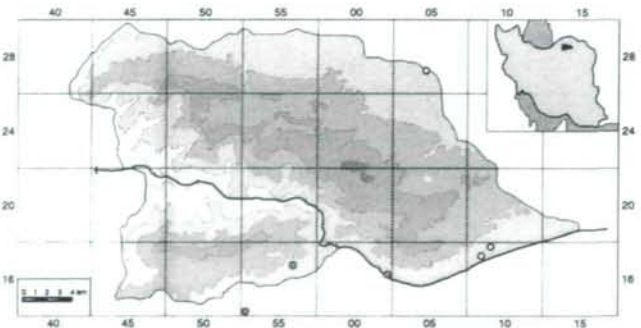
Map 652. *Lycium kopetdaghi* Pojark.



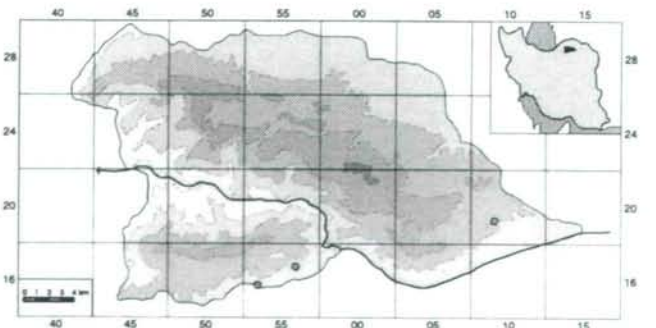
Map 653. *Physalis alkekengi* L.



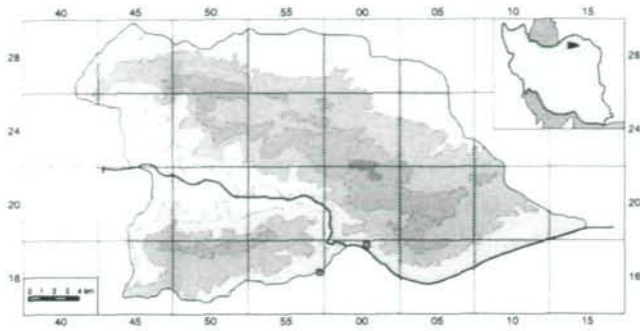
Ma 654. *Solanum dulcamara* L.



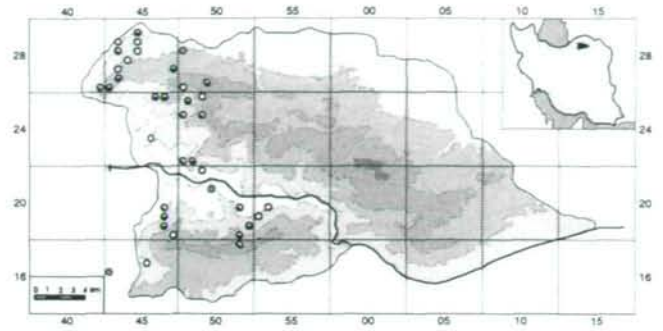
Map 655. *Reaumuria alternifolia* (Labill.) Britten



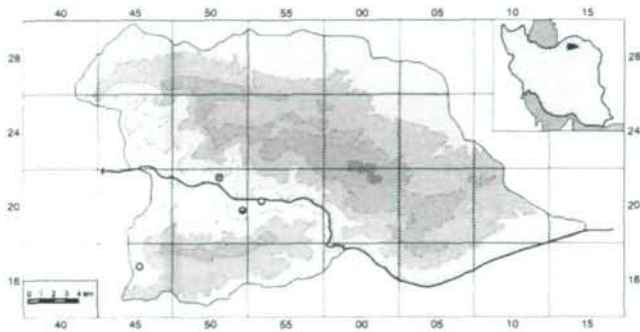
Map 656. *Tamarix ramosissima* Ledeb.



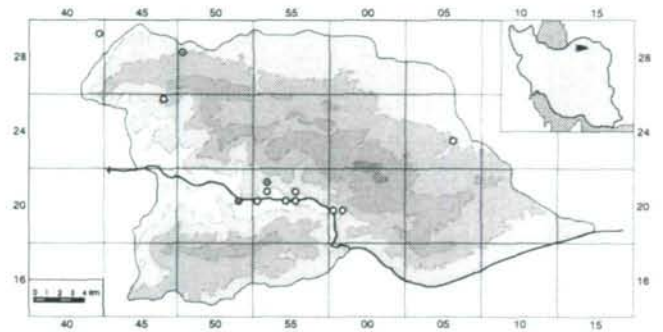
Map 657. *Stelleropsis antoninae* Podedb.



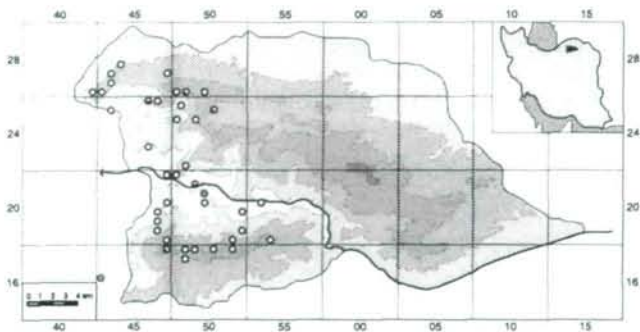
Map 658. *Tilia platyphyllos* Scop. subsp. *caucasica* (Rupr.) Loria



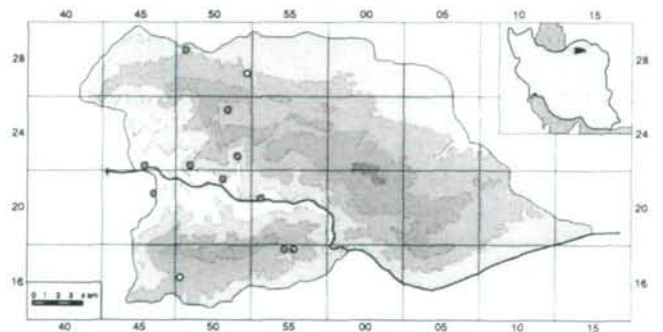
Map 659. *Celtis australis* L.



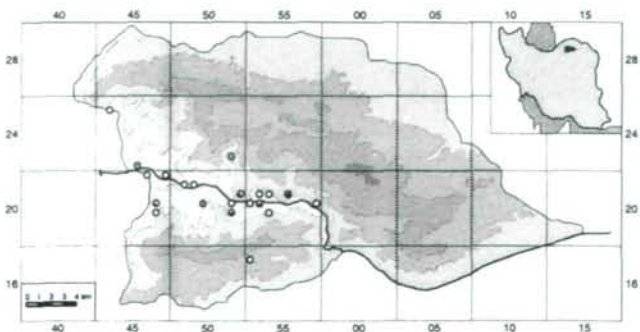
Map 660. *Celtis caucasica* Willd.



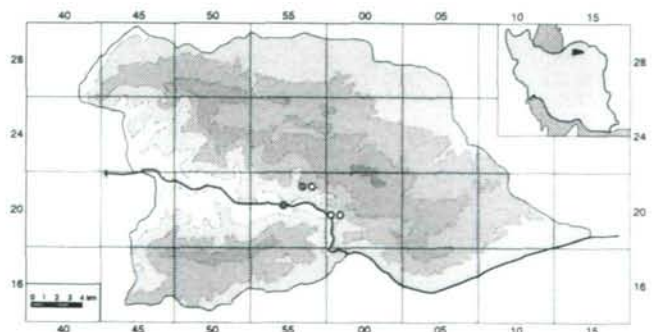
Map 661. *Ulmus glabra* Huds.



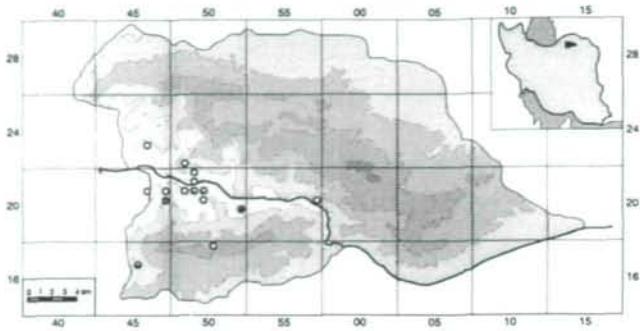
Map 662. *Ulmus minor* Mill.



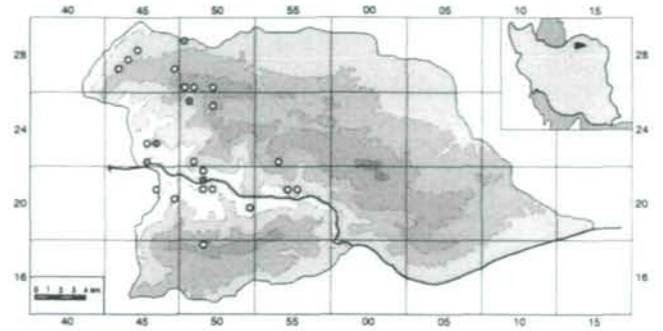
Map 663. *Zelkova carpinifolia* (Pall.) K. Koch



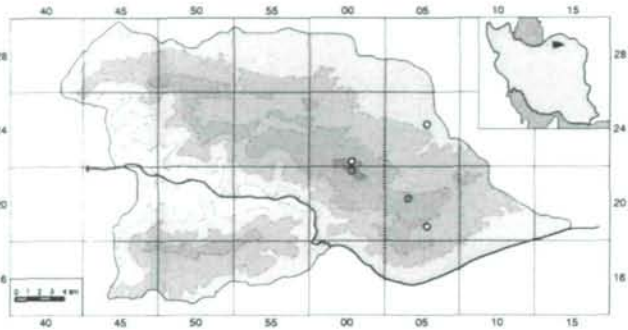
Map 664. *Parietaria judaica* L.



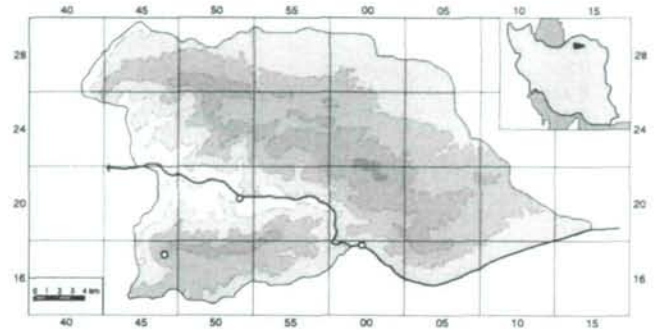
Map 665. *Parietaria officinalis* L.



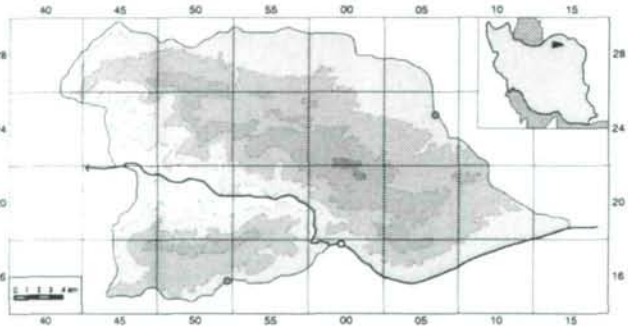
Map 666. *Urtica dioica* L.



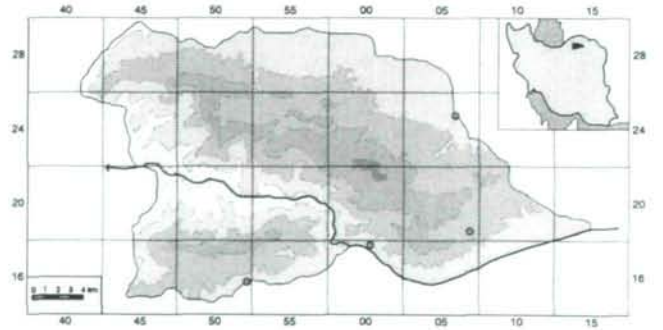
Map 667. *Valeriana sisymbriifolia* Vahl.



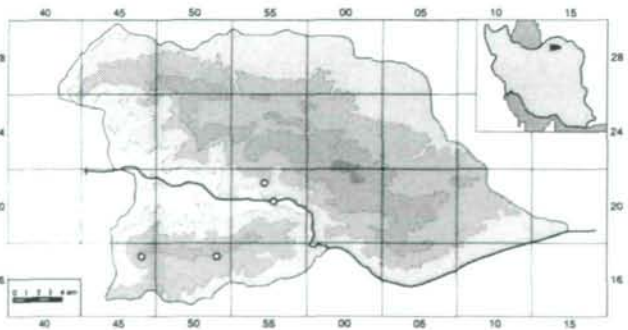
Map 668. *Valerianella dentata* (L.) Poll.



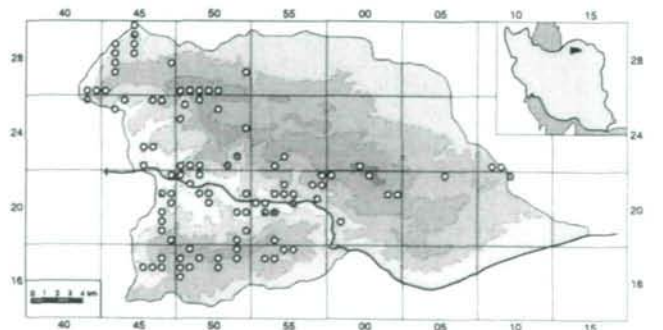
Map 669. *Valerianella platycarpa* Trautv.



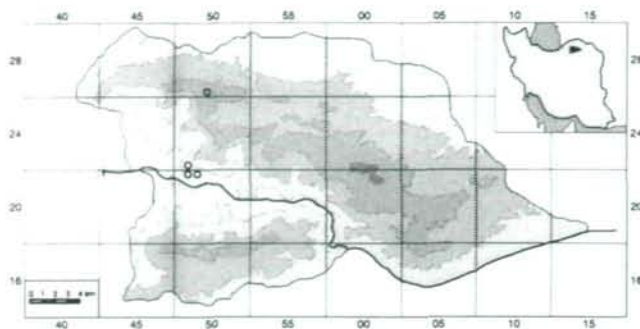
Map 670. *Valerianella sclerocarpa* Fisch. & C. A. Mey.



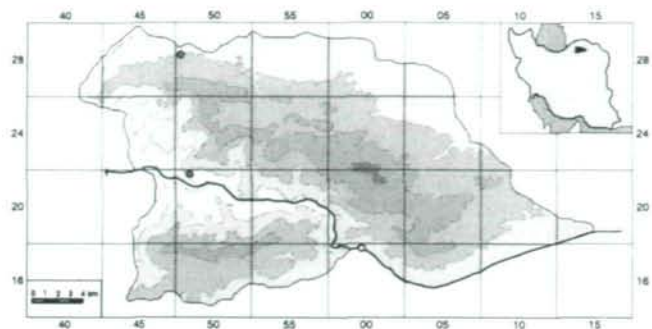
Map 671. *Valerianella uncinata* (M. Bieb.) Dufr.



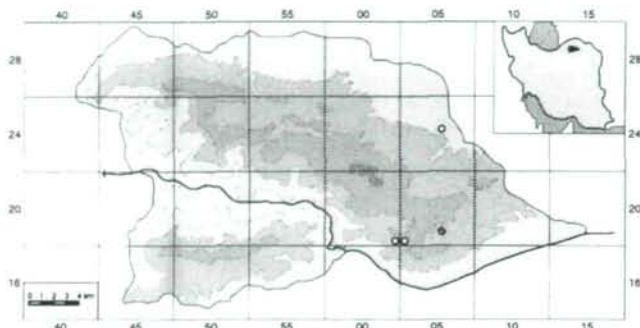
Map 672. *Viola alba* Bess.



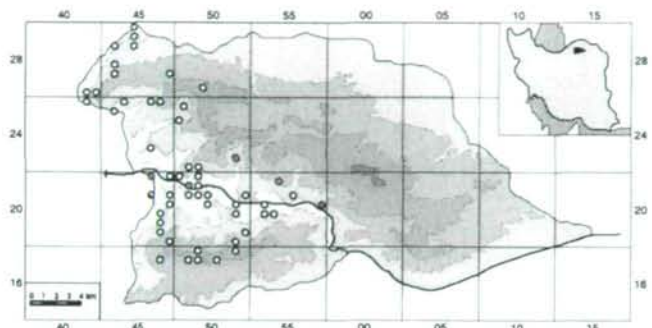
Map 673. *Viola jordanii* Harry



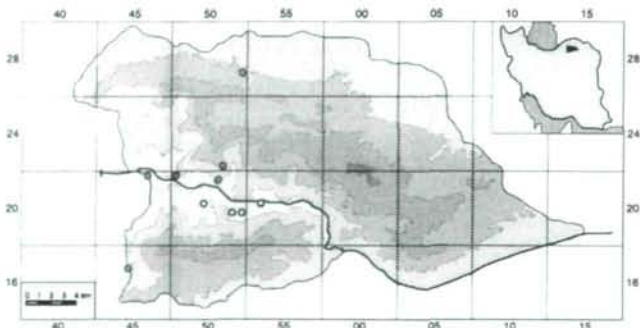
Map 674. *Viola kitaibeliana* Schult.



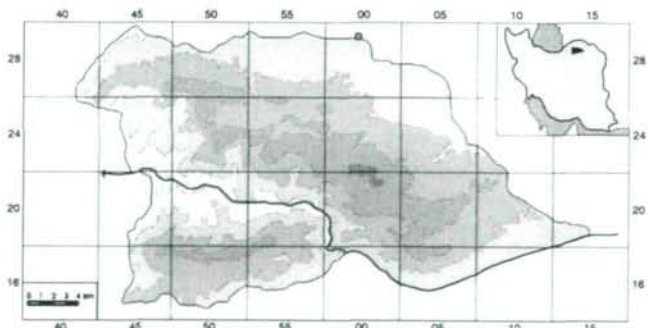
Map 675. *Viola occulta* Lehm.



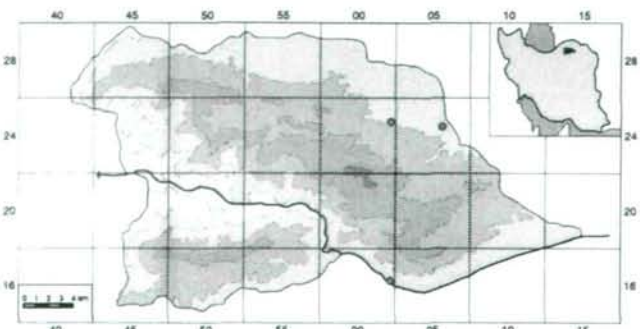
Map 676. *Viola sieheana* W. Becker



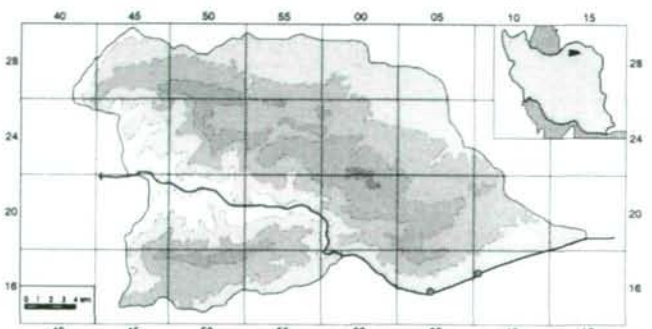
Map 677. *Vitis sylvestris* C. C. Gmel.



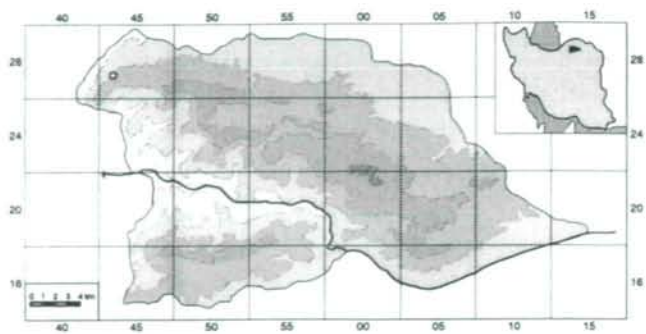
Map 678. *Malacocarpus crithmifolius* (Retz.) Fisch. & C. A. Mey.



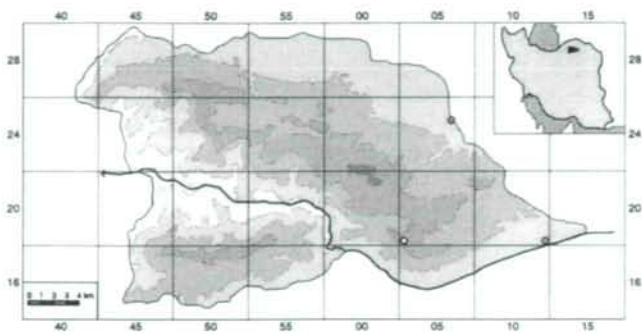
Map 679. *Zygophyllum atriplicoides* Fisch. & C. A. Mey.



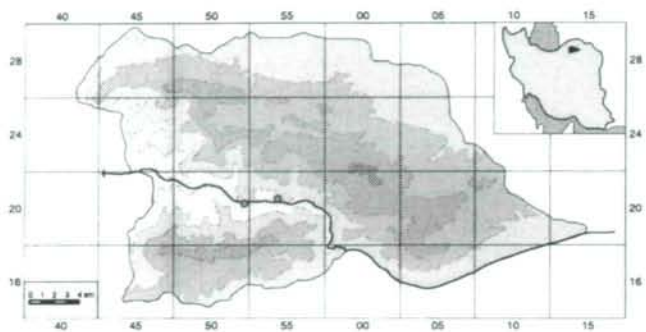
Map 680. *Zygophyllum fabago* L.



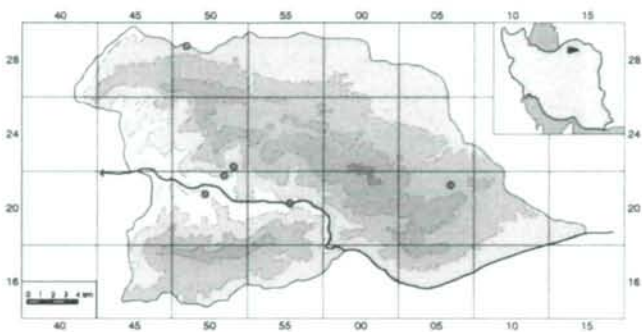
Map 681. *Aisma lanceolata* With.



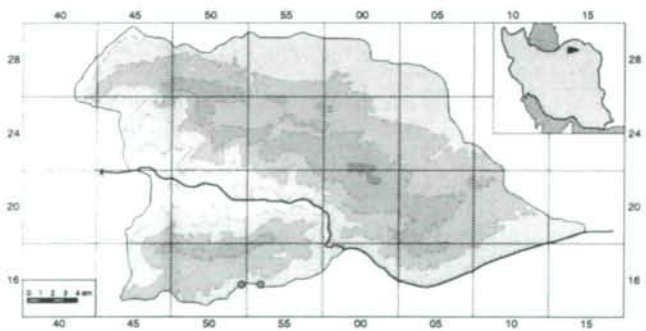
Map 682. *Ixiolirion tataricum* (Pall.) Herb.



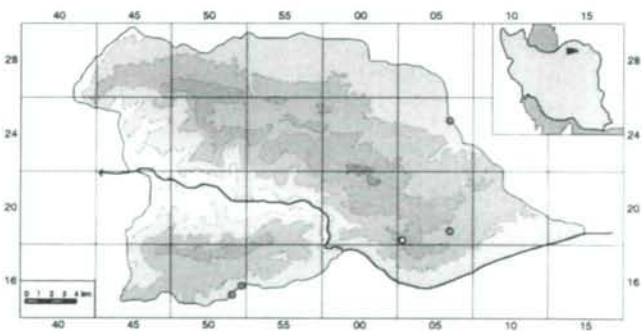
Map 683. *Sternbergia lutea* (L.) Ker Gawl. ex Spreng.



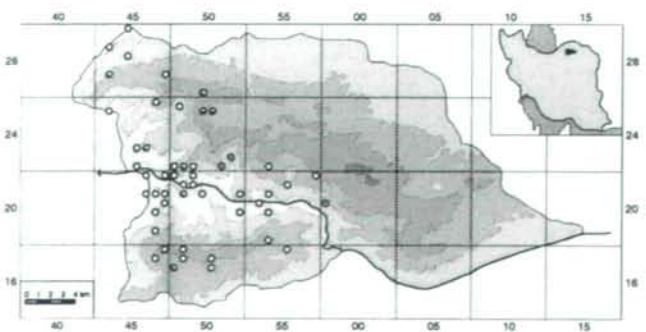
Map 684. *Arum rupicola* Boiss. var. *virescens* (Stapf) Boyce



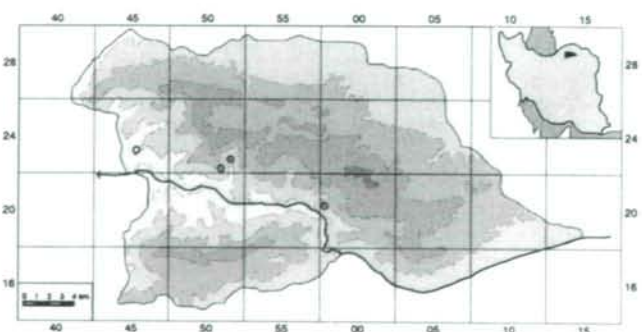
Map 685. *Bolboschoenus maritimus* (L.) Palla



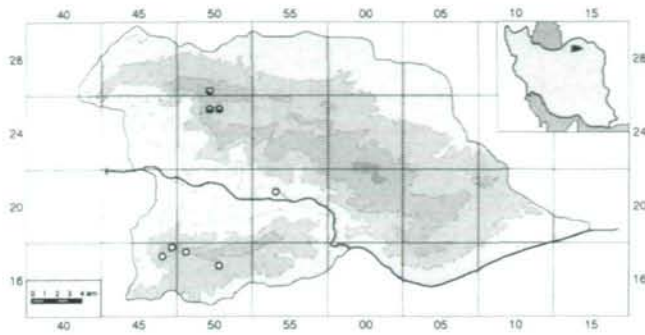
Map 686. *Carex divisa* Huds.



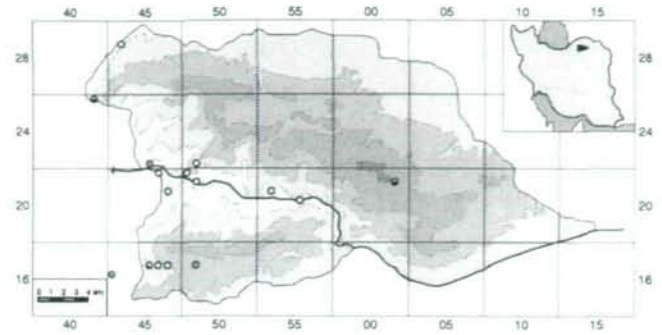
Map 687. *Carex divisa* Stokes, s. l.



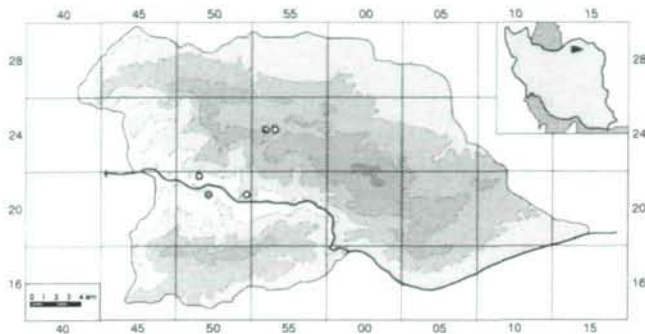
Map 688. *Carex divisa* Stokes subsp. *divulsa*



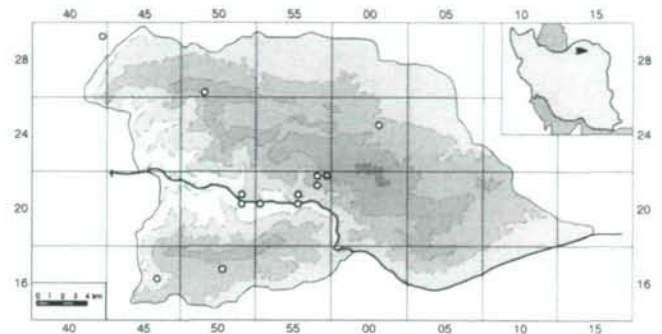
Map 689. *Carex divulsa* Stokes subsp. *leersii* (Kneuck.) W. Koch



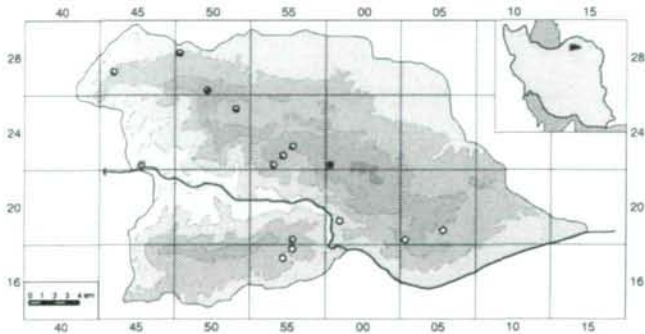
Map 690. *Carex flacca* Schreb. subsp. *serrulata* (Biv.) Greuter



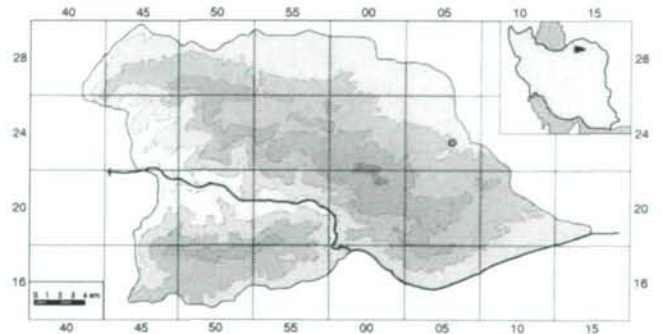
Map 691. *Carex griolettii* Roem.



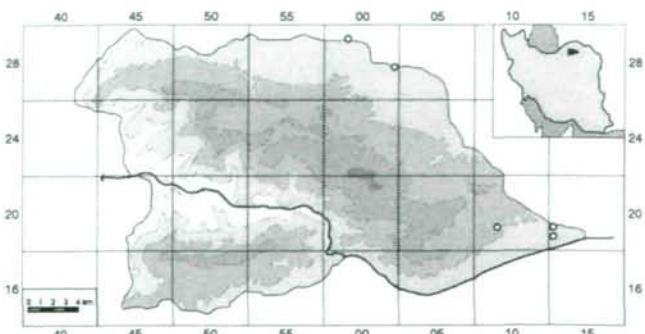
Map 692. *Carex hallerana* Asso



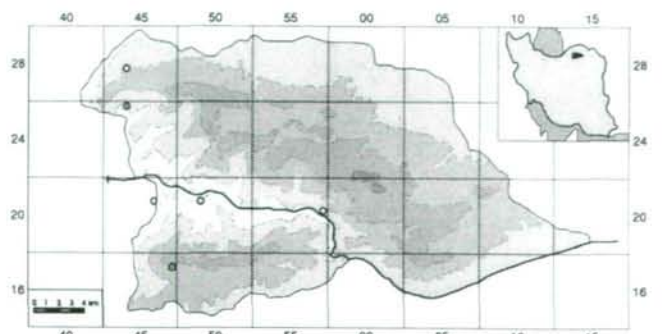
Map 693. *Carex melanostachya* M. Bieb.



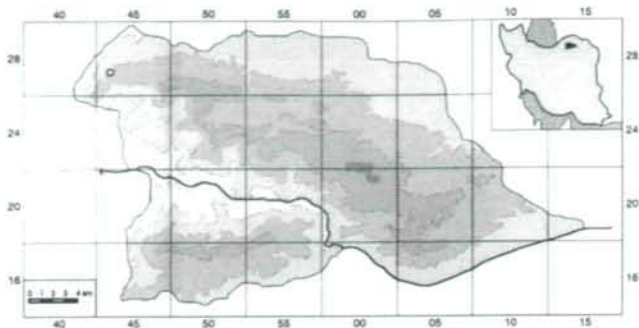
Map 694. *Carex otrubae* Podp.



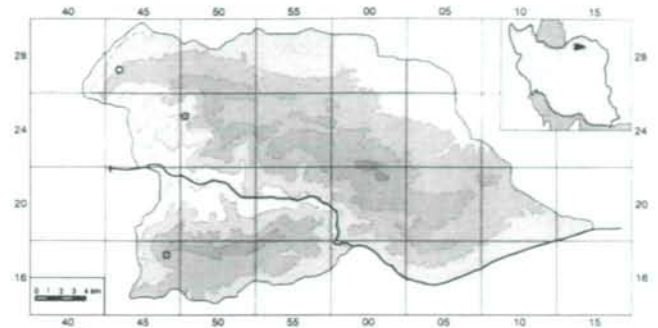
Map 695. *Carex pachystylis* J. Gay



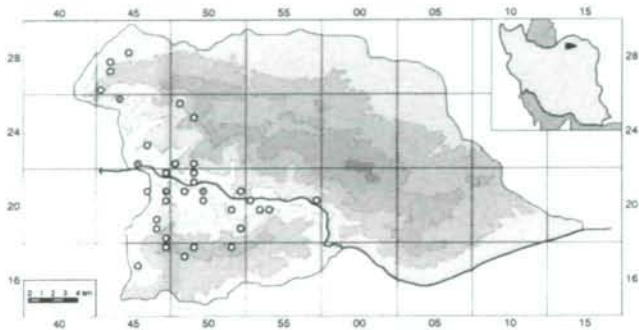
Map 696. *Carex pendula* Huds.



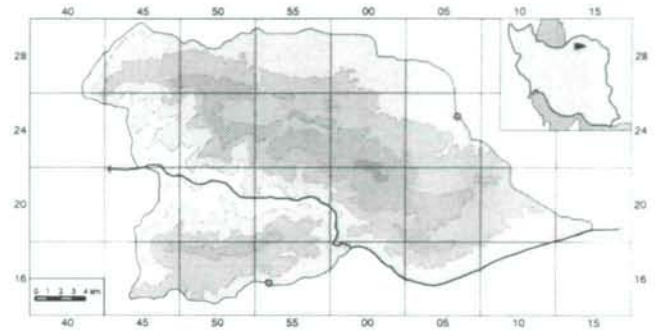
Map 697. *Carex pseudocyperus* L., *Eleocharis mitracarpa* Steud. & *Schoenoplectus mucronatus* (L.) Palla



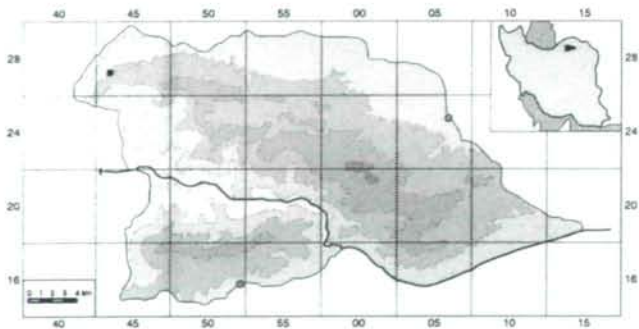
Map 698. *Carex remota* L.



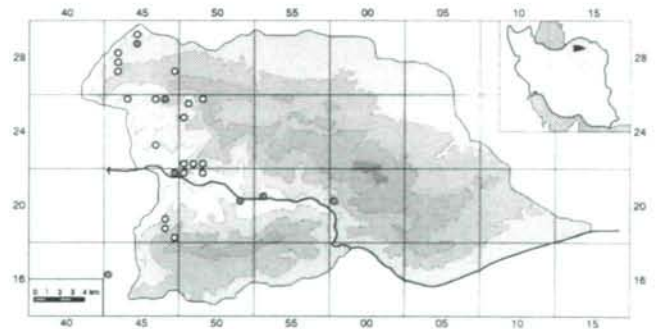
Map 699. *Carex sylvatica* Huds.



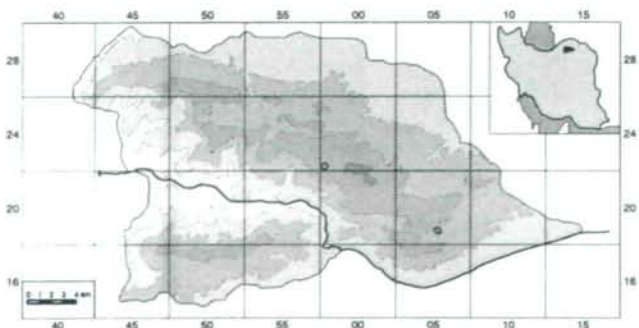
Map 700. *Cyperus longus* L.



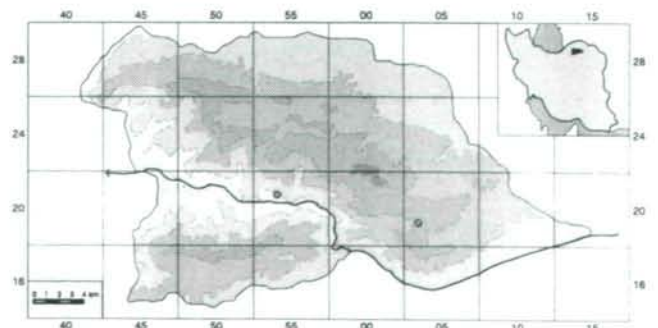
Map 701. *Schoenoplectus lacustris* (L.) Palla subsp. *tabernaemontani* (C.C.Gmel.) A. & D. Löve



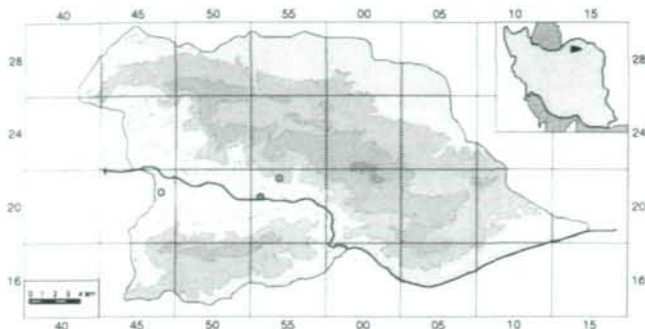
Map 702. *Tamus communis* L.



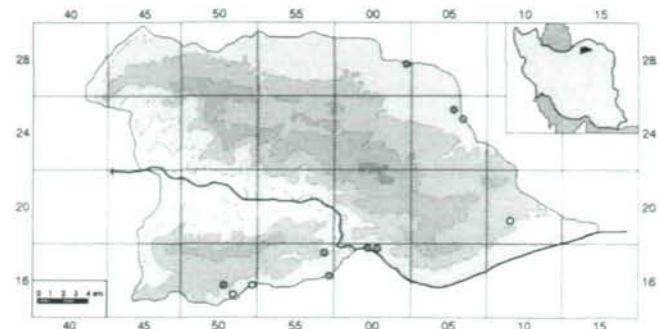
Map 703. *Crocus almeihensis* C. D. Brickell & B. Mathew



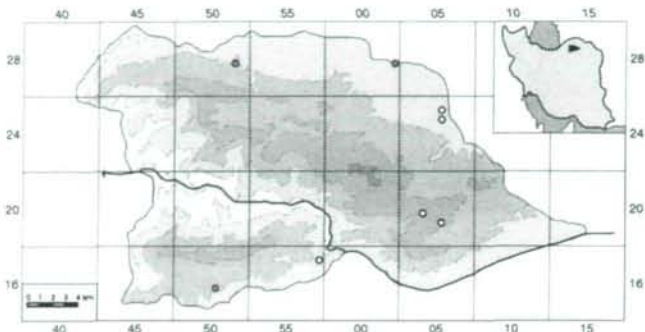
Map 704. *Crocus speciosus* M. Bieb.



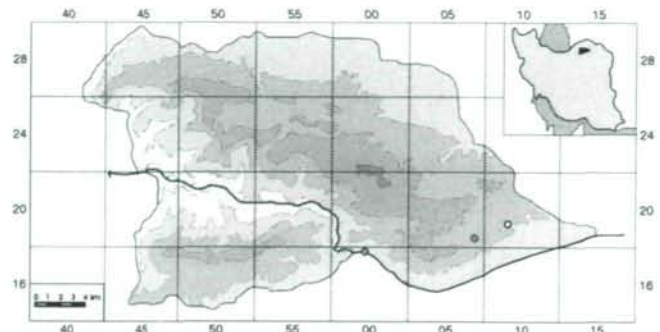
Map 705. *Gladiolus italicus* Mill.



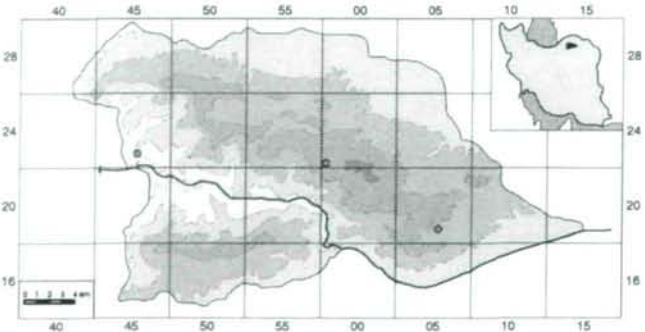
Map 706. *Iris acutiloba* C. A. Mey. subsp. *lineolata* (Trautv.) B. Mathew & Wendelbo



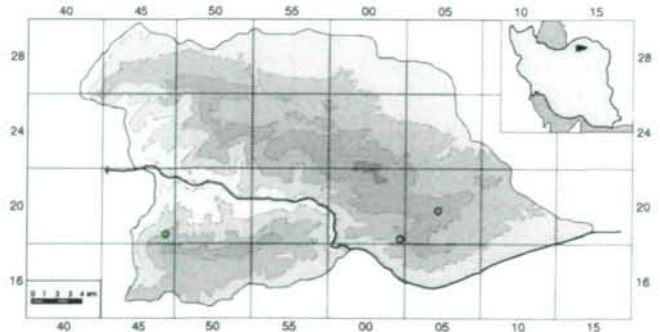
Map 707. *Iris fosterana* Aitch. & Baker



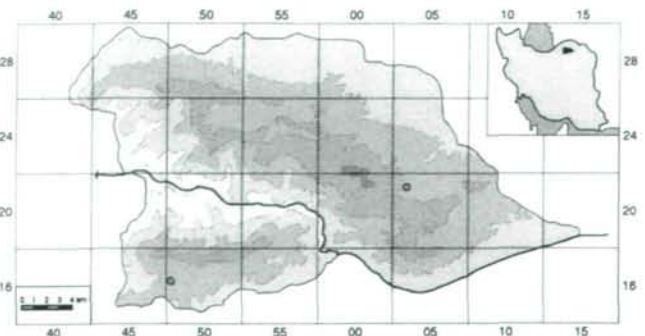
Map 708. *Iris kopetdagensis* (Vved.) B. Mathew & Wendelbo



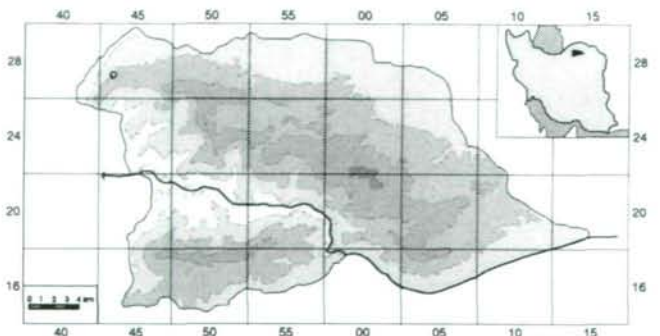
Map 709. *Iris reticulata* M. Bieb.



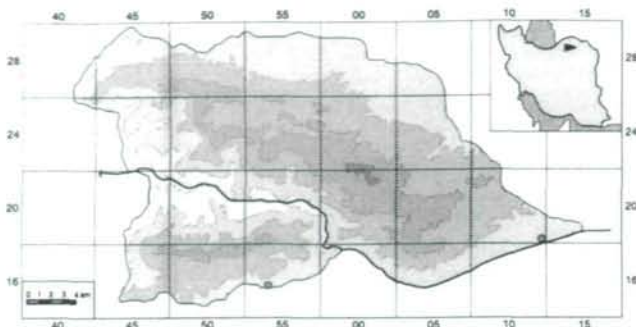
Map 710. *Iris spuria* L. subsp. *musulmanica* (Fomin) Takht.



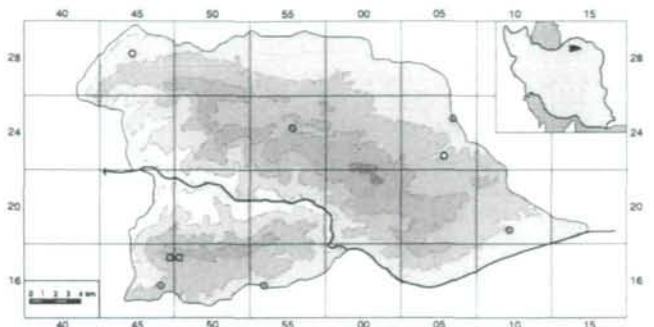
Map 711. *Juncus articulatus* L.



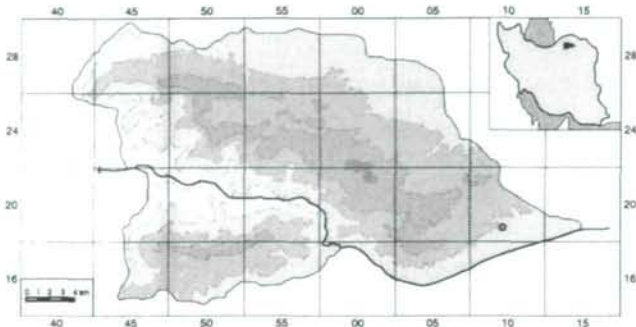
Map 712. *Juncus effusus* L. & *J. fontanesii* J. Gay



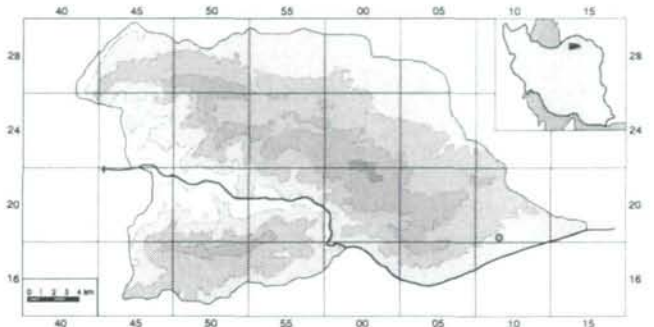
Map 713. *Juncus gerardi* Loisel. subsp. *persicus* (Boiss.) Snogerup



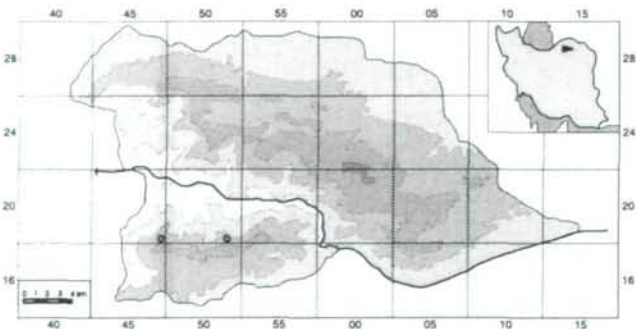
Map 714. *Juncus inflexus* L.



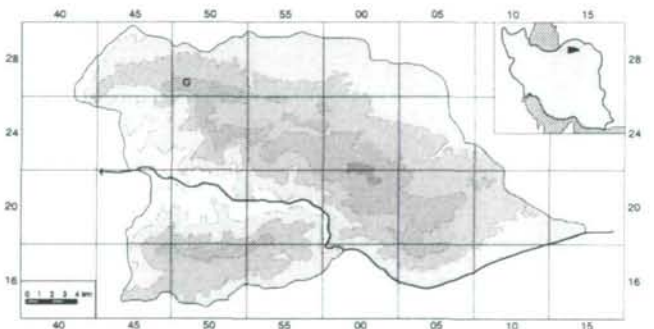
Map 715. *Juncus maritimus* Lam. & *Asparagus griffithii* Baker



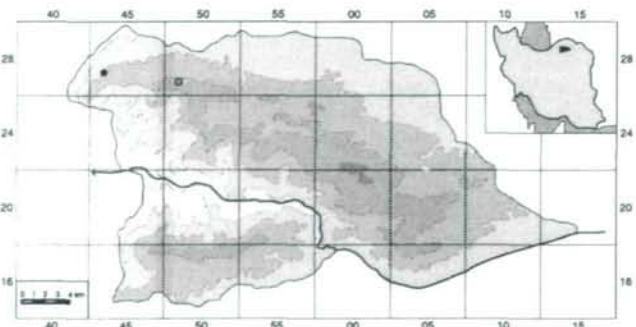
Map 716. *Juncus rigidus* Desf.



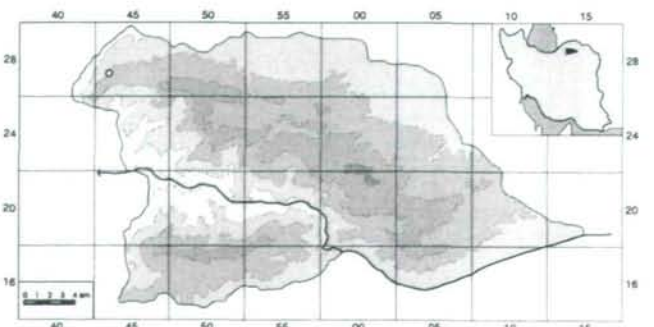
Map 717. *Luzula forsteri* (Sm.) DC.



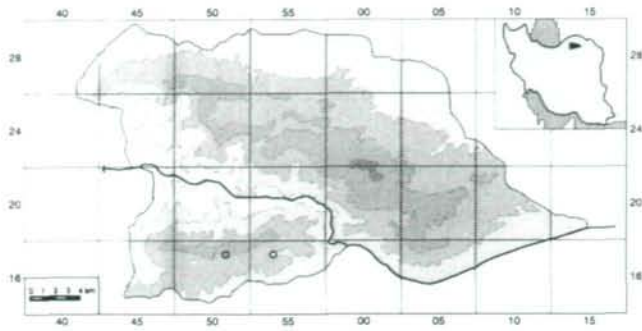
Map 718. *Lemna gibba* L.



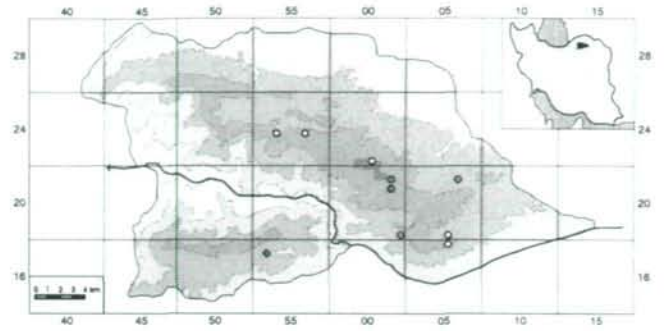
Map 719. *Lemna minor* L.



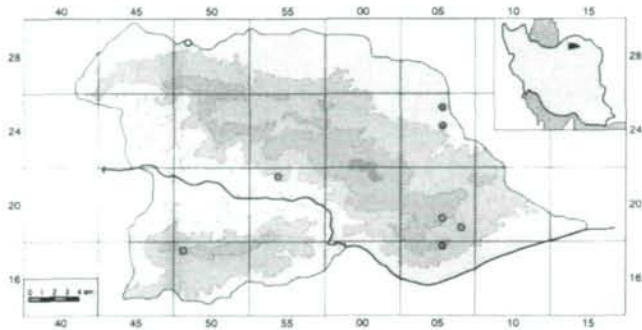
Map 720. *Lemna trisulca* L. & *Spirodela polyrhiza* (L.) Schleid.



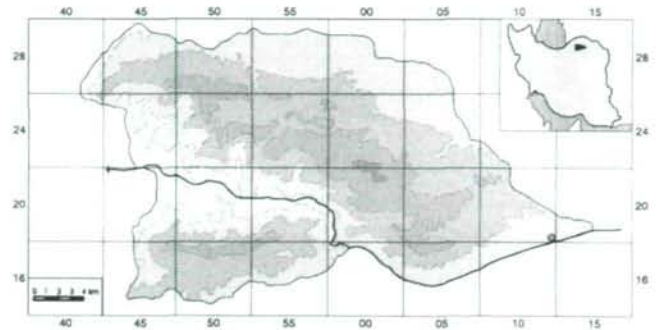
Map 721. *Allium affine* Ledeb.



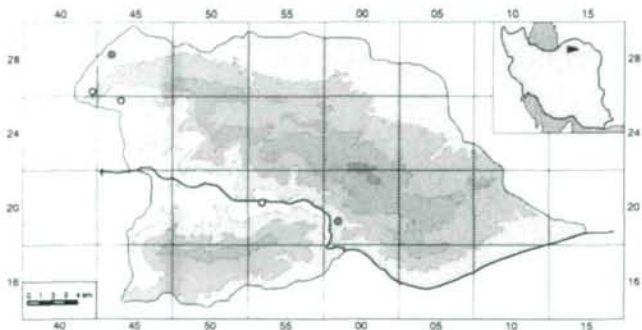
Map 722. *Allium chelotum* Wendelbo



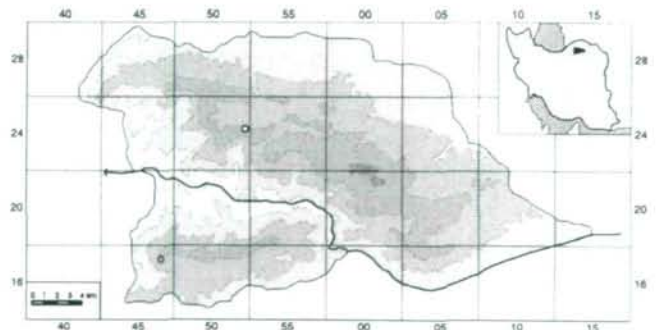
Map 723. *Allium cristophii* Trautv.



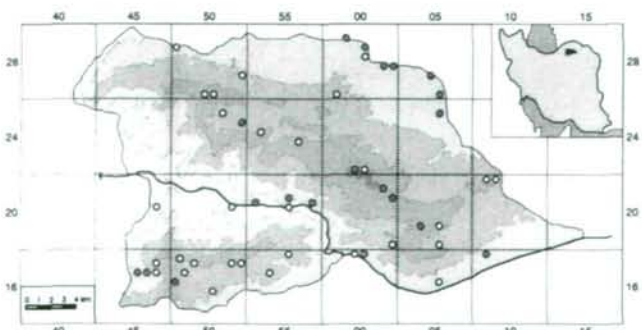
Map 724. *Allium helicophyllum* Vved.



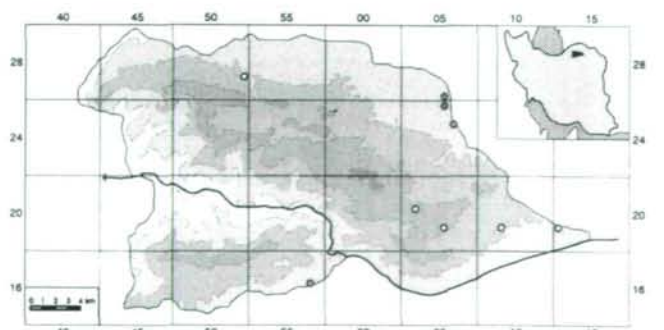
Map 725. *Allium lenkoranicum* Miscz.



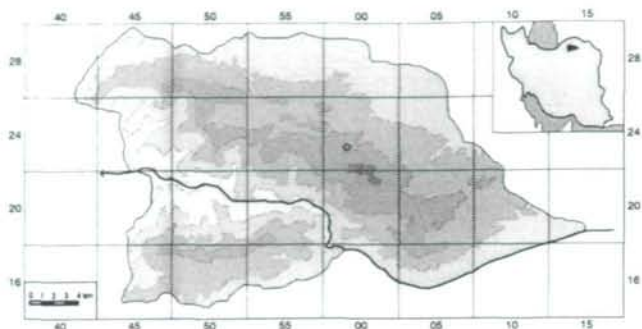
Map 726. *Allium paradoxum* (M. Bieb.) G. Don



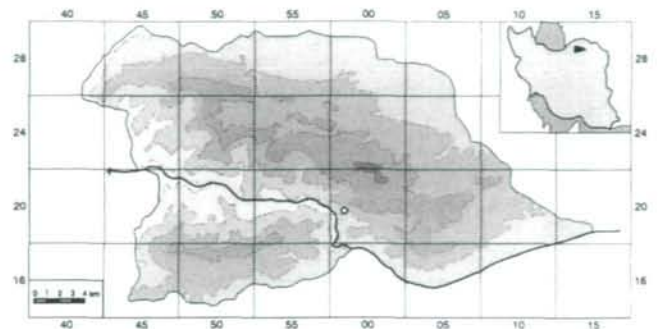
Map 727. *Allium rubellum* M. Bieb.



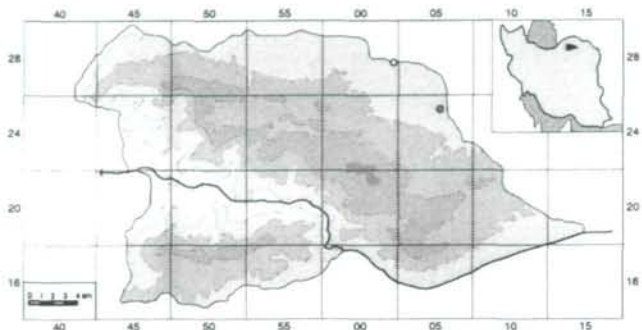
Map 728. *Allium scabriscapum* Boiss. & Kotschy



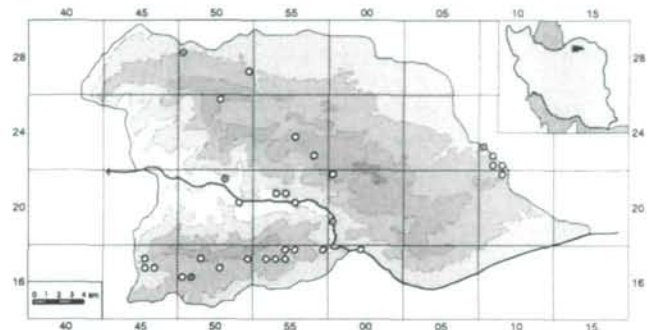
Map 729. *Allium subvineale* Wendelbo



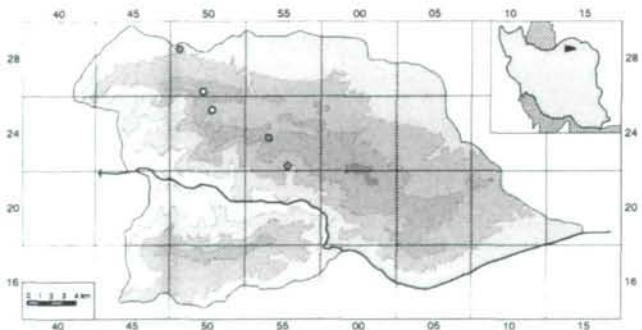
Map 730. *Allium vavilovii* Popov & Vved.



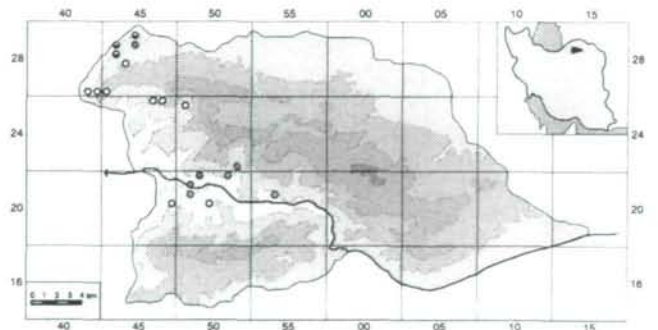
Map 731. *Allium xiphopetalum* Aitch. & Baker



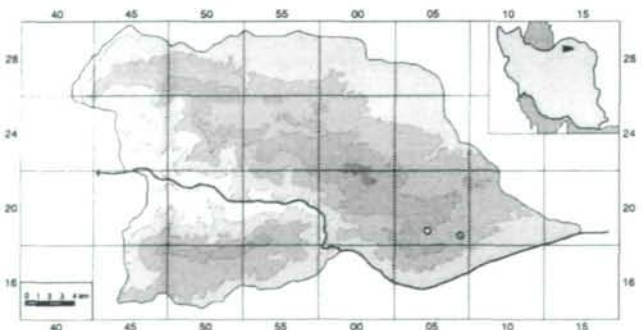
Map 732. *Asparagus verticillatus* L.



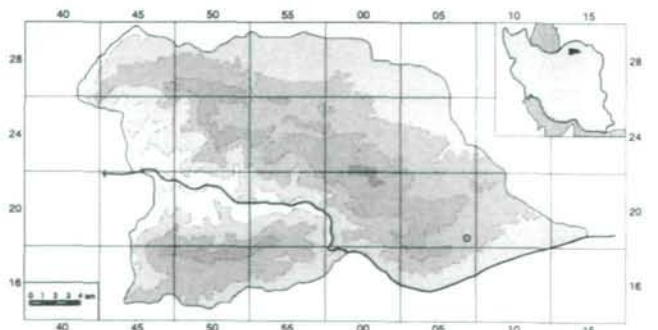
Map 733. *Colchicum speciosum* Steven



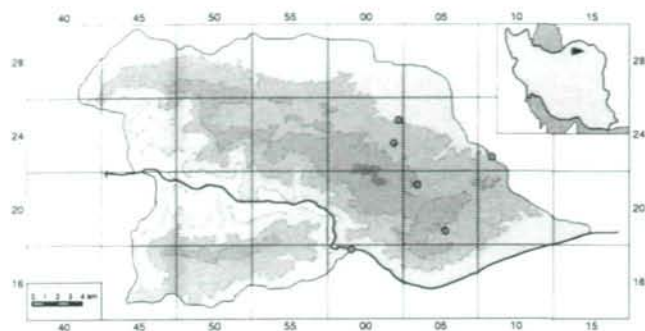
Map 734. *Danaë racemosa* (L.) Moench



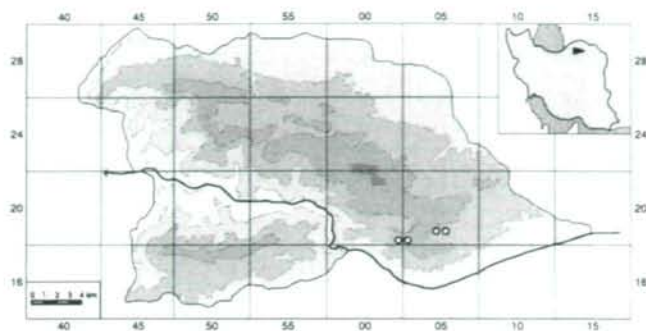
Map 735. *Eremurus indieriensis* (Steven) Boiss.



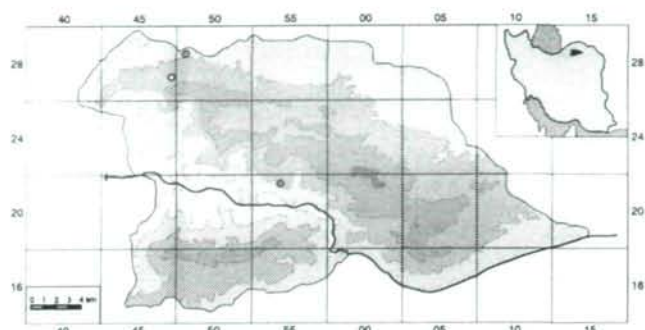
Map 736. *Eremurus kopetdaghensis* Popov ex B. Fedtsch.



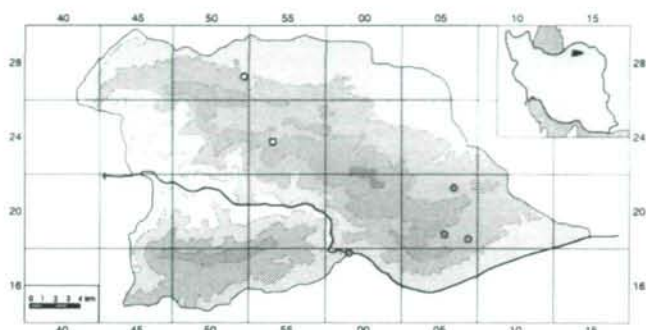
Map 737. *Eremurus olgae* Regel



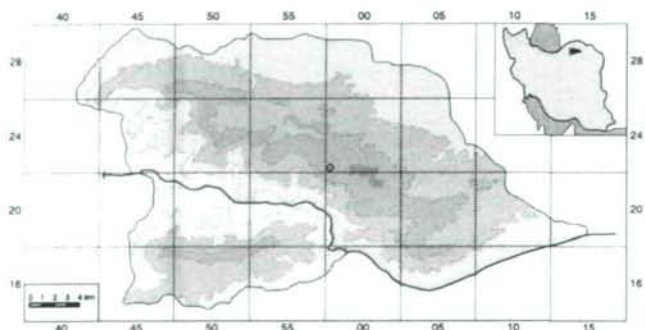
Map 738. *Eremurus spectabilis* M. Bieb. subsp. *subalbiflorus* (Vved.) Wendelbo



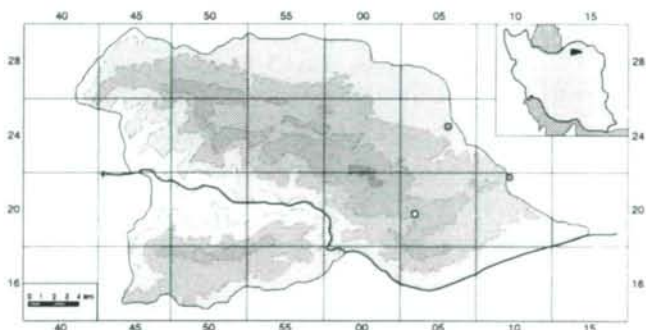
Map 739. *Fritillaria kotschyana* Herb.



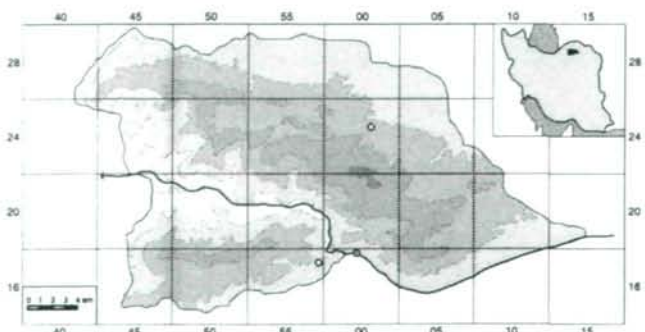
Map 740. *Fritillaria raddeana* Regel



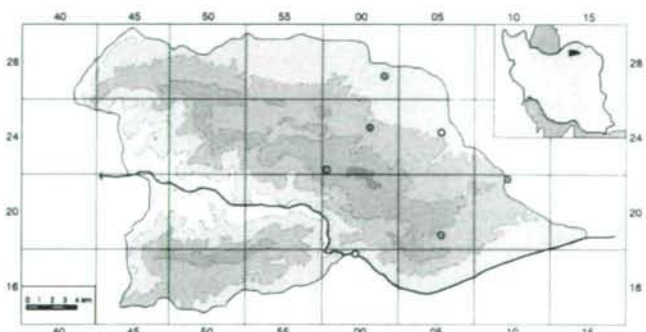
Map 741. *Gagea glacialis* K. Koch



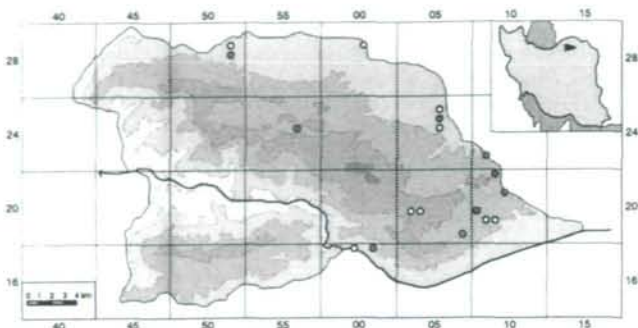
Map 742. *Gagea reticulata* (Pall.) Schult. & Schult. f.



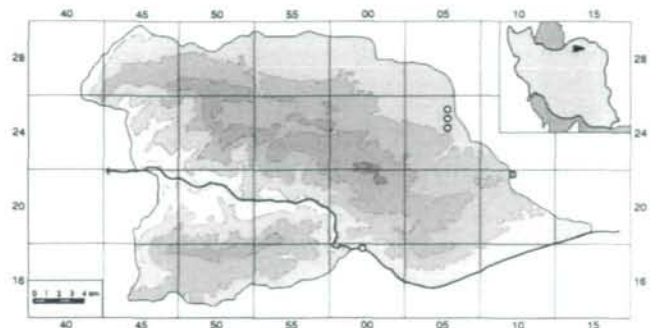
Map 743. *Gagea stipitata* Merckl. ex Bunge



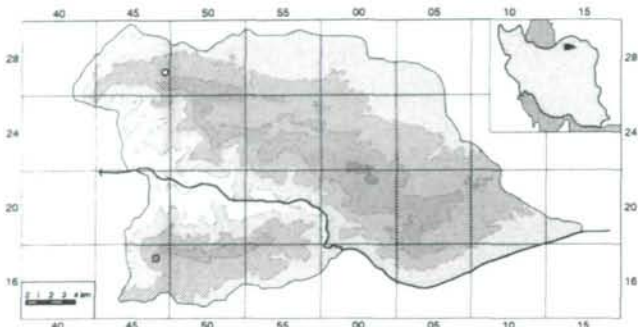
Map 744. *Hyacinthus litwinowii* Czerniak.



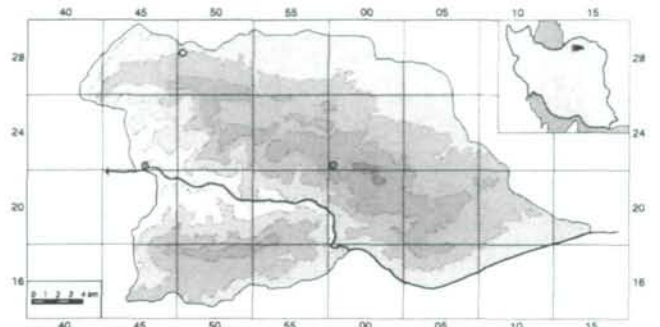
Map 745. *Muscari caucasicum* (Griseb.) Baker



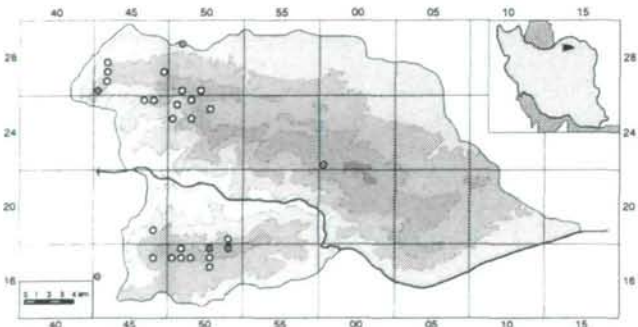
Map 746. *Muscari neglectum* Guss.



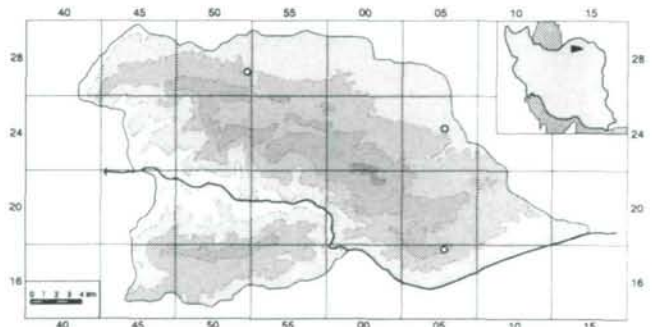
Map 747. *Ornithogalum bungei* Boiss.



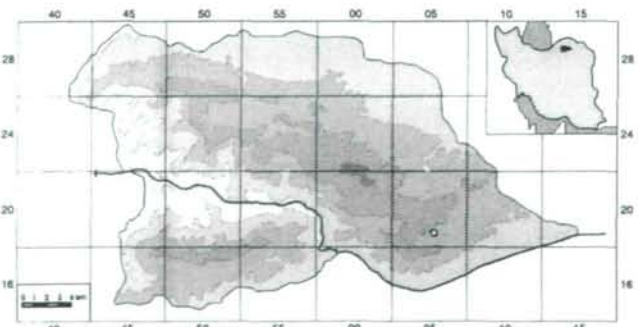
Map 748. *Ornithogalum sinterisii* Freyn



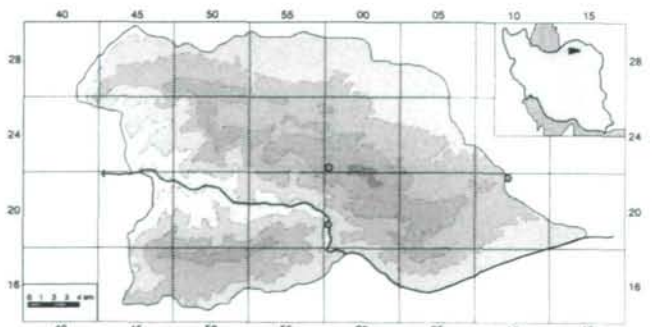
Map 749. *Polygonatum orientale* Desf.



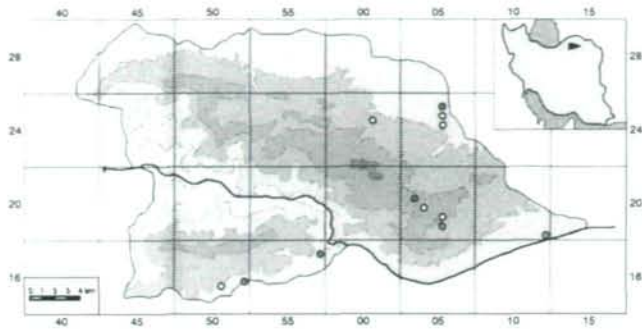
Map 750. *Polygonatum sewerzowii* Regel



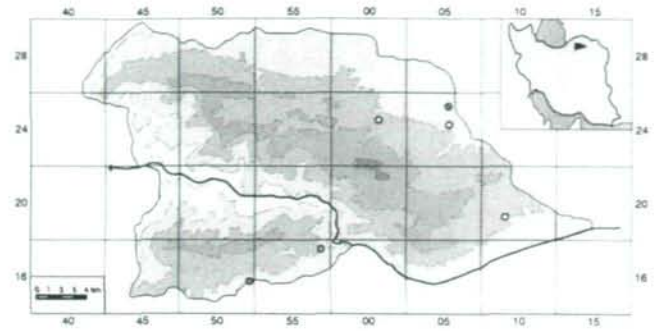
Map 751. *Tulipa biflora* Pall.



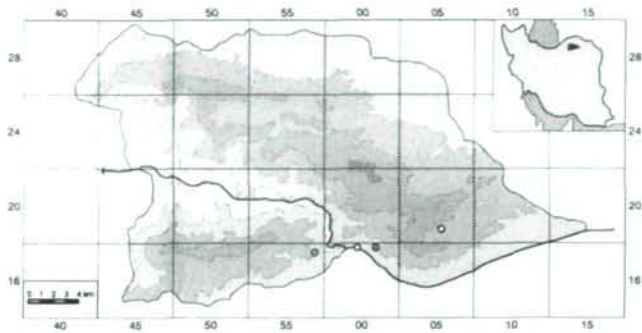
Map 752. *Tulipa hoogiana* B. Fedtsch.



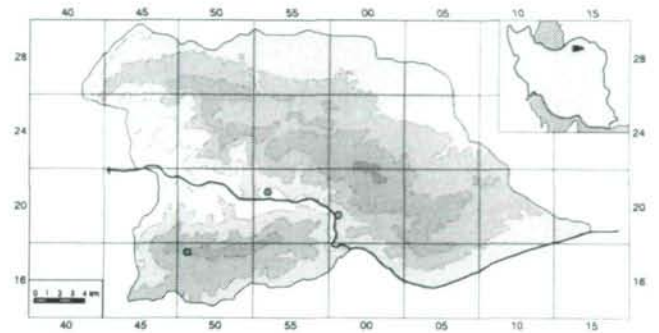
Map 753. *Tulipa micheliana* Hoog



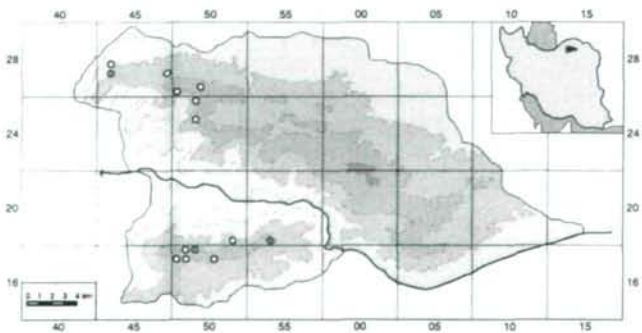
Map 754. *Tulipa montana* Lindl.



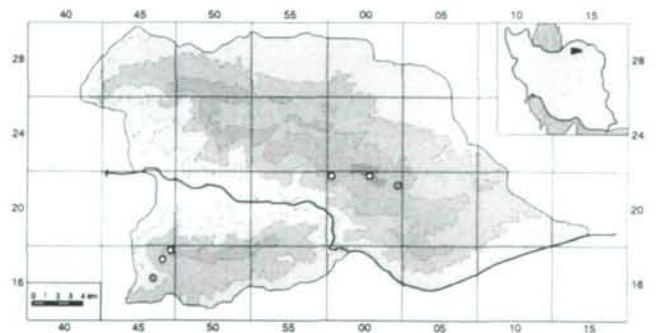
Map 755. *Tulipa wilsoniana* Hoog



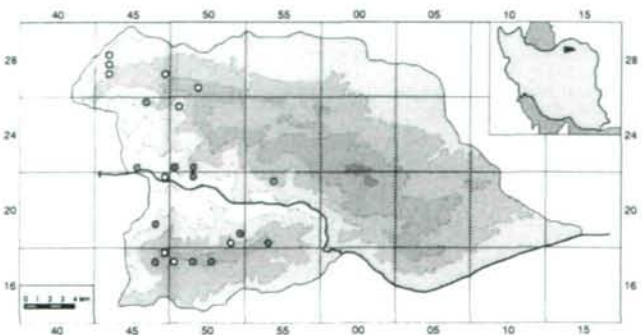
Map 756. *Anacamptis pyramidalis* (L.) Rich.



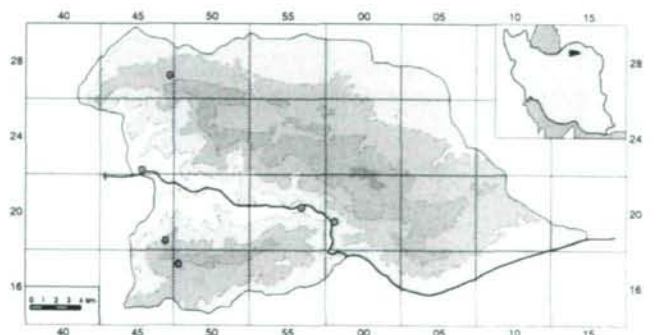
Map 757. *Cephalanthera caucasica* Kränzl.



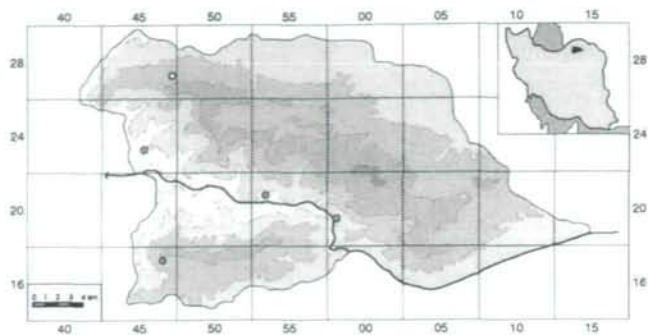
Map 758. *Cephalanthera damasonium* (Mill.) Druce



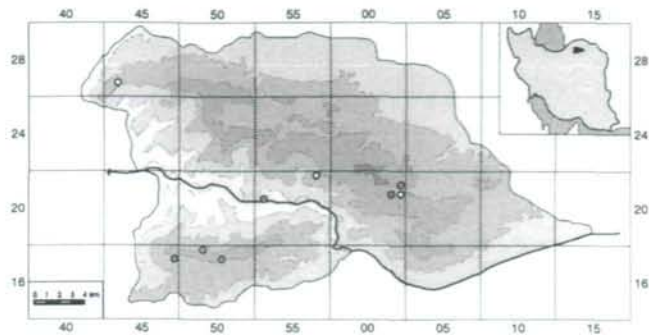
Map 759. *Cephalanthera longifolia* (L.) Fritsch



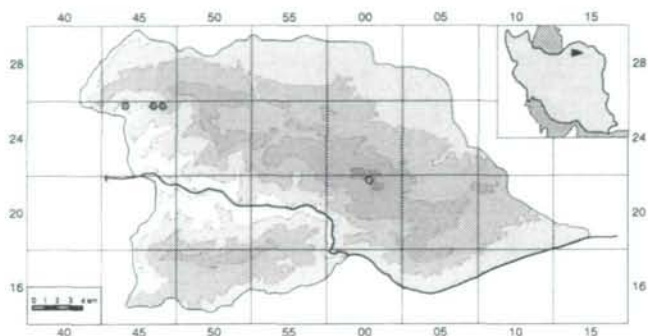
Map 760. *Cephalanthera rubra* (L.) Rich.



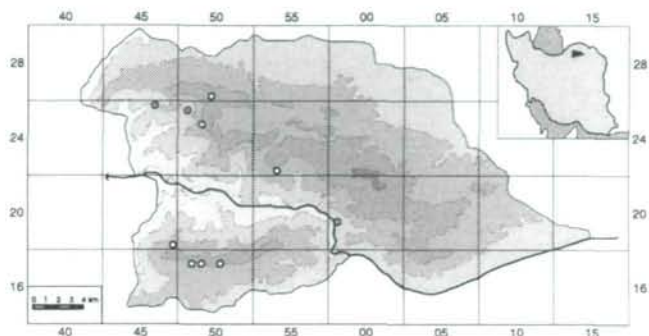
Map 761. *Dactylorhiza romana* (Seb.) Soó subsp. *georgica* (Klinge) Soó



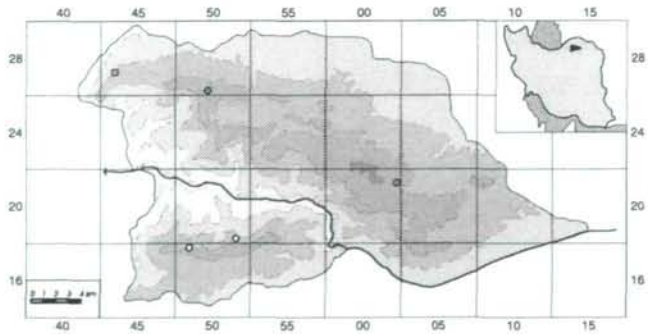
Map 762. *Epipactis helleborine* (L.) Crantz



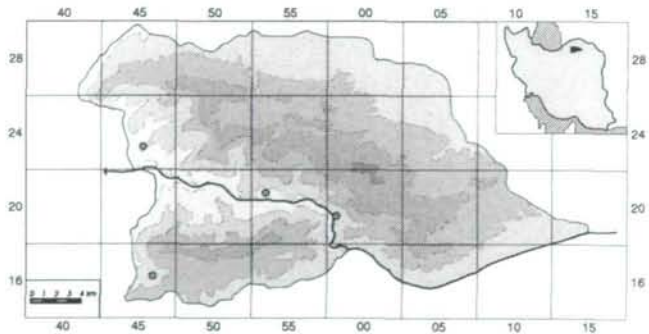
Map 763. *Epipactis microphylla* (Ehrh.) Sw.



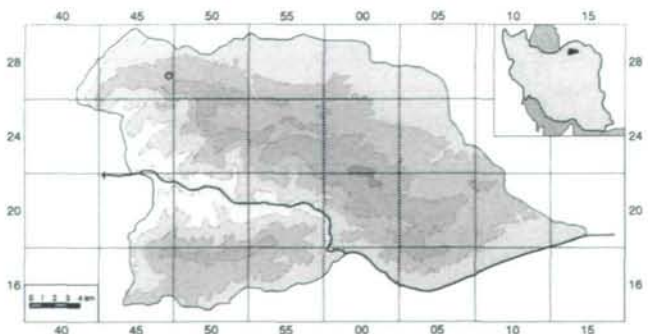
Map 764. *Epipactis persica* (Soó) Nannefeldt



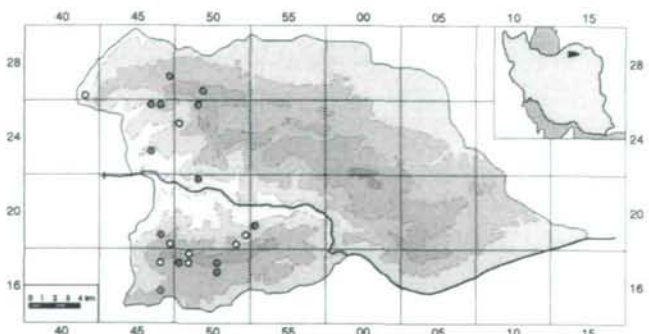
Map 765. *Epipactis rechingeri* Renz



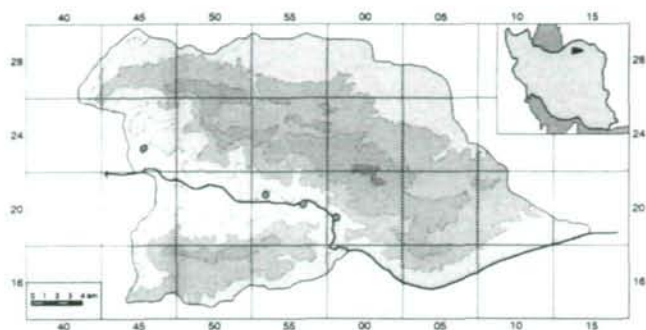
Map 766. *Limodorum abortivum* (L.) Sw.



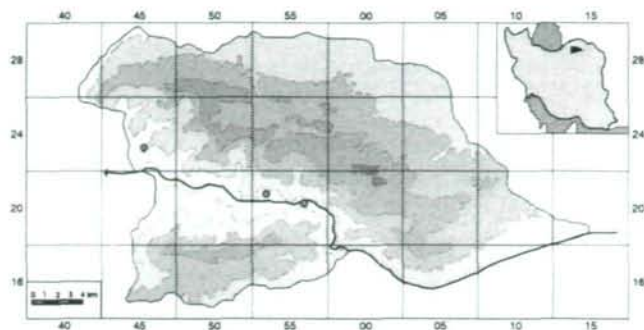
Map 767. *Listera ovata* (L.) R. Br.



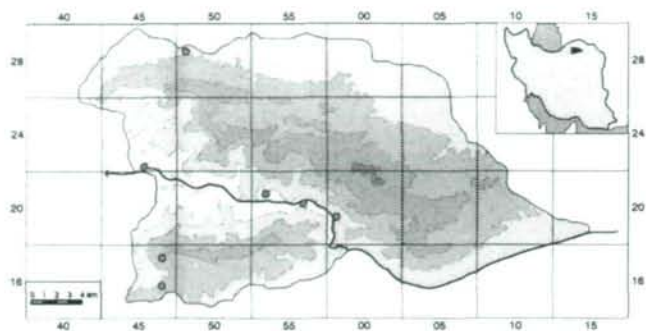
Map 768. *Neottia nidus-avis* (L.) Rich.



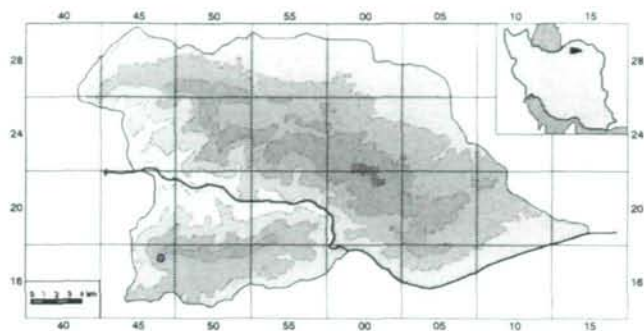
Map 769. *Ophrys scolopax* Cav.



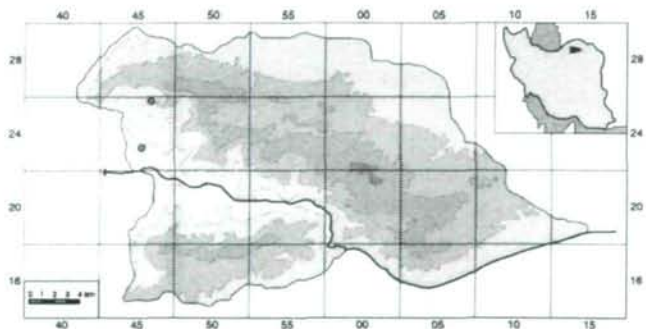
Map 770. *Ophrys sphegodes* Mill. subsp. *transhyrcana* (Czerniak.) Soó



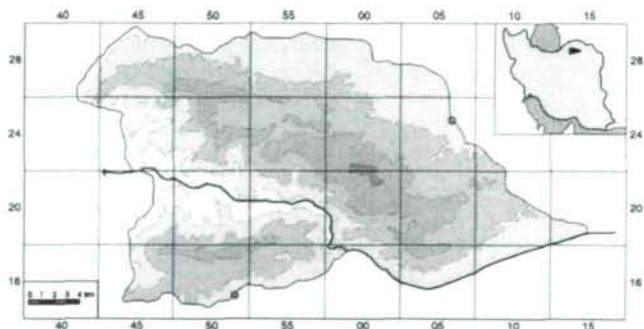
Map 771. *Orchis adenocheila* Czerniak.



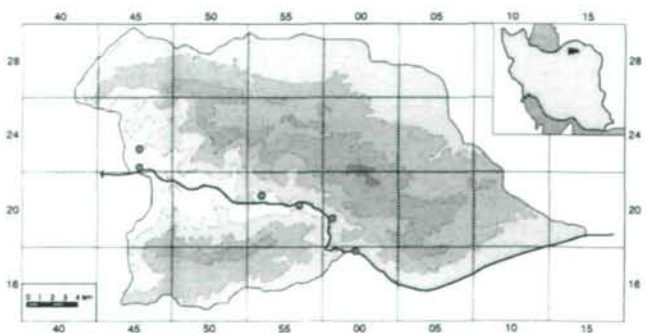
Map 772. *Orchis coriophora* L.



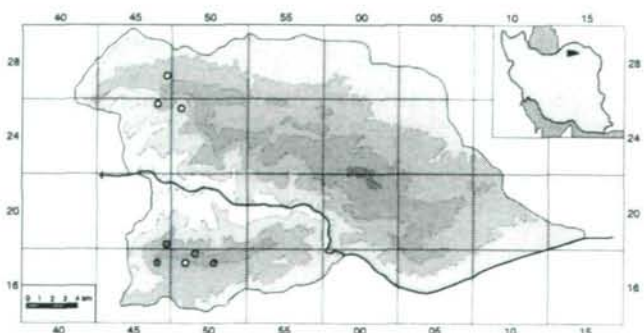
Map 773. *Orchis mascula* L. subsp. *pinetorum* (Boiss. & Kotschy) Camus



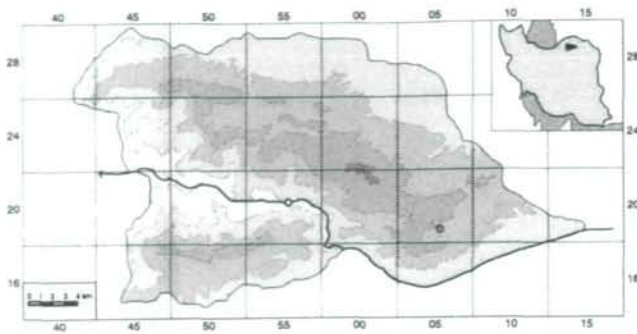
Map 774. *Orchis palustris* Jacq.



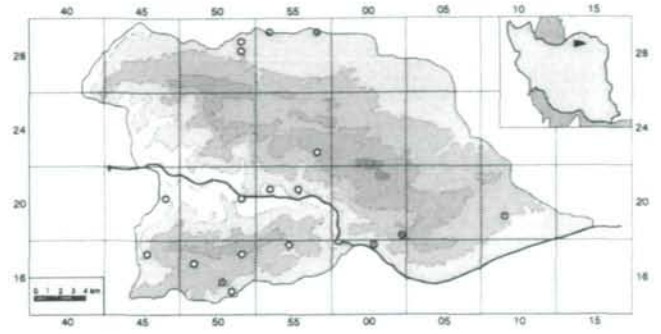
Map 775. *Orchis simia* Lam.



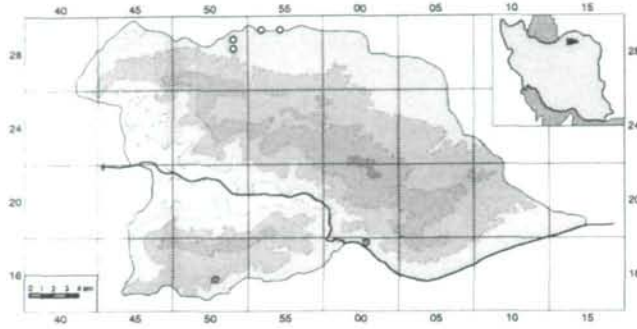
Map 776. *Platanthera bifolia* (L.) Rich.



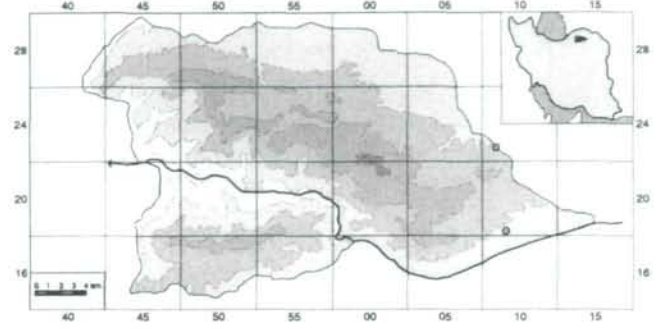
Map 777. *Aegilops cylindrica* Host



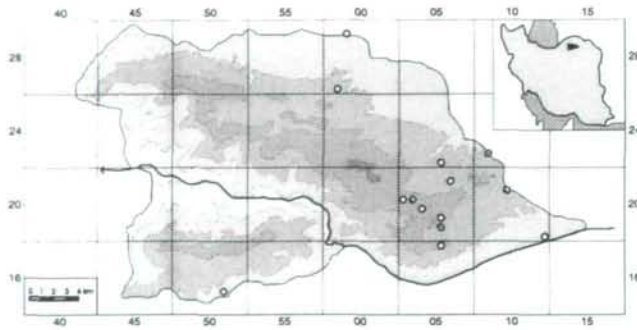
Map 778. *Aegilops tauschii* Coss.



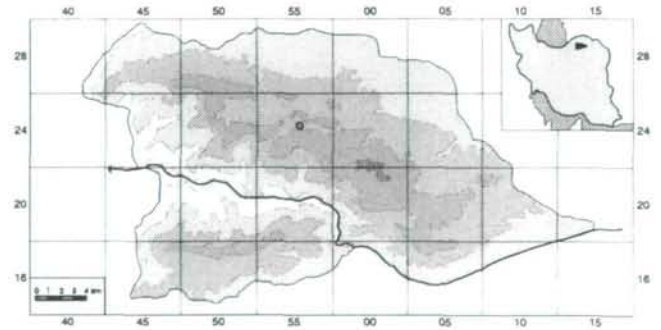
Map 779. *Aegilops triuncialis* L.



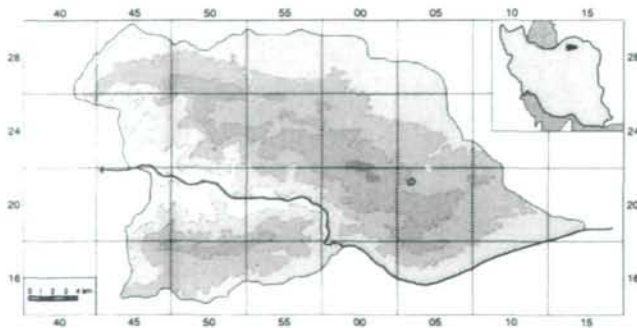
Map 780. *Aeluropus litoralis* (Gouan) Parl.



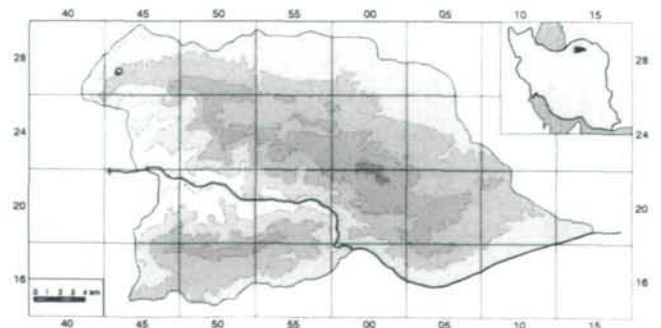
Map 781. *Agropyron cristatum* (L.) Gaertn. subsp. *pectinatum* (M. Bieb.) Tzvelev



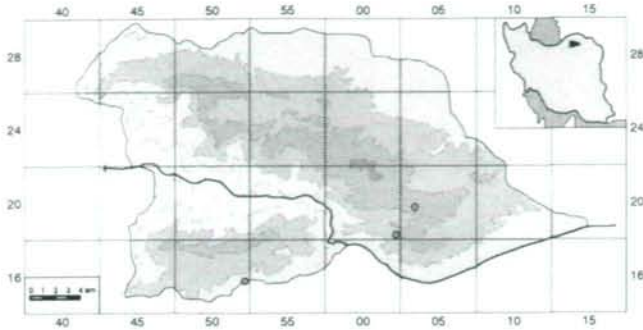
Map 782. *Agrostis gigantea* Roth, s. l.



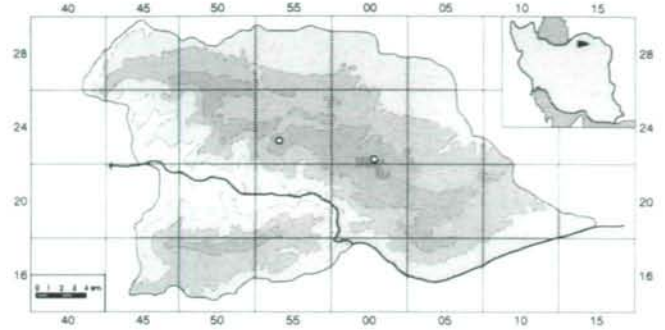
Map 783. *Agrostis* cf. *stolonifera* L.



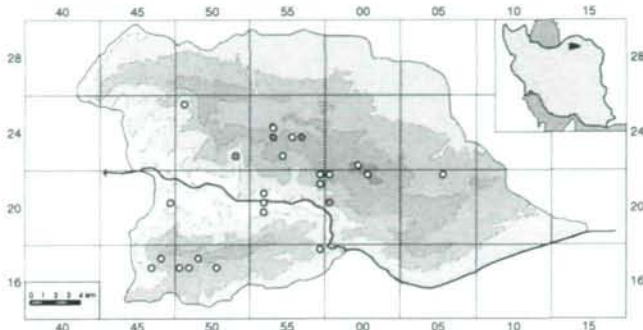
Map 784. *Alopecurus aequalis* Sobol. & *Glyceria arundinacea* (M. Bieb.) Kunth



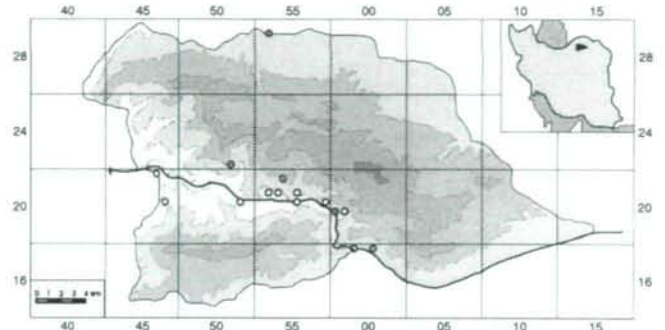
Map 785. *Alopecurus arundinaceus* Poir.



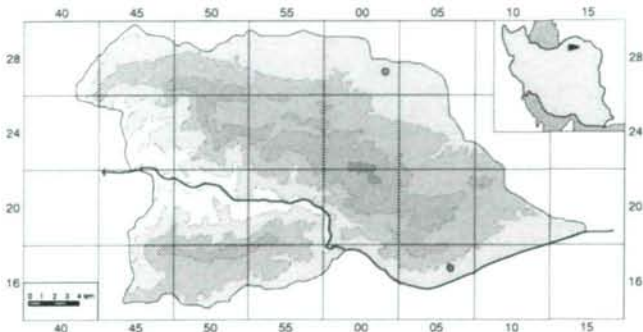
Map 786. *Alopecurus textilis* Boiss.



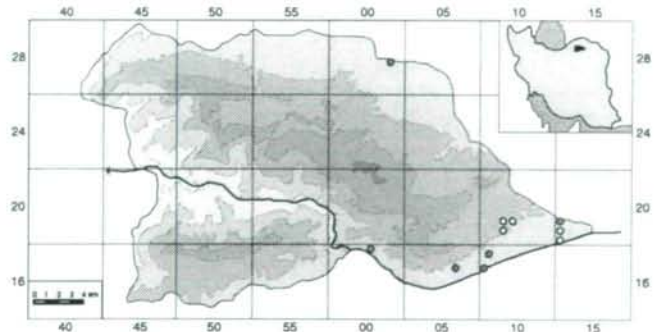
Map 787. *Arrhenatherum elatius* (L.) P. Beauv. ex J. & C. Presl



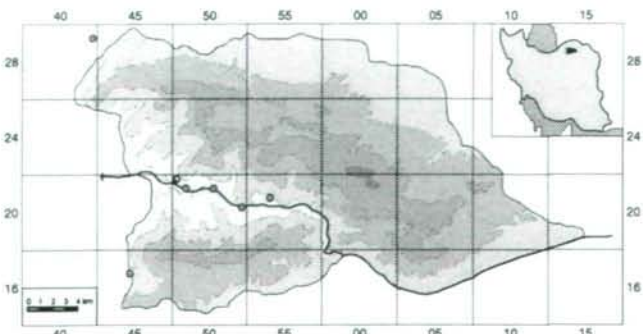
Map 788. *Avena sterilis* L. subsp. *ludoviciana* (Duietu) Gillet & Magne



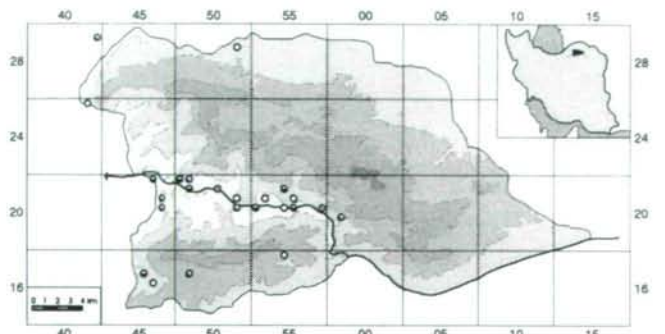
Map 789. *Avena wiestii* Steud.



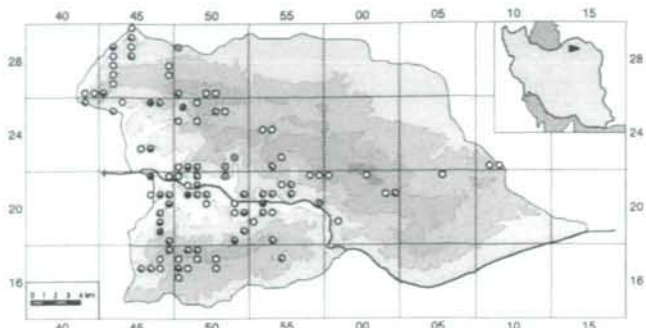
Map 790. *Boissiera squarrosa* (Banks & Sol.) Nevski



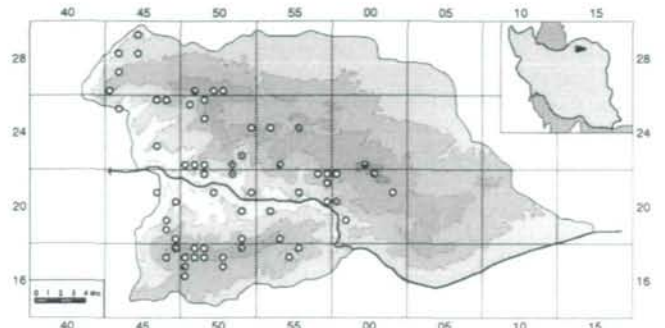
Map 791. *Bothriochloa bladhii* (Retz.) S. T. Blake



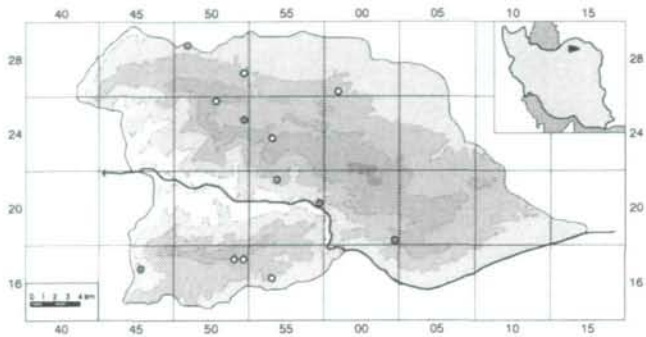
Map 792. *Bothriochloa ischaemum* (L.) Keng (some dots may refer to *B. bladhii* (Retz.) S. T. Blake)



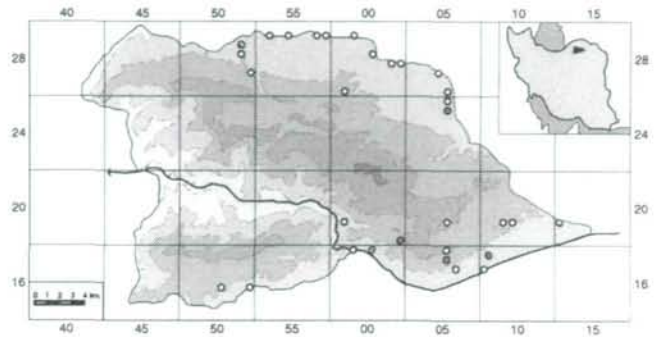
Map 793. *Brachypodium sylvaticum* (Huds.) P. Beauv.



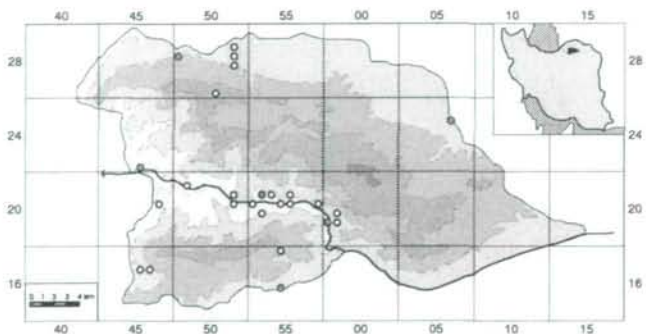
Map 794. *Bromus benekenii* (Lange) Trimen



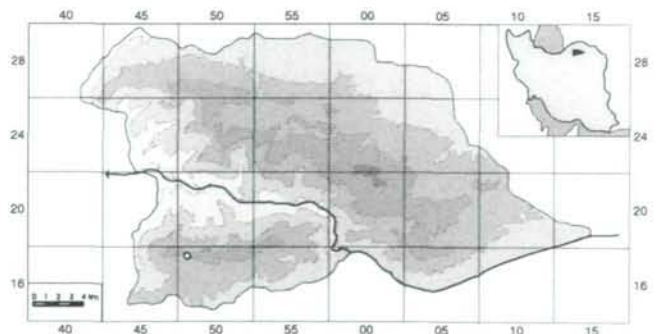
Map 795. *Bromus briziformis* Fisch. & C. A. Mey.



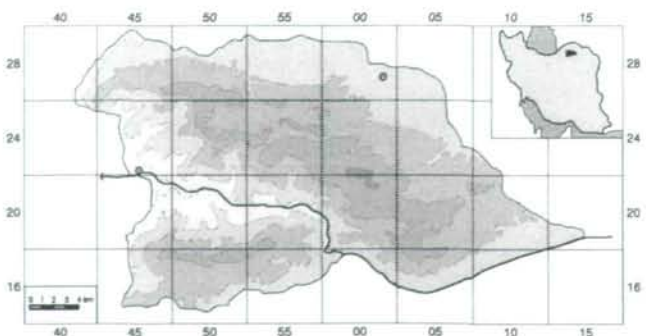
Map 796. *Bromus danthoniae* Trin.



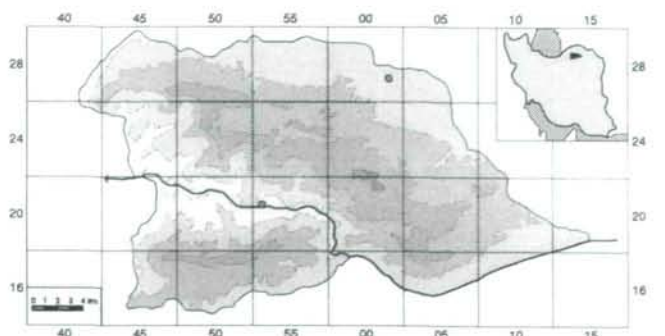
Map 797. *Bromus gedrosianus* Pénzes (some dots may refer to *B. japonicus*)



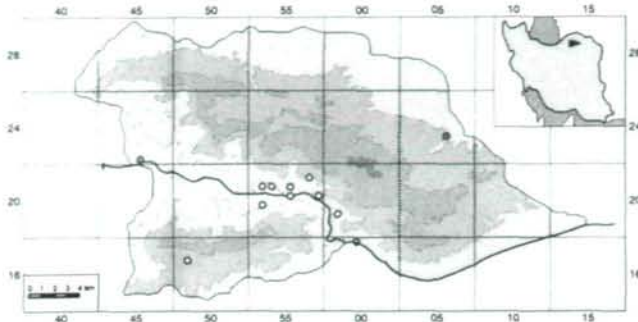
Map 798. *Bromus intermedius* Guss.



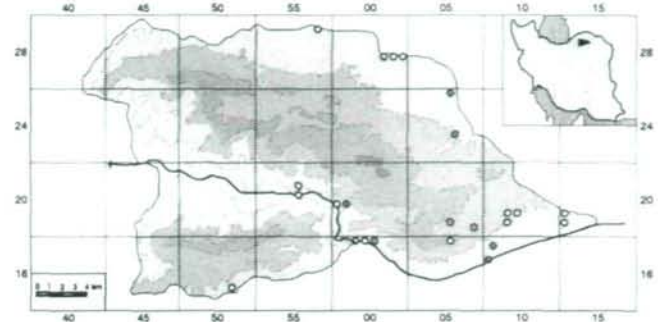
Map 799. *Bromus japonicus* Thunb. ex Murray



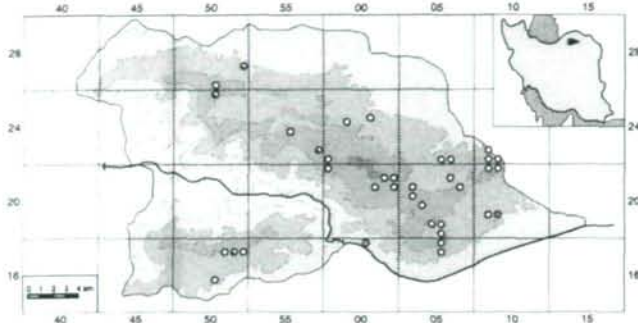
Map 800. *Bromus madritensis* L.



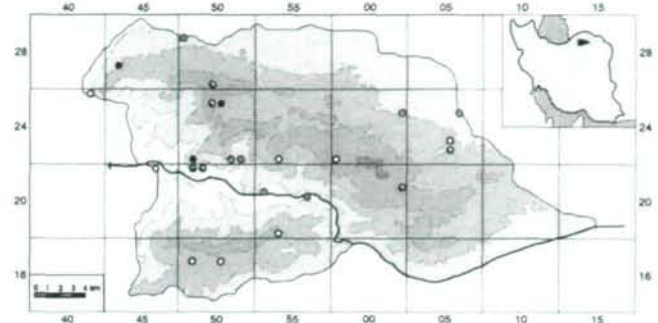
Map 801. *Bromus sterilis* L.



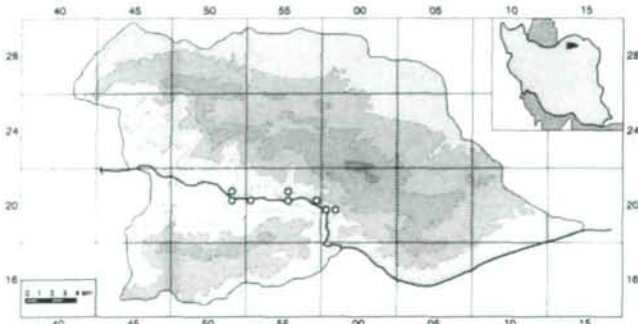
Map 802. *Bromus tectorum* L. subsp. *tectorum*



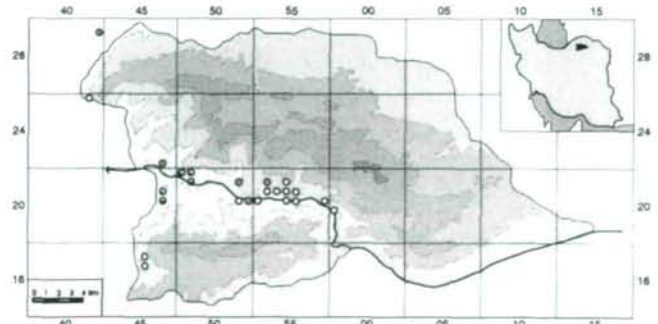
Map 803. *Bromus tomentellus* Boiss.



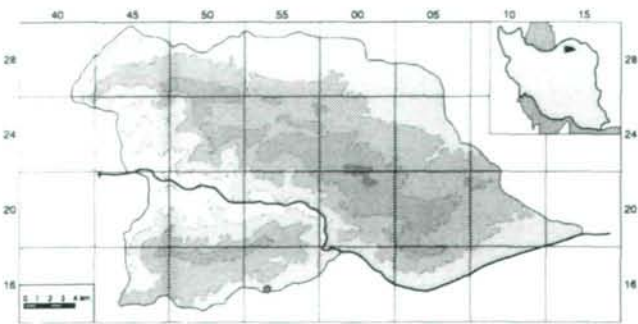
Map 804. *Calamagrostis epigejos* (L.) Roth



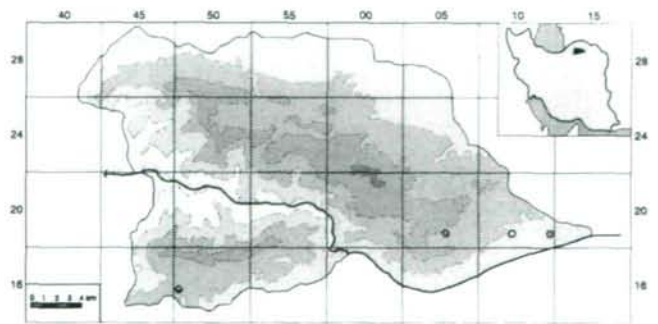
Map 805. *Catapodium rigidum* (L.) C. E. Hubb. ex Dony



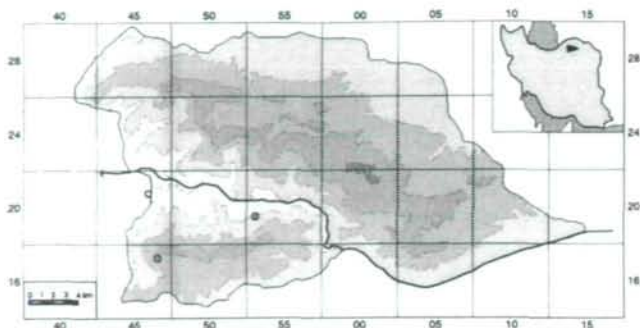
Map 806. *Cleistogenes serotina* (L.) Keng



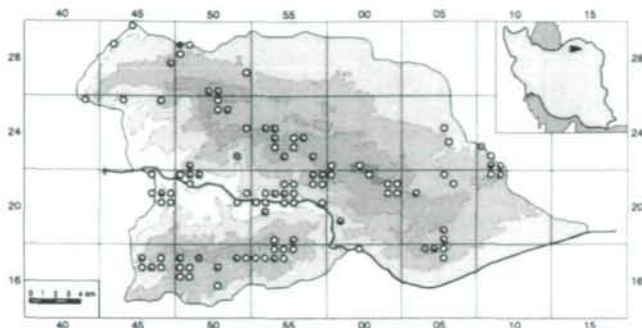
Map 807. *Cypripis schoenoides* (L.) Lam.



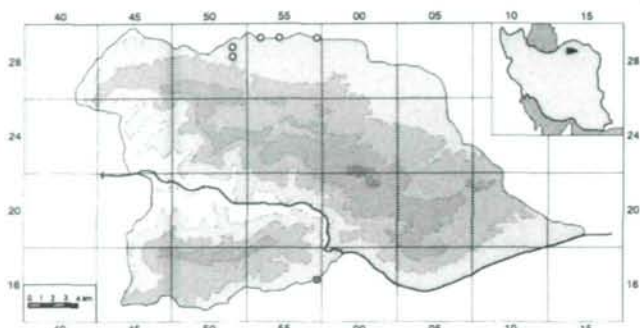
Map 808. *Cynodon dactylon* (L.) Pers.



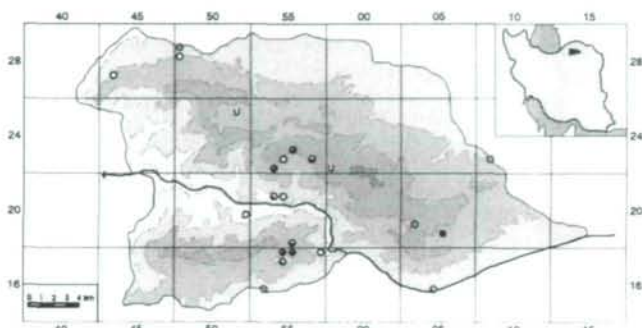
Map 809. *Cynosurus echinatus* L.



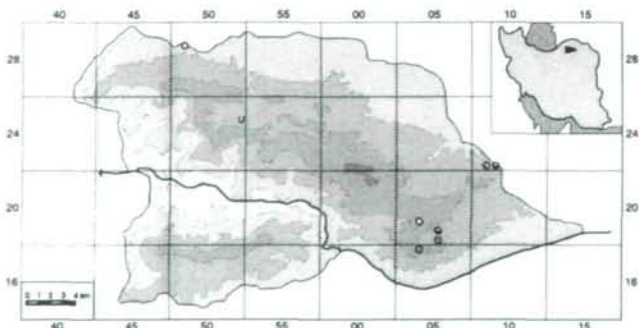
Map 810. *Dactylis glomerata* L., s. l.



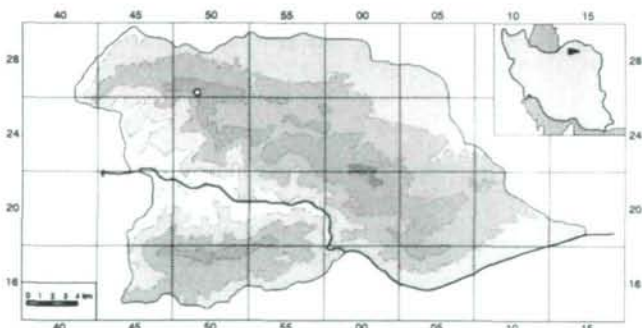
Map 811. *Echinaria capitata* (L.) Desf.



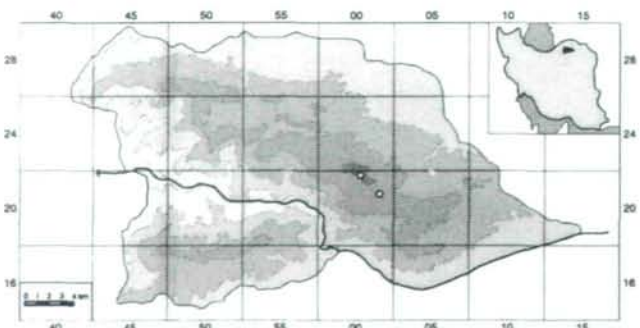
Map 812. *Elymus elongatiformis* (Drobov) Assadi



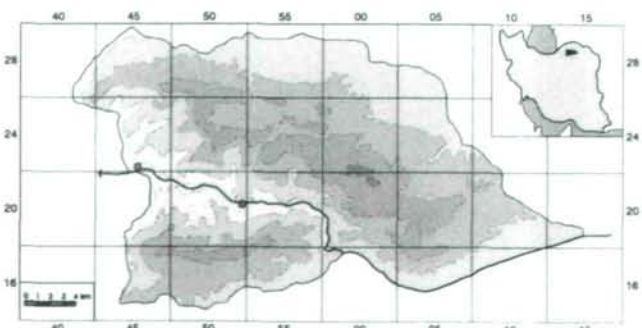
Map 813. *Elymus hispidus* (Opir) Melderis, s. l.



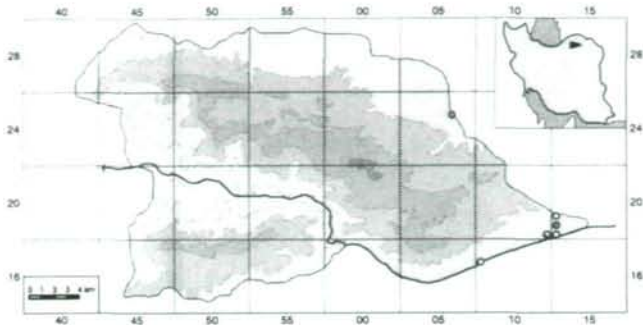
Map 814. *Elymus longearistatus* (Boiss.) Tzvelev



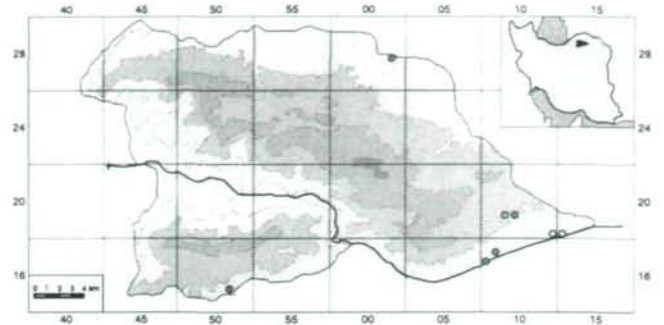
Map 815. *Elymus transhyrcanus* (Nevski) Tzvelev



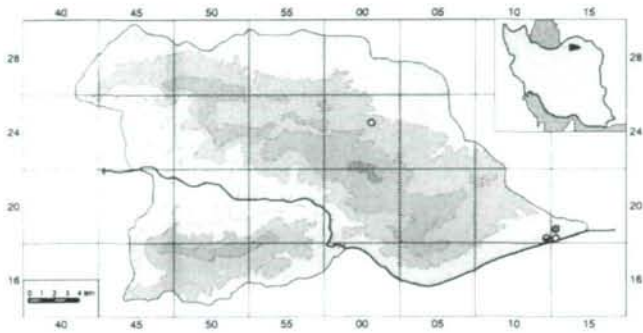
Map 816. *Eragrostis minor* Host



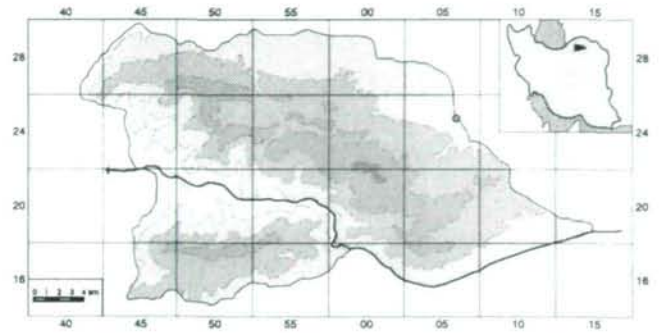
Map 817. *Eremopyrum bonaepartis* (Spreng.) Nevski



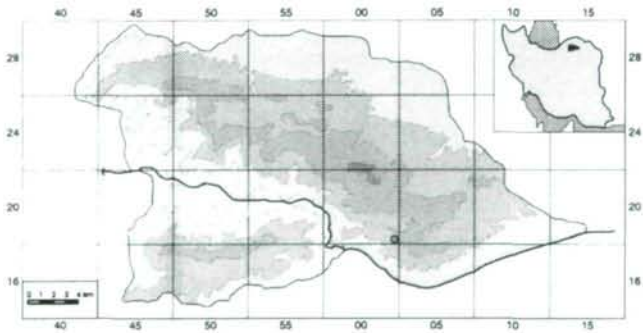
Map 818. *Eremopyrum distans* (K. Koch) Nevski



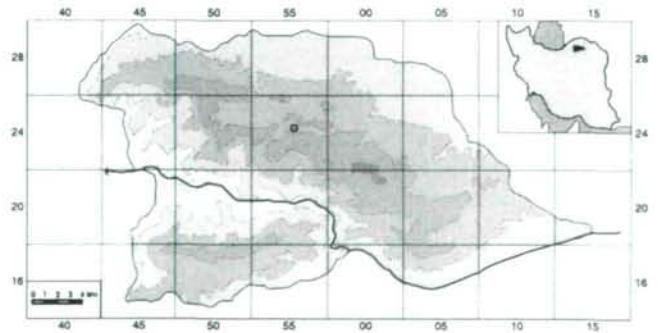
Map 819. *Eremopyrum orientale* (L.) Jaub. & Spach



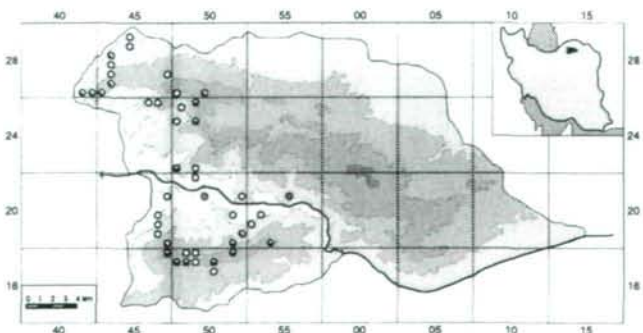
Map 820. *Eremopyrum triticeum* (Gaertn.) Nevski



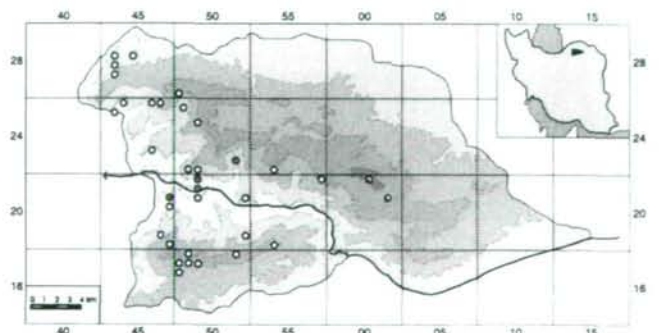
Map 821. *Festuca akhaniai* Tzvelev



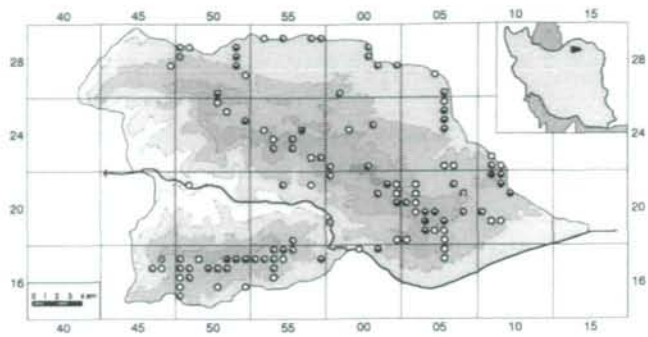
Map 822. *Festuca arundinacea* Schreb.



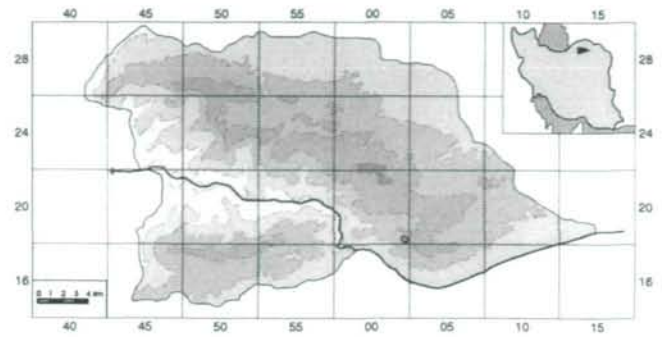
Map 823. *Festuca drymeia* Mert. & Koch



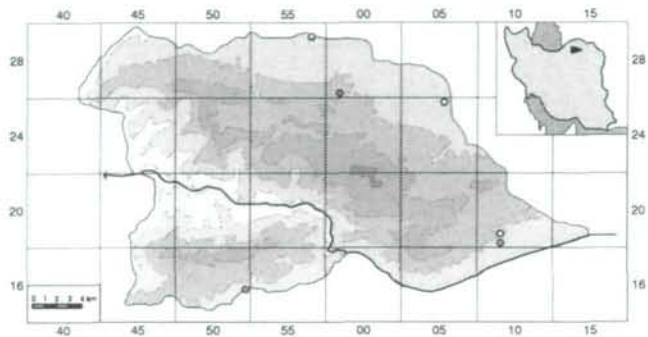
Map 824. *Festuca gigantea* (L.) Vill.



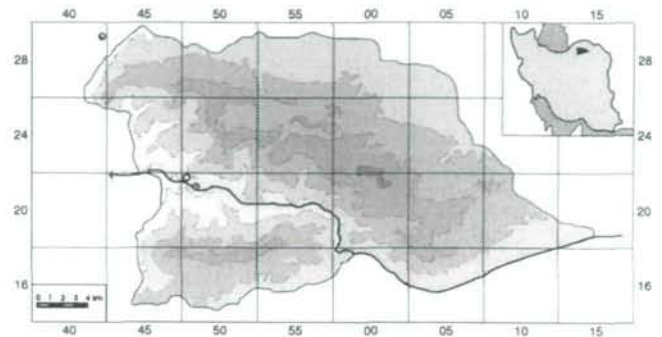
Map 825. *Festuca valesiaca* Gaudin



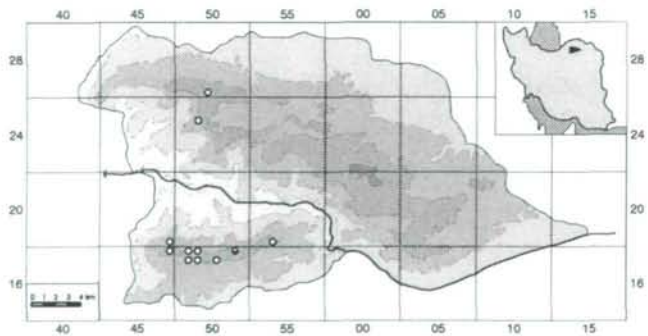
Map 826. *Glyceria plicata* (Fries) Fries



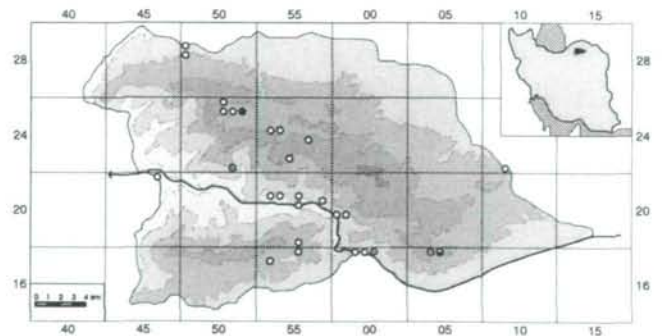
Map 827. *Henrardia persica* (Boiss.) C. E. Hubb.



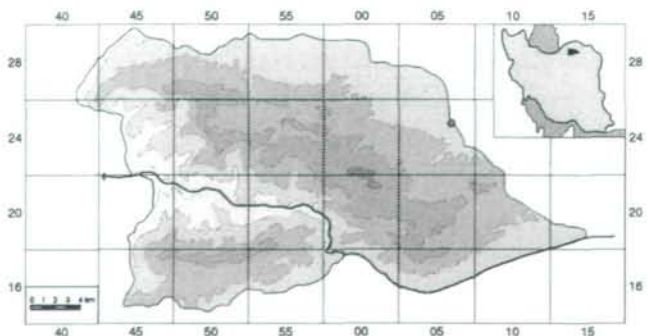
Map 828. *Heteropogon contortus* (L.) P. Beauv. ex Roem. & Schult.



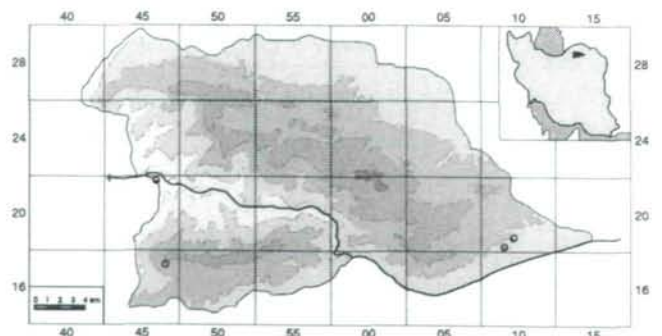
Map 829. *Hordelymus europaeus* (L.) Jess.



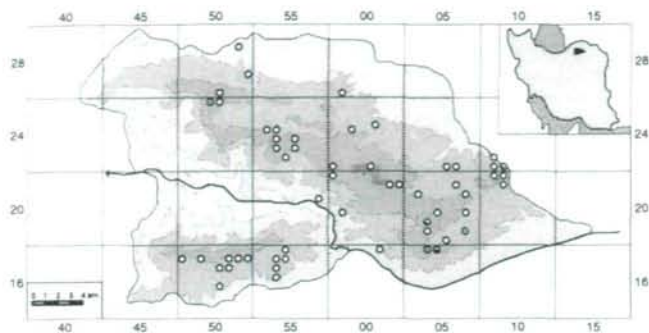
Map 830. *Hordeum bulbosum* L.



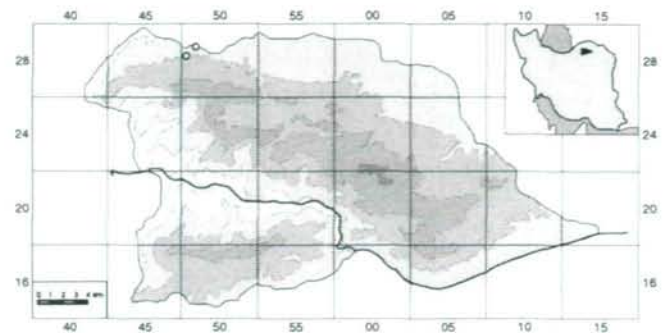
Map 831. *Hordeum murinum* L. subsp. *leporinum* (Link) Arcang.



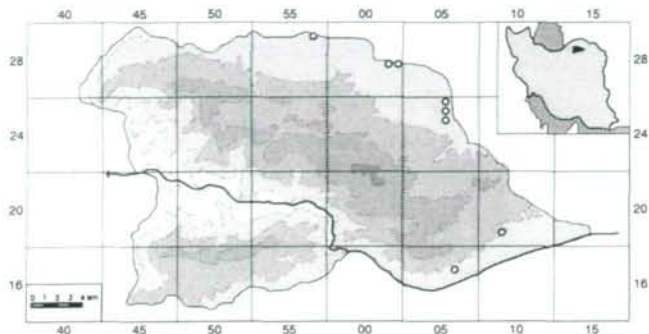
Map 832. *Imperata cylindrica* (L.) Raensch.



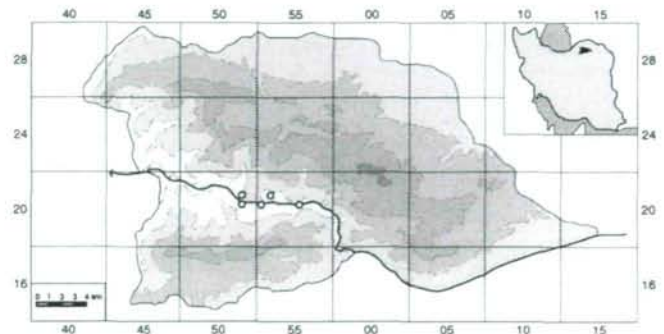
Map 833. *Koeleria macrantha* (Ledeb.) Schult.



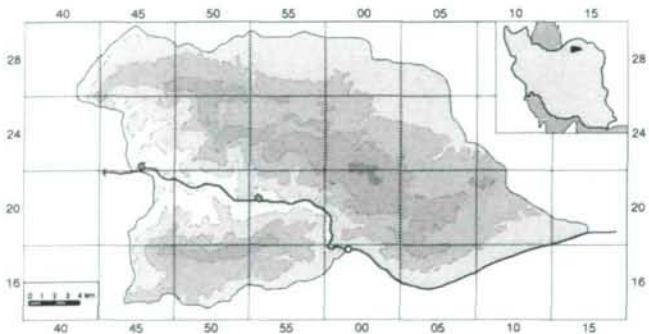
Map 834. *Koeleria nitidula* Velen.



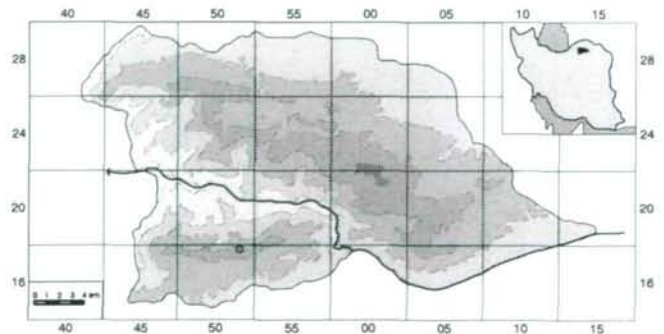
Map 835. *Lolium subulatum* (Banks & Sol.) Eig



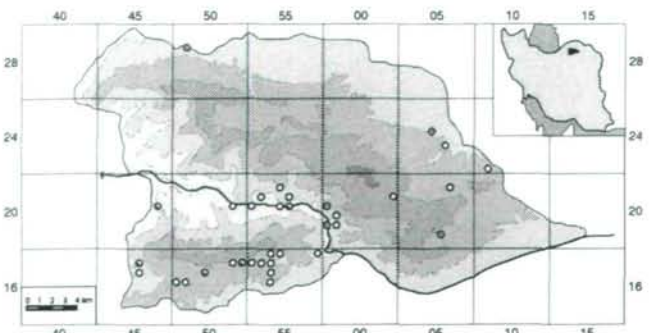
Map 836. *Lolium lolium* (Bory & Chaub.) Hand.-Mazz.



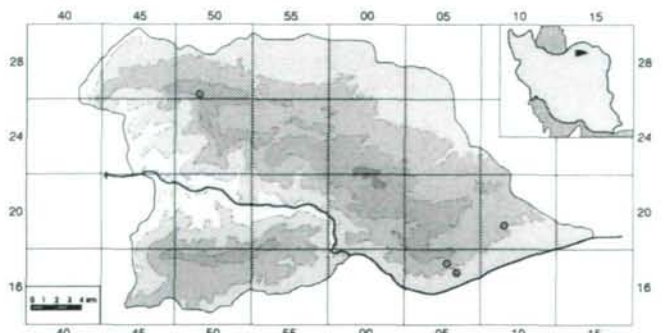
Map 837. *Lolium rigidum* Gaudin



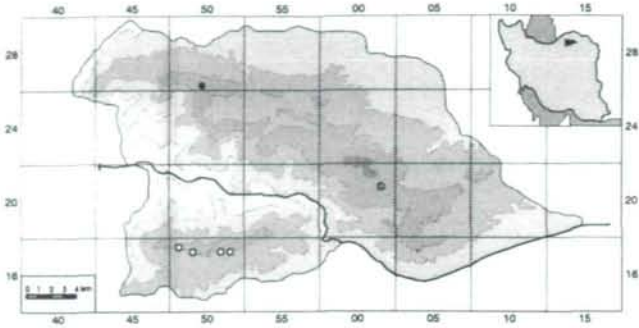
Map 838. *Melica altissima* L.



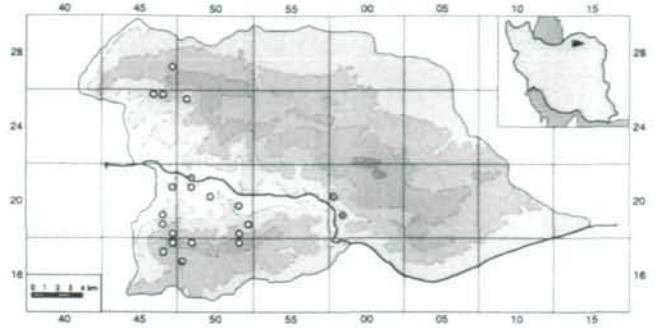
Map 839. *Melica ciliata* L., s. l.



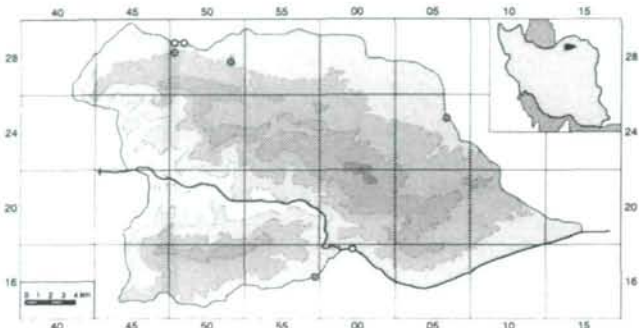
Map 840. *Melica persica* Kunth, s. l. (incl. *M. jacquemontii* subsp. *jacquemontii* & subsp. *hohenackeri*)



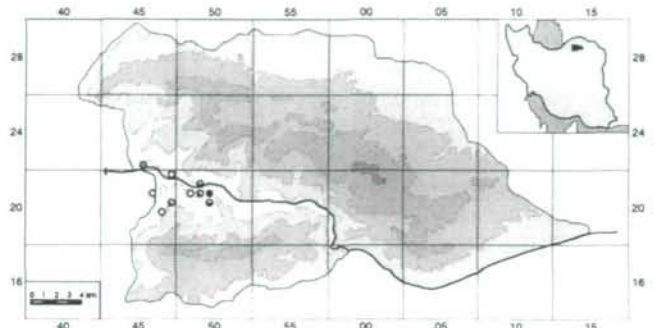
Map 841. *Melica transsilvanica* Schur



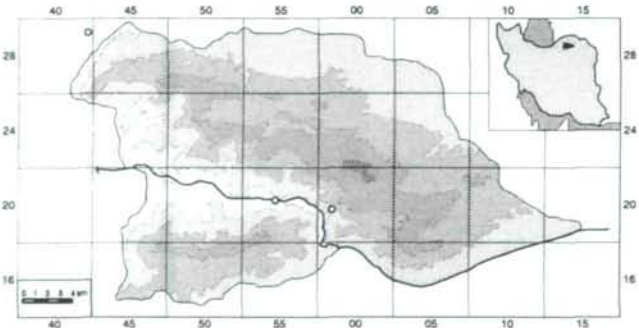
Map 842. *Melica uniflora* Retz.



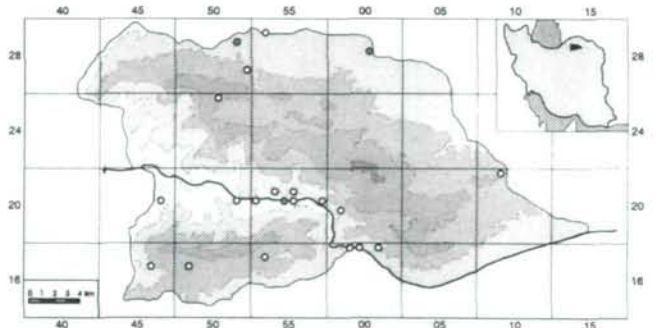
Map 843. *Milium vernale* M. Bieb.



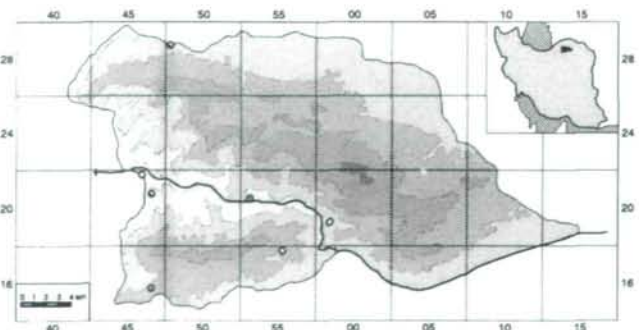
Map 844. *Oplismenus undulatifolius* (Ard.) Roem. & Schult.



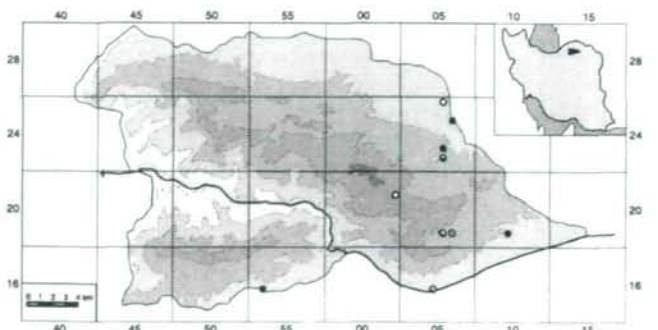
Map 845. *Pennisetum orientale* Rich.



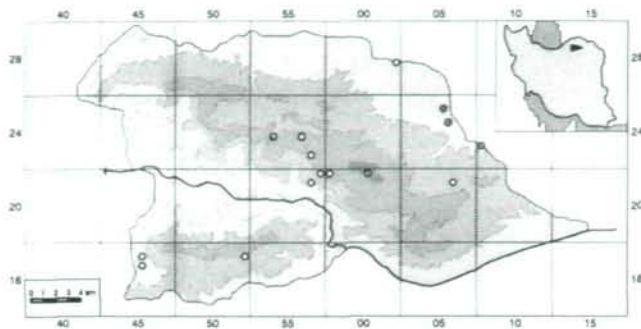
Map 846. *Phleum paniculatum* Huds.



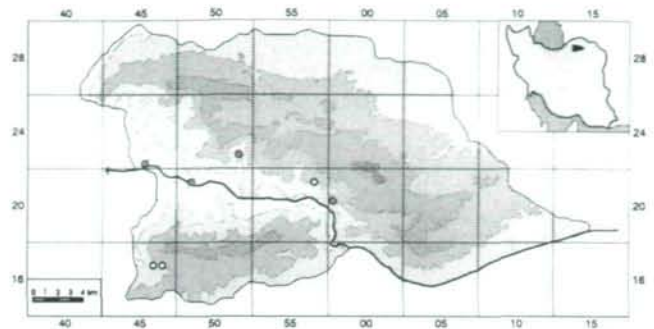
Map 847. *Phleum pratense* L.



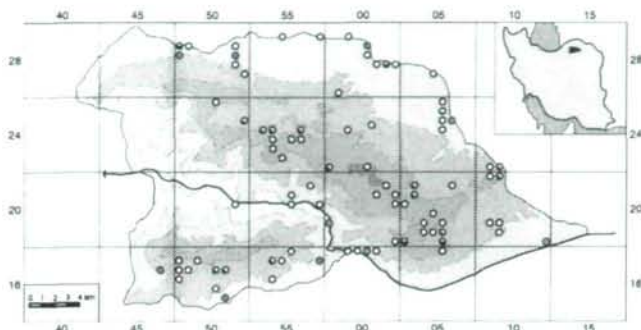
Map 848. *Phragmites australis* (Cav.) Trin. ex Steud.



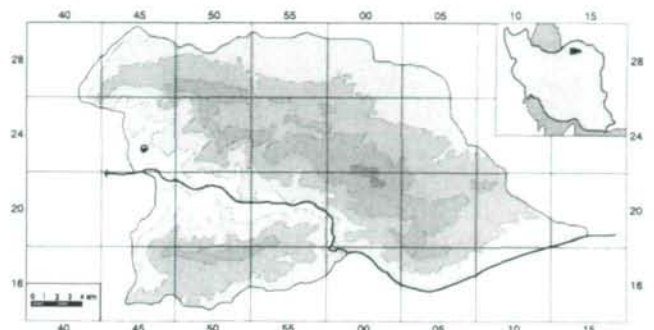
Map 849. *Piptatherum holciforme* (M. Bieb.) Roem. & Schult.



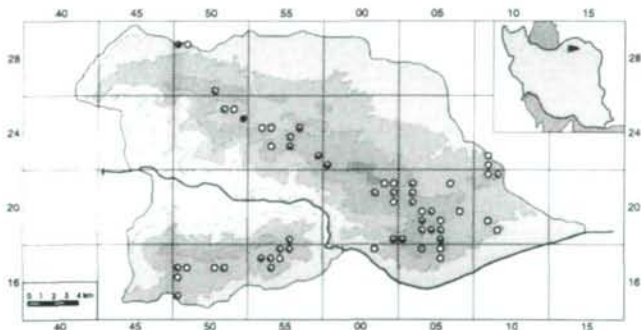
Map 850. *Piptatherum virescens* (Trin.) Boiss.



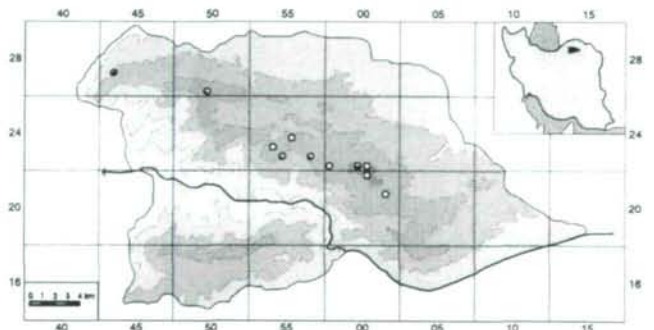
Map 851. *Poa bulbosa* L. s. l.



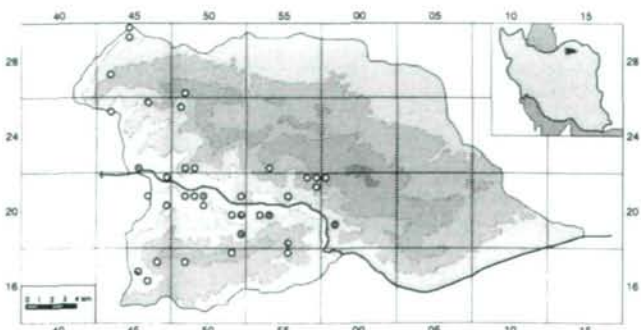
Map 852. *Poa compressa* L.



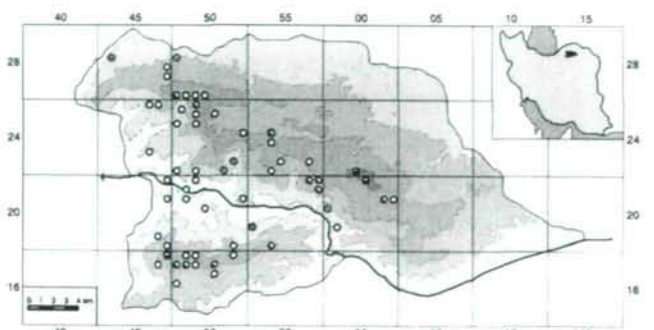
Map 853. *Poa densa* Troitzky



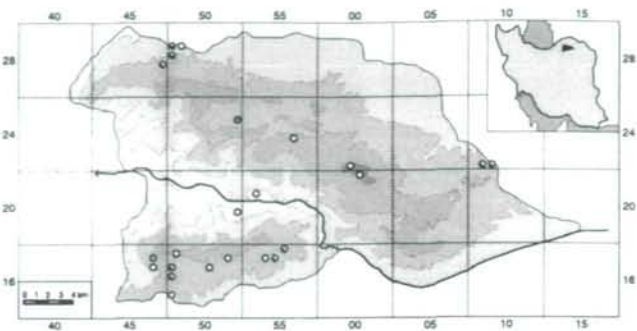
Map 854. *Poa golestanensis* H. Scholz & Akhani



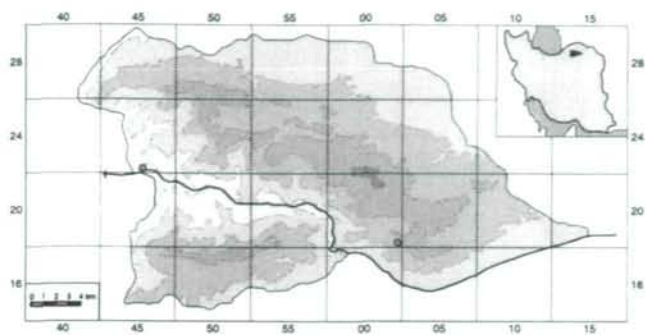
Map 855. *Poa masenderana* Freyn & Sint.



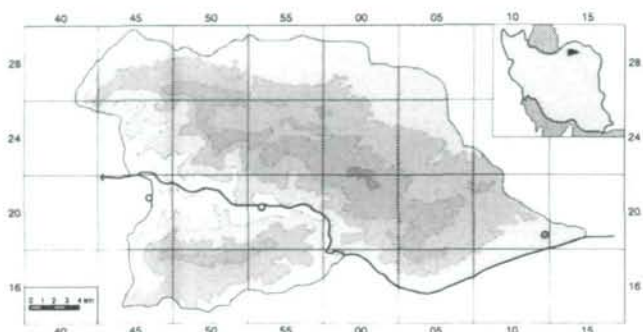
Map 856. *Poa nemoralis* L.



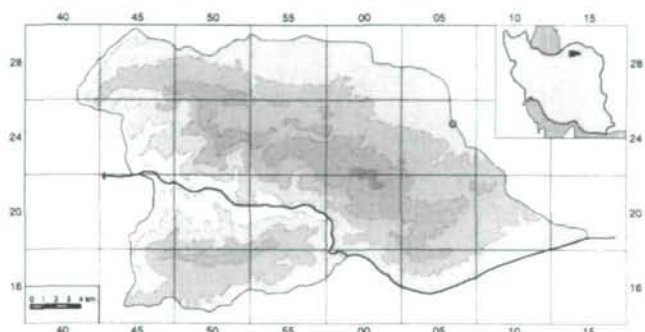
Map 857. *Poa pratensis* L. subsp. *angustifolia* (L.) Lindb. f.



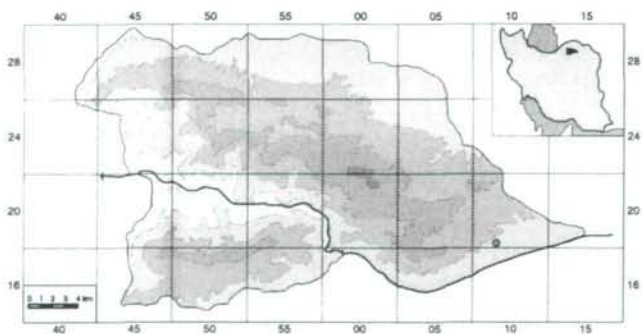
Map 858. *Poa trivialis* L.



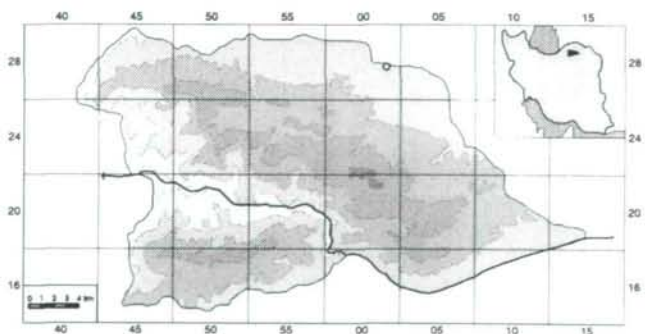
Map 859. *Polygonum fugax* Nees ex Steud.



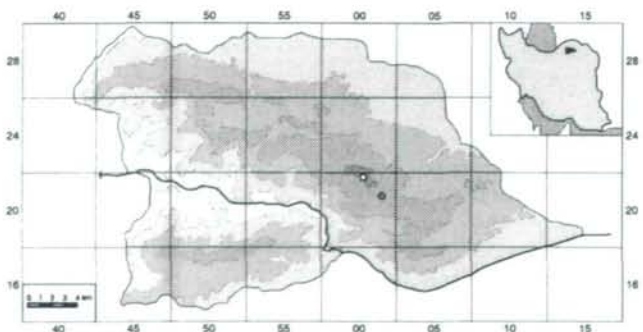
Map 860. *Puccinellia bulbosa* (Grossh.) Grossh. & *Sclerochloa dura* (L.) P. Beauv.



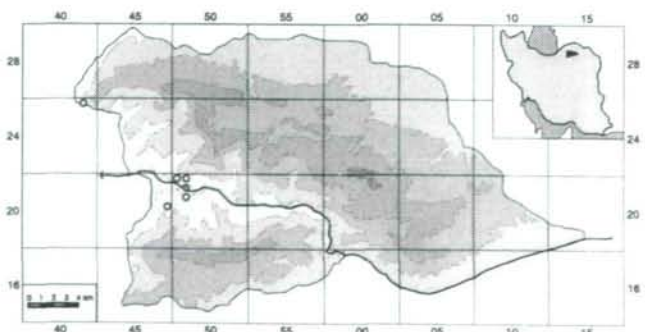
Map 861. *Puccinellia grosheimiana* (V. I. Krecz.) V. I. Krecz.



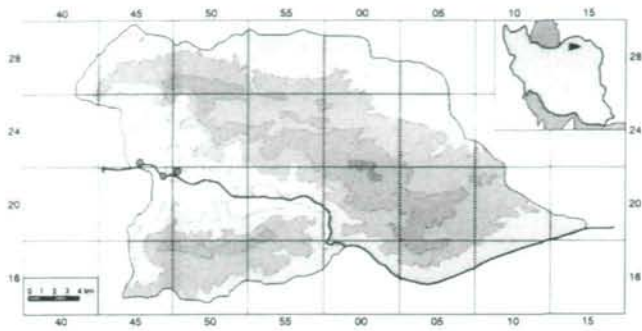
Map 862. *Rhizocephalus orientalis* Boiss.



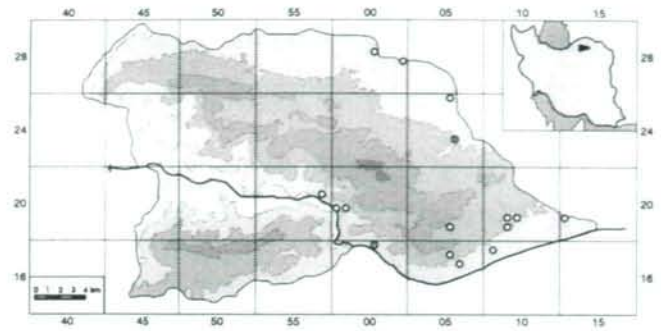
Map 863. *Secale montanum* Guss.



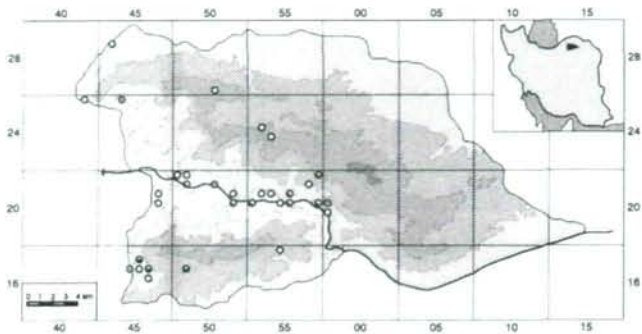
Map 864. *Setaria viridis* (L.) P. Beauv.



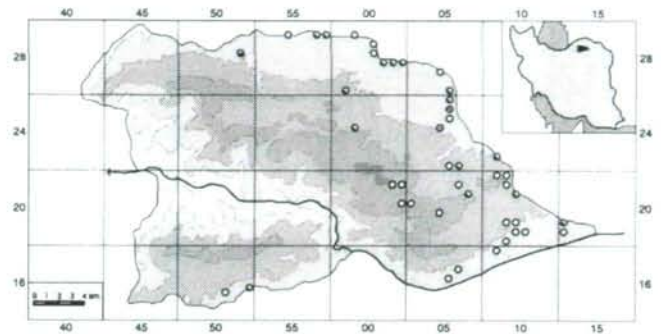
Map 865. *Sorghum halepense* (L.) Pers.



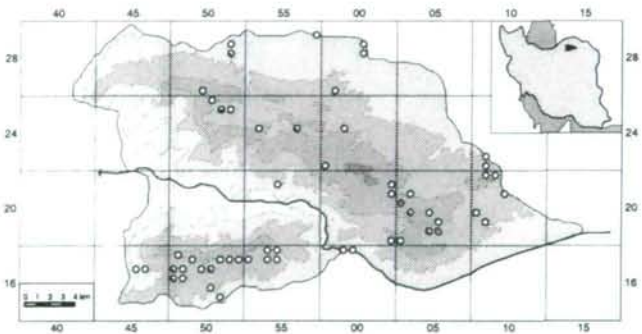
Map 866. *Stipa arabica* Trin. & Rupr.



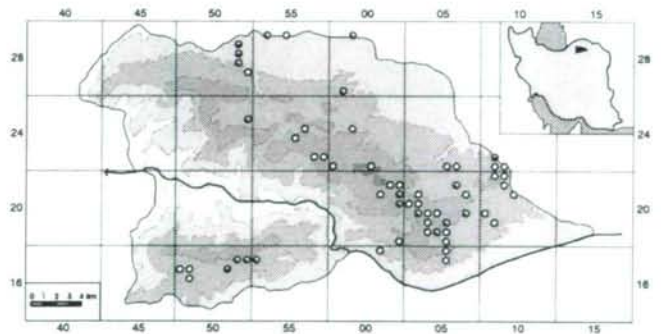
Map 867. *Stipa bromoides* (L.) Dörf.



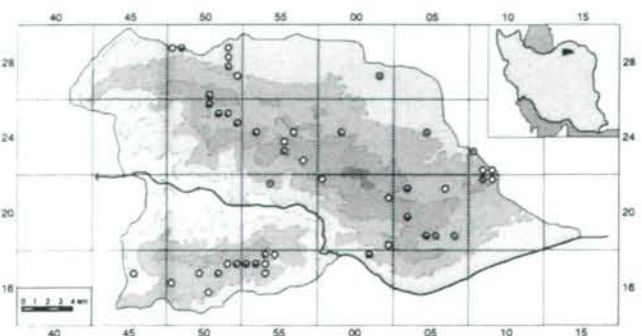
Map 868. *Stipa caucasica* Schmalh., s.l.



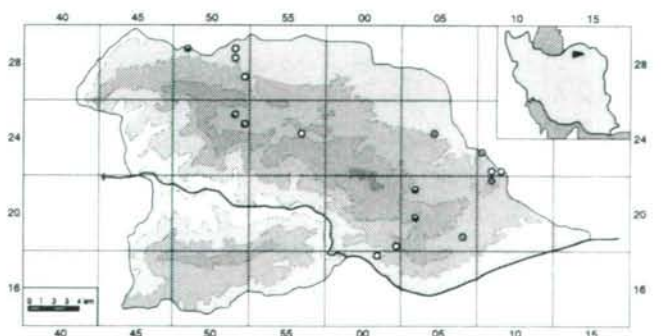
Map 869. *Stipa holosericea* Trin.



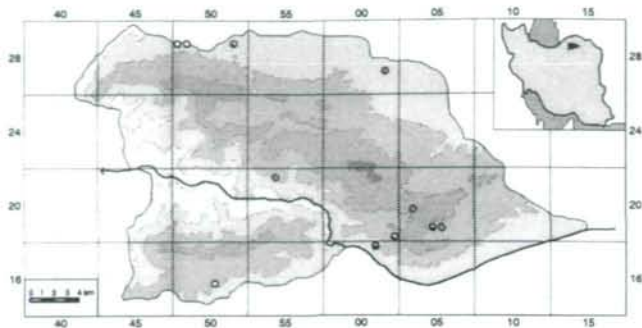
Map 870. *Stipa lessingiana* Trin. & Rupr.



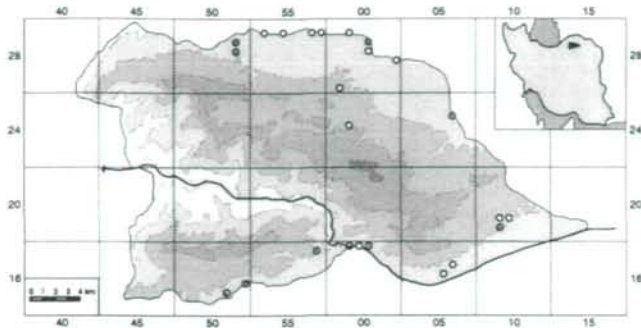
Map 871. *Stipa pennata* L. s. l. (incl. *St. pulcherrima* K. Koch & *St. zalesskii* Wilensky)



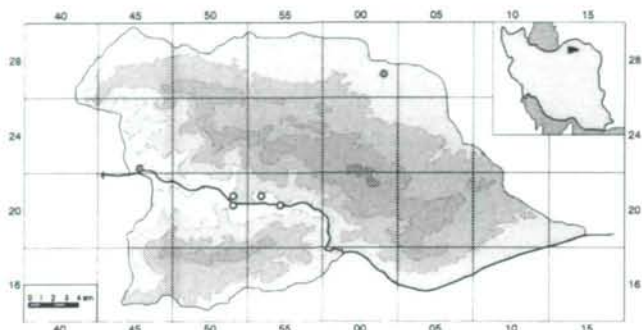
Map 872. *Stipa pulcherrima* K. Koch



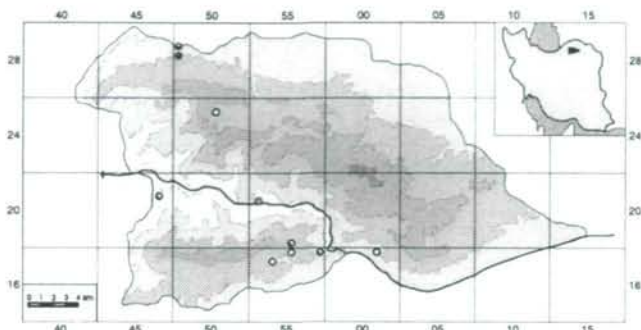
Map 873. *Stipa zalesskii* Wilensky



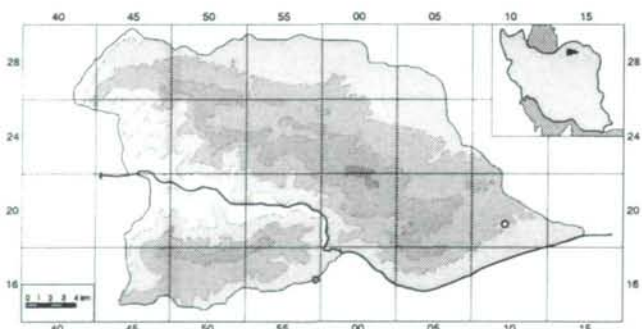
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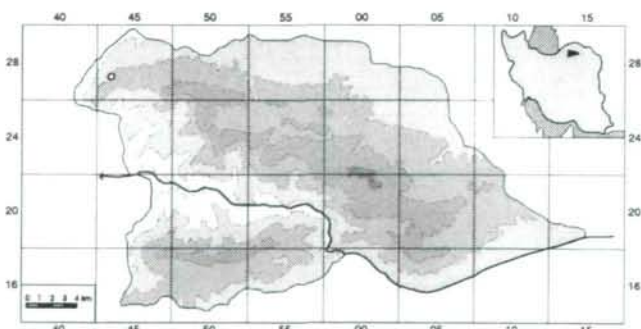
Map 875. *Trachynia distachya* (L.) Link



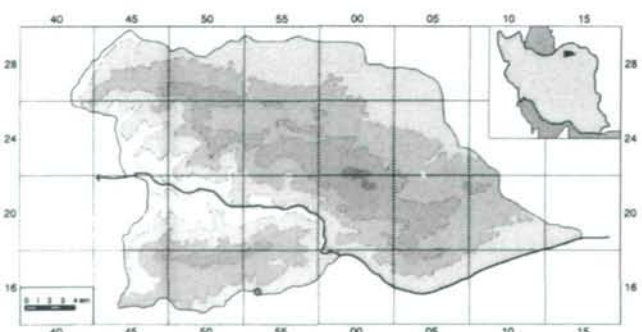
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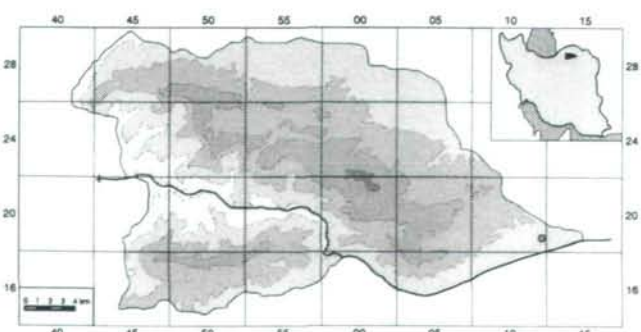
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<i>E. triticeum</i>	820	<i>Geranium kotschyi</i>	427	<i>I. kopetdagensis</i>	708
<i>Eremostachys labiosiformis</i>	445	<i>G. purpureum</i>	428	<i>I. reticulata</i>	709
<i>E. moluccelleoides</i>	446	<i>G. pyrenaicum</i>	429	<i>I. spuria</i> ssp. <i>musulmanica</i>	710
<i>Eremurus indiensis</i>	735	<i>G. rotundifolium</i>	430	<i>Ixiolirion tataricum</i>	682
<i>E. kopetdaghensis</i>	736	<i>Geum heterocarpum</i>	580	<i>Jasminum fruticans</i>	498
<i>E. olgae</i>	737	<i>G. urbanum</i>	581	<i>Johrenia golestanica</i>	53
<i>E. spectabilis</i> ssp.		<i>Gladiolus segetum</i>	705	<i>Juglans regia</i>	439
<i>subalbiflorus</i>	738	<i>Glaucium elegans</i>	509	<i>Juncus articulatus</i>	711
<i>Erigeron acer</i>	123	<i>G. oxylobum</i>	510	<i>J. effusus</i>	712
<i>Eriocyclus ghaffooriana</i>	46	<i>Glyceria arundinacea</i>	784	<i>J. fontanesii</i>	712
<i>Erodium cicutarium</i>	426	<i>G. plicata</i>	826	<i>J. gerardi</i> ssp. <i>persicus</i>	713
<i>Eryngium bungei</i>	47	<i>Glycyrrhiza glabra</i>	376	<i>J. inflexus</i>	714
<i>E. caucasicum</i>	48	<i>Goldbachia laevigata</i>	228	<i>J. maritimus</i>	715
<i>Erysimum ischnostylum</i>	224	<i>Gypsophila aretioides</i>	263	<i>J. rigidus</i>	716
<i>E. kerbabaevii</i>	225	<i>G. bicolor</i>	264	<i>Juniperus communis</i>	20
<i>Euclidium syriacum</i>	226	<i>Halothamnus glaucus</i>	304	<i>J. excelsa</i>	21
<i>E. tenuissimum</i>	227	<i>Haloxylon ammodendron</i>	305	<i>J. sabina</i>	22
<i>Euonymus latifolia</i>	288	<i>Haplophyllum acutifolium</i>	619	<i>Jurinea antonowii</i>	133
<i>E. velutina</i>	289	<i>H. obtusifolium</i>	620	<i>J. monocephala</i>	134
<i>Eupatorium cannabinum</i>	124	<i>Hedysarum kopetdaghi</i>	377	<i>J. radians</i> ssp. <i>radians</i>	135
<i>Euphorbia amygdaloides</i>	347	<i>H. micropterum</i>	378	<i>Kalidium caspicum</i>	306
<i>E. buhsei</i>	348	<i>Helianthemum</i>		<i>Kochia prostrata</i>	307
<i>E. bungei</i>	349	<i>nummularium</i>	323	<i>Koeleria macrantha</i>	833
<i>E. falcata</i>	350	<i>H. salicifolium</i>	324	<i>K. nitidula</i>	834
<i>E. humilis</i>	315	<i>Helichrysum ocephalum</i>	126	<i>Koelpinia linearis</i>	136
<i>E. marschalliana</i>	352	<i>Henrardia persica</i>	827	<i>Korovinina tenuisecta</i>	55
<i>Falcaria vulgaris</i>	49	<i>Heraclium gorganicum</i>	54	<i>Korshinskya</i>	
<i>Ferula ovina</i>	50	<i>Herniaria cashemiriana</i>	265	<i>kopetdaghensis</i>	56
<i>F. szowitsiana</i>	51	<i>H. incana</i>	266	<i>Krascheninnikovia</i>	
<i>Festuca akhaniai</i>	821	<i>Hesperis hyrcana</i>	229	<i>ceratoides</i>	308
<i>F. arundinacea</i>	822	<i>Heteropappus altaicus</i>	127	<i>Lactuca georgica</i>	137
<i>F. drymeia</i>	823	<i>Heteropogon contortus</i>	828	<i>L. serriola</i>	138
<i>F. gigantea</i>	824	<i>Holosteum glutinosum</i>	267	<i>Lagochilus aucheri</i>	448

Lallemantia iberica	449	M. monantha	385	Origanum vulgare	462
L. royleana	450	M. monspeliaca	386	Ornithogalum bungei	747
Lamium album	451	M. orbicularis	387	O. sintenisii	748
L. amplexicaule	452	M. rigiduloides	388	Orobanche alba	503
L. purpureum	453	M. sativa	389	O. coelestis	504
Lappula barbata	180	Melica altissima	838	O. mutelii	505
L. sinaica	181	M. ciliata	839	O. orientalis	506
L. spinocarpos	182	M. persica	840	Oxalis corniculata	507
Lapsana communis	139	M. transsilvanica	841	Oxytropis kopetdaghensis	398
Laser rechingeri	57	M. uniflora	842	O. suaveis	399
L. trilobum	58	Melilotus albus	390	Paenonia wittmanniana	508
Lathyrus aphaca	379	M. dentatus	391	Paliurus spina-christi	561
L. laxiflorus	380	Melissa officinalis	457	Papaver dubium ssp.	
L. pratensis	381	Mentha aquatica	458	erosum	512
Lecokia cretica	59	M. longifolia	459	P. pavonicum	513
Lemna gibba	718	Meristotropis xanthioides	392	Parietaria judaica	664
L. minor	719	Mesostomma kotschyana		P. officinalis	665
L. trisulca	720	ssp. afghanica	269	Parrotia persica	432
Leontodon asperimus	140	Mespilus germanica	583	Pennisetum orientale	845
Leptorhabdos parviflora	628	Milium vernale	843	Periploca graeca	73
Lepyrodiclis stellarioides	268	Minuartia hamata	270	Perovskia abrotanoides	463
Limodorum abortivum	766	M. meyeri	271	Petasites hybridus	144
Limonium gmelinii	524	Moehringia trinervia	272	Petrorhagia prolifera	273
L. suffruticosum	525	Moriera spinosa	232	Phleum paniculatum	846
Linaria dalmatica	629	Muscari caucasicum	745	Ph. pratense	847
L. pyramidalis ssp.		M. neglectum	746	Phlomis cancellata	464
kopetdaghensis	630	Myosotis alpestris	187	P. herba-venti ssp.	
L. simplex	631	M. arvensis	188	kopetdaghensis	465
L. spec. (aff. grandiflora)	632	M. minutiflora	189	Phragmites australis	848
Linosyris vulgaris	141	M. ramosissima	190	Phyllitis scolopendrium	7
Linum corymbulosum	489	Myriactis wallichii	142	Physalis alkekengi	653
L. nervosum	490	Neotorularia dentata	233	Picnomon acarna	145
Listera ovata	767	Neottia nidus-avis	768	Picris strigosa	146
Lithospermum arvense	183	Nepeta pungens	460	Pimpinella anthriscoides	61
L. officinale	184	N. sintenisii	461	P. tragium	62
L. purpureocaeruleum	185	Noaea mucronata	309	Piptatherum holciforme	849
L. tenuiflorum	186	N. caspica	191	P. virescens	850
Lolium subulatum	835	N. lutea	192	Pistacia atlantica	31
Lolium loliaceum	836	N. turcomanica	193	Plantago lanceolata	516
L. rigidum	837	Onobrychis cornuta	393	P. major	517
Lonicera bracteolaris	246	O. sintenisii	394	P. podlechii	518
L. floribunda	247	O. transcaspica	395	Platanthera bifolia	776
L. iberica	248	Ononis pusilla	397	Plumbago europaea	526
Lotus corniculatus	382	O. spinosa ssp. antiquorum	396	Poa bulbosa	851
Luzula forsteri	717	Onopordon acanthium	143	P. compressa	852
Lycium kopetdaghi	652	Onosma dichoranthia	194	P. densa	853
Lycopus europaeus	454	O. longiloba	195	P. golestanensis	854
Lythrum salicaria	492	Ophrys scolopax	769	P. masenderana	855
Malacocarpus crithmifolius	678	O. sphegodes ssp.		P. nemoralis	856
Malus orientalis	582	transhyrcana	770	P. pratensis ssp. angustifolia	857
Marrubium astracanicum	455	Oplismenus undulatifolius	844	P. trivialis	858
M. parviflorum	456	Opopanax hispidus	60	Polygala anatolica	528
Matteucia struthiopteris	19	Orchis adenocheila	771	Polygonatum orientale	749
Matthiola alyssifolia	230	O. coriophora	772	P. sewerzowii	750
M. farinosa	231	O. mascula ssp. pinetorum	773	Polygonum convolvulus	531
Medicago lupulina	383	O. palustris	774	P. hyrcanicum	532
M. minima	384	O. simia	775	P. patulum	533

<i>P. persicaria</i>	534	<i>R. tuberosus</i> ssp.		<i>S. cyri</i>	277
<i>P. thymifolium</i>	535	<i>turcomanicus</i>	541	<i>S. indepressa</i>	278
<i>Polypodium interjectum</i>	15	<i>Salix aegyptiaca</i>	623	<i>S. italica</i>	279
<i>P. vulgare</i>	16	<i>S. alba</i>	624	<i>S. latifolia</i>	280
<i>Polypogon fugax</i>	859	<i>Salsola arbusculiformis</i>	310	<i>S. noctiflora</i>	281
<i>Polystichum aculeatum</i>	10	<i>S. aucheri</i>	311	<i>S. tenella</i>	282
<i>Populus caspica</i>	621	<i>S. dendroides</i>	312	<i>S. viscosa</i>	283
<i>P. nigra</i>	622	<i>S. nitraria</i>	313	<i>S. vulgaris</i>	284
<i>Potamogeton natans</i>	878	<i>S. orientalis</i>	314	<i>Sisymbrium altissimum</i>	236
<i>Potentilla micrantha</i>	584	<i>S. tomentosa</i>	315	<i>Solenanthus circinnatus</i>	198
<i>P. recta</i>	585	<i>Salvia</i> aff. <i>rhytidea</i>	470	<i>Sonchus palustris</i>	156
<i>P. reptans</i>	586	<i>S. atropatana</i>	467	<i>Sorbus persica</i>	597
<i>Prangos latiloba</i>	63	<i>S. chloroleuca</i>	468	<i>S. torminalis</i>	598
<i>Primula heterochroma</i>	544	<i>S. glutinosa</i>	469	<i>Sorghum halepense</i>	865
<i>Prunella vulgaris</i>	466	<i>S. sclarea</i>	471	<i>Spiraea hypericifolia</i>	599
<i>Prunus divaricata</i>	587	<i>S. virgata</i>	472	<i>Spirodela polyrhiza</i>	720
<i>Psychrogeton aucheri</i>	147	<i>Sambucus ebulus</i>	249	<i>Stachys annua</i>	477
<i>Pteridium aquilinum</i>	13	<i>Sameraria armena</i>	235	<i>S. byzantina</i>	478
<i>Puccinellia bulbosa</i>	860	<i>Samolus valerandi</i>	545	<i>S. laxa</i>	479
<i>P. grossheimiana</i>	861	<i>Sanguisorba minor</i>	596	<i>S. subaphylla</i>	480
<i>Pyrus boissieriana</i>	588	<i>Sanicula europaea</i>	64	<i>S. trinervia</i>	481
<i>Quercus castaneifolia</i>	417	<i>Saponaria bodeana</i>	274	<i>S. turcomanica</i>	482
<i>Q. macranthera</i>	418	<i>Satureja mutica</i>	473	<i>Stellaria holostea</i>	285
<i>Ranunculus cicutarius</i>	555	<i>Scabiosa columbaria</i>	343	<i>S. media</i>	286
<i>R. lingua</i>	290	<i>S. micrantha</i>	344	<i>Stelleropsis antoninae</i>	657
<i>R. polyanthemos</i>	556	<i>S. rotata</i>	345	<i>Sterigmostemum</i>	
<i>Rapistrum rugosum</i>	234	<i>Scandix stellata</i>	65	<i>ramosissimum</i>	237
<i>Reaumuria alternifolia</i>	655	<i>Scariola orientalis</i>	148	<i>Sternbergia lutea</i>	683
<i>Reseda lutea</i>	560	<i>S. viminea</i>	149	<i>Stipa arabica</i>	866
<i>Rhamnus cathartica</i>	562	<i>Schoenoplectus lacustris</i>		<i>St. bromoides</i>	867
<i>Rh. pallasii</i>	563	ssp. <i>tabernaemontani</i>	701	<i>St. caucasica</i>	868
<i>Rh. spathulifolia</i>	564	<i>S. mucronatus</i>	697	<i>St. holosericea</i>	869
<i>Rheum turkestanicum</i>	536	<i>Sclerochloa dura</i>	860	<i>St. lessingiana</i>	870
<i>Rhizocephalus orientalis</i>	862	<i>Scorzonera grossheimii</i>	150	<i>St. pennata</i> s. l. (incl.	
<i>Rhynchosorys maxima</i>	633	<i>S. litwinowii</i>	151	<i>pulcherrima</i> & <i>zalesskii</i>)	871
<i>Ribes melananthum</i>	431	<i>S. raddeana</i>	152	<i>St. pulcherrima</i>	872
<i>Rochelia bungei</i>	196	<i>Scrophularia gaubae</i>	634	<i>St. zalesskii</i>	873
<i>R. persica</i>	197	<i>S. variegata</i>	635	<i>Suaeda altissima</i>	316
<i>Roemeria hybrida</i> ssp.		<i>Scutellaria pinnatifida</i> ssp.		<i>S. linifolia</i>	317
<i>dodecandra</i>	514	<i>alpina</i>	474	<i>S. microphylla</i>	318
<i>R. refracta</i>	515	<i>S. tournefortii</i>	475	<i>S. microsperma</i>	319
<i>Rosa beggeriana</i>	589	<i>Secale montanum</i>	863	<i>S. physophora</i>	320
<i>R. canina</i>	590	<i>Securigera securidaca</i>	400	<i>Taeniatherum caput-</i>	
<i>R. persica</i>	591	<i>S. varia</i>	401	<i>medusae</i> ssp. <i>crinitum</i>	874
<i>Rosularia radicata</i>	334	<i>Sedum pallidum</i>		<i>Tamarix ramosissima</i>	656
<i>R. sempervivum</i>	335	<i>pentapetalum</i>	336	<i>Tamus communis</i>	702
<i>Rubia florida</i>	616	<i>S. stoloniferum</i>	337	<i>Tanacetum coccineum</i>	157
<i>R. rechingeri</i>	617	<i>Sempervivum iranicum</i>	338	<i>T. parthenium</i>	158
<i>Rubus caesius</i>	592	<i>Senecio erucifolius</i> ssp.		<i>T. polycephalum</i> ssp.	
<i>R. dolichocarpus</i>	593	<i>grandidentatus</i>	153	<i>duderanum</i>	159
<i>R. raddeanus</i>	594	<i>Serratula latifolia</i>	154	<i>Tauscheria lasiocarpa</i>	238
<i>R. sanctus</i>	595	<i>S. quinquefolia</i>	155	<i>Teucrium chamaedrys</i>	483
<i>Rumex caucasicus</i>	537	<i>Seseli tortuosum</i> ssp. <i>kiabii</i>	66	<i>T. hyrcanicum</i>	484
<i>R. crispus</i>	538	<i>Setaria viridis</i>	864	<i>T. polium</i>	485
<i>R. obtusifolius</i> ssp.		<i>Sideritis montana</i>	476	<i>Thalictrum isopyroides</i>	557
<i>subalpinus</i>	539	<i>Silene aucheriana</i>	275	<i>Th. minus</i>	558
<i>R. sanguinus</i>	540	<i>S. coronaria</i>	276	<i>Th. sultanabadense</i>	559

<i>Thesium arvense</i>	625	<i>T. micheliana</i>	753	<i>V. siaretensis</i>	648
<i>Th. kotschyianum</i>	626	<i>T. montana</i>	754	<i>Vicia cassubica</i>	409
<i>Thlaspi perfoliatum</i>	239	<i>T. wilsoniana</i>	755	<i>V. crocea</i>	410
<i>Th. stenocarpum</i>	240	<i>Tussilago farfara</i>	166	<i>V. grandiflora</i>	411
<i>Thymus kotschyianus</i>	486	<i>Typha domingensis</i>	879	<i>V. hirsuta</i>	412
<i>Tilia platyphyllos</i> ssp.		<i>Ulmus glabra</i>	661	<i>V. lutea</i>	413
<i>caucasica</i>	658	<i>U. minor</i>	662	<i>V. pannonica</i>	414
<i>Tordylium maximum</i>	67	<i>Urtica dioica</i>	666	<i>V. subvillosa</i>	415
<i>Torilis japonica</i>	68	<i>Valeriana sisymbriifolia</i>	667	<i>V. variabilis</i>	416
<i>Trachynia distachya</i>	875	<i>Valerianella dentata</i>	668	<i>V. herbacea</i>	71
<i>Tragopogon capitatus</i>	160	<i>V. platycarpa</i>	669	<i>Vincetoxicum pumilum</i>	74
<i>T. gongylorrhizus</i>	161	<i>V. sclerocarpa</i>	670	<i>V. scandens</i>	75
<i>T. graminifolius</i>	162	<i>V. uncinata</i>	671	<i>Viola alba</i>	672
<i>T. kotschyi</i>	162	<i>Varthemia persica</i>	167	<i>V. jordanii</i>	673
<i>T. longirostris</i>	163	<i>Velezia rigida</i>	287	<i>V. kitaibeliana</i>	674
<i>T. vvedenskyi</i>	164	<i>Verbascum blattaria</i>	636	<i>V. occulta</i>	675
<i>Trifolium angustifolium</i>	402	<i>V. cheiranthifolium</i> var.		<i>V. sieheana</i>	676
<i>T. arvense</i>	403	<i>transcaspicum</i>	637	<i>Viscum album</i>	491
<i>T. campestre</i>	404	<i>V. gossypinum</i>	638	<i>Vitis sylvestris</i>	677
<i>T. ochroleucum</i>	405	<i>V. sinuatum</i>	639	<i>Vulpia persica</i>	877
<i>T. pratense</i>	406	<i>V. speciosum</i>	640	<i>Zannichellia palustris</i>	880
<i>T. tumens</i>	407	<i>V. sublobatum</i>	641	<i>Zelkova carpinifolia</i>	663
<i>Trigonella foenum-graceum</i>	408	<i>V. thapsus</i>	642	<i>Ziziphora clinopodioides</i>	487
<i>Trinia leiogona</i>	69	<i>Veronica arvensis</i>	643	<i>Z. tenuior</i>	488
<i>Tripleurospermum</i>		<i>Veronica beccabunga</i> ssp.		<i>Zosima absinthifolia</i>	70
<i>disciforme</i>	165	<i>muscosa</i>	644	<i>Zygophyllum atriplicoides</i>	679
<i>Trisetum flavescens</i>	876	<i>V. campylopoda</i>	645	<i>Z. fabago</i>	680
<i>Tulipa biflora</i>	751	<i>V. khorassanica</i>	646		
<i>T. hoogiana</i>	752	<i>V. polita</i>	647		

8 Summary

In this study an attempt has been made to provide a first comprehensive overview of the vascular plant biodiversity of Golestan National Park (GNP), as one of the UNESCO designated Reserves and the first Iranian National Park. The area with 91,895 hectares is located in the northeast of Iran, in a transition zone between Hyrcanian forests, juniper woodlands and mountain and *Artemisia* steppes. This research is based on the intensive field studies of the author from 1986 to 1996, and the study of ca. 5,200 herbarium specimens collected by the author and other collectors during the last thirty years. A general chapter is devoted to the physico-geographical features of the area, climatic conditions, cryptogamic plants and wildlife. The most important vegetation units are described in the second chapter. The major part of the dissertation is devoted to the flora of the area, and an annotated checklist of the vascular flora is provided. A table is provided for each species including examined material, habitat, altitude range, chorotype, growth form and the endangered status of the species within the Park and Iran. Many taxonomical notes are provided, when necessary. The data of the annotated checklist are analysed in chapter 4 with regard to the number of taxa on various taxonomic levels, comparisons of species richness with the whole of Iran and available data from other areas, species diversity along altitudinal gradients, growth form spectra and the endangered categories. Phytogeography and endemism are discussed in a separate chapter (5). The most important threats to the area are briefly discussed in chapter 6. Based on nearly 20,000 records gained from 570 phyto-sociological relevés and herbarium specimens, the distribution map within the Park for 880 species, showing their cover abundances, is provided, using the computer programme "FLOREIN" (chapter 7). A selection of 170 photographs is included to document the vegetation types and the floristic diversity of the Park. A list of all studied specimens and their collectors is appended. The most important results are summarized below:

1. GNP is situated in the eastern extension of the Alborz Mountains and the western extension of Khorasan-Kopetdagh Mountains from 37°16'43" to 37°31'35" N and from 55°43' 25" to 56°17'48" E (Figs. 1, 2). The area is characterized by a high topographic amplitude from 450 to 2411 m and unique orographic structures from flat plains to vertical cliffs, with a wide range of soil categories and water resources. Geologically (Fig. 3), the central parts of the area consist of various limestone formations of the Jurassic and the northern parts of the Cretaceous which may be limestone, sandstone or marl. The older rocks of the Upper Precambrian and Silurian are exposed in the southern parts of the area. The Paleozoic sediments provide a source of salinity to the southern parts of the Park. The flat plains in the south and northeast of the area are often alluvial and loess land or conglomerate and sandstone of the Quarternary. The most outstanding features of the area are the extremely different climatic conditions which vary from temperate sub-humid in the west to cold arid and cold semi-arid in the south and east of the Park with an annual precipitation ranging from ca. 150 to ca. 1000 mm (Figs. 5, 6). The complex of various orographic, topographic, geologic, hydrologic and climatic conditions provide a wide range of biotopes inhabited by many animals and plants with completely different habitats.
2. The main vegetation units of the Park include closed forests, open woodlands and scrubs, mountain meadows, steppes, and halophytic, hygrophilous, aquatic and fern communities (Figs. 7-10). The closed forests are composed of lowland (450-1000 m) and montane forests (1000-2250 m). *Parrotia persica*, *Zelkova carpinifolia* and *Diospyrus lotus* are indicators of lowland forest occurring with other common trees like *Quercus castaneifolia* and *Carpinus betulus*. The montane forests are divided into eight units: i) submontane forests (*Carpinus betulus-Quercus castaneifolia* zone); ii) *Carpinus betulus-Ilex spinigera* stands; iii) *Sorbus torminalis-Fraxinus excelsior-Carpinus betulus*-zone; iv) *Acer hyrcanum-Fraxinus excelsior* zone; v) pure *Carpinus orientalis* community on steep slopes; vi) *Quercus macranthera* forests; vii) transition forests between *Quercus macranthera* and other montane communities and viii) hygrophilous montane forest stands. The open scrubs are divided into 'open shrublands or scrubs of rocky outcrops and cliffs', 'successional scrub communities', 'transition scrubs including *Acer monspessulanum* subsp. *turcomanicum*, *Crataegus* spp. and *Paliurus spina-christi* scrubs' and *Juniperus* woodlands. Mountain meadows are found in forest openings of previously cultivated sites (dominated by *Hordeum bulbosum*, *Dactylis glomerata*, *Calamagrostis epigejos*,

Vicia variabilis etc.) and meadows in montane steppes which are often dominated by *Elymus elongatiformis*, *Cephalaria microcephala*, *Carex melanostachya* etc. A large area of the northern, north-central, southern and eastern parts of the Park is covered by steppes including *Artemisia* steppes, mountain steppes of thorn-cushions (*Onobrychis cornuta*, *Acantholimon raddeanum*) and grasses (*Poa densa*, *P. bulbosa*, *Festuca valesiaca*, *Stipa* spp.) and *Stipa* steppes. The saline biotopes in the Mirza-Baylu plain are occupied by *Tamarix androssowii* stands and communities of *Salsola dendroides*, *Phragmites australis* (halophytic ecotype), *Suaeda physophora*, *Anabasis aphylla*, scrub of *Haloxylon ammodendron* and spots of annual halophytes. The riparian vegetation along the rivers and streams in steppe and montane steppe areas is mainly composed of *Phragmites australis* and *Salix aegyptiaca*. The vegetation of the acidic (pH=6.5-6.6) isolated Sulukli Lake is dominated by *Schoenoplectus lacustris-Lemna* in the permanent parts of the lake and followed by meadows in damp places and *Salix cf. caprea* at the forest margin. The invasive fern *Pteridium aquilinum* is dominated in montane forest openings and montane forest margins in the center and northwest of the Park, in previously destroyed forests and scrubs.

3. During this research a total of 6 species, 1 subspecies and one combination are presented as new to science, and ca. 30 species as new records for Iran. Due to space limitation most of these species are dealt with in detail in separate publications or are still in press (Akhani 1996, Akhani 1999, Akhani & Scholz 1999, Tzvelev 1997). Most of the new species are highly isolated and probably relic species like *Laser rechingeri*, *Eriocyclus ghaffooriana*, *Plantago podlechii* and *Centaurea golestanica*.
4. According to this study a total of 1,302 species of native or naturalized vascular plants belonging to 107 families and 542 genera are known from GNP. About 700 species are new for the area. This is astonishing because the surface area of the Park covers only 0.06% of Iran (1,648,000 km² versus 919 km²), but 19% of the species, 45% of the genera and 69% of the families of the Iranian vascular plants occur in the Park (Fig. 28). It is estimated that the total number of species within the Park is ca. 1,500 species and the number could increase to 2,000 species, if the flora of the adjacent areas came into consideration. The richest families are *Asteraceae* with 161 species, *Fabaceae* with 121 species and *Poaceae* with 111 species together comprising 30% of the flora. Families which contain high percentages of the Iranian flora are *Poaceae* (with 30% of the Iranian flora in the Park), *Liliaceae* (24%), *Chenopodiaceae* (31%), *Rosaceae* (28%), *Polygonaceae* (29%) and *Orchidaceae* (48%). *Astragalus* with 45 species is the largest genus in the Park followed by *Allium* (18 species), *Veronica* (17), *Silene* (16), *Vicia* (16), *Centaurea* and *Carex* (each 15).
5. Studies of the altitudinal spectra and species diversity show that the altitude range of 1000-1500 m is favoured by a large number of species (335) followed by 450-2000 m (199 species), 1000-2000 m (157), 450-1500 m (139), 450-1000 m (134), 1500-2000 m (103), 450-2400 m (88), 1000-2400 m (58), 1500-2400 m (36) and 2000-2400 m (25), respectively. A correlation between available surface area in each altitude range and species diversity shows that the altitude range between 450 and 1000 m has the highest correlation (Fig. 31-C). This is followed by the altitude ranges 2000-2400 m and 1000-1500 m. The analysed data show that the diversity of species is negatively correlated with the increase of the altitude amplitude. Most of the species show an altitudinal amplitude of ca. 500 m.
6. Studies of the growth form spectra show that leafy erect hemicryptophytes with 265 species (20.4%) and leafy erect therophytes with 258 species (19.8%) are the prevailing growth forms in our area. These are followed by graminoid hemicryptophytes with 90 species (7%), bulbous and tuberous geophytes, and rhizomatous geophytes each with 75 species (5.8%) of the flora. The total number of hemicryptophytes with 463 species (35.6%) and the total number of therophytes with 390 species (30%) compose the majority of the flora (Fig. 32). The area has a comparatively higher percentage of phanerophytes than Central Europe. This is probably due to the fact that the Caspian forests, as tertiary relic forests, are richer than the Central European forests in their tree elements.

7. The endangered status of the species within the Park has been evaluated based on 20,000 records. 245 species are only known from one record, 140 species from 2 records, 98 species from 3 records and all these species are considered as endangered in the Park. A further 297 species are vulnerable (known from 4-8 records) and 164 species are rare (known from 9-15 records) (Table 7). 31 species are endangered with indeterminate status and the status of 21 species cannot be determined. 290 species are classified as safe or non-endangered species with over 15 records each. The frequency distribution of species ordered by decreasing number of records (Fig. 33) matches a logarithmic curve. The endangered status of the species in Iran (Table 8) shows that 153 endangered, 102 vulnerable and 127 rare species in Iran are growing in GNP. A further 736 species are safe in Iran and 54 species with indeterminate endangered category and 108 species with unknown status, respectively. In chapter 4.4 a list of the species with high conservation value is given. 20 species are known to be endemic within or around the Park or subendemic. There are ca. 90 other species which are until now either known in Iran only from the Park or from very few records outside the Park, some with interesting disjunctions.
8. A phytogeographical analysis of the Park (Table 9; Figs. 34, 35, 36) showed that a large part of the flora of the Park (40.6 %) belongs to the Irano-Turanian elements which is followed by 15% Euro-Siberian species and only 0.5% Mediterranean species. The biregional Irano-Turanian/Mediterranean species with 8%, Euro-Siberian/Mediterranean species with 7%, Euro-Siberian/Irano-Turanian species with 3%, and Irano-Turanian/Saharo-Sindian species with 1% comprise 19% the flora of the area. A remarkable percentage of the species are Euro-Siberian/Irano-Turanian/ Mediterranean (9%). Pluri-regional species with 10%, and cosmopolitan and subcosmopolitan species together with 3% and other species with 3 % characterize the flora of the area. These figures clearly show that the area has an Irano-Turanian flora in xeric and an Euro-Siberian flora in mesic zones, respectively. A high percentage of the Irano-Turanian species (21%) of the Park are endemic in the Khorasan and Kopetdagh sector of the Irano-Turanian area and a remarkable percentage (30%) of the Euro-Siberian species belongs to the Hyrcanian sector which is evidence of their separate phytogeographical status as province.
9. An evaluation of major threats to the Park shows that the present conservation efforts are not efficient and should urgently be improved. The most threat is the so-called "Asian road" passing through the Park which make control of the visitors and preventing the illegal exploitation of the Park impossible. Another major threat is fire which only during very recent times (1995, 1996) has led to the destruction of ca. 2,500 hectares of the forests and scrubs of the area. Other important threats are hunting, grazing, harvesting of herbal vegetation and the presence of an asphalt factory at the border of the Park.

9 Zusammenfassung

In der vorliegenden Arbeit wird versucht eine erste umfangreiche Darstellung der Gefäßpflanzendiversität im Golestan National Park (GNP) zu präsentieren. Das Gebiet mit einer Fläche von 91895 Hektar liegt im Nordosten des Iran und ist der erste iranische Nationalpark und ein UNESCO Reservat. Es liegt im Übergangsbereich zwischen den hyrcanischen Wäldern, offenen *Juniperus* Wäldern und *Artemisia*-Steppen. Die Untersuchung stützt sich auf intensive Feldstudien des Verfassers von 1987 bis 1996, sowie Studien an ca. 5200 Herbarbelegen, die in den letzten dreißig Jahren vom Autor oder von anderen Botanikern gesammelt wurden. Im ersten allgemeinen Kapitel werden die physikogeographischen Verhältnisse des Gebietes, das Klima, die Kryptogamenflora sowie die Fauna dargestellt. Wichtige Vegetationstypen werden im zweiten Kapitel behandelt. Der Großteil der Arbeit befaßt sich mit der Flora des Gebietes (Kapitel 3), in dem eine kommentierte Liste der Pflanzen präsentiert wird. Für jede Art werden in tabellarischer Form die untersuchten Belege (die Nummer und Abkürzung der Sammler), das Habitat, der Höhenbereich, das Areal, die Wuchsform, und die Gefährdung im Park und im Iran angegeben. Vielfach werden auch Anmerkungen zur Taxonomie kritischer Sippen hinzugefügt. Die floristischen Daten werden im Kapitel vier in Bezug auf die Zahl der Sippen in den verschiedenen taxonomischen Kategorien analysiert. Die Artenvielfalt im Park wurde mit der des Iran und anderen Gebieten verglichen, sowie deren Verteilung auf verschiedene Höhenstufen ermittelt. Ebenso wurden die Artenzahl in den verschiedenen Wuchformen und Gefährdungskategorien bestimmt. Die Pflanzengeographie und der Endemismus werden im Kapitel 5 und die wichtigsten Gefahren für den Park im Kapitel 6 diskutiert. Basierend auf fast 20000 Daten, die von pflanzensoziologischen Aufnahmen und Herbarbelegen stammen, wurden die Verbreitungskarten für 880 Arten innerhalb des Parkes mit Hilfe des Computerprogramms „FLOREIN“ angefertigt (Kapitel 7). In einer Auswahl von 170 Farbbildern werden die Vegetationstypen und die Vielfältigkeit der Flora dokumentiert. Eine Liste der untersuchten Belege ist im Anhang beigegeben. Im folgenden sind die wichtigsten Ergebnisse zusammengefaßt:

1. Der Golestan Nationalpark umfasst die östlichen Ausläufer des Alborz-Gebirges und die westlichen Ausläufer des Khorasan-Kopetdag-Gebirges von 37°16'43" bis 37°31'35"N und 55°43'25" bis 55°43'25"E (Fig. 1, 2). Das Gebiet hat eine Höhenlage zwischen 450 bis 2411 m und weist eine vielfältige orographische Struktur auf. Der Großteil des Zentrums des Gebietes besteht aus Kalksteinformationen des Jura, der Norden aus Kalk, Sandstein oder Mergel der Kreidezeit. Im Süden des Gebietes findet man präkambrische und silurische Gesteine. In den paläozoischen Ablagerungen im Almeh-Tal befinden sich Salzfosilien. Die flachen Ebenen im Süden und Nordosten des Parkes sind hauptsächlich Ablagerungen des Quartärs, die aus Löß, Konglomeraten und Sandstein bestehen. Der besondere Charakter des Gebietes wird durch die äußerste Vielfältigkeit des Klimas bestimmt, das von feuchtem warm-gemäßigtem Klima im Westen bis kalt-ariden Klima im Osten und Süden des Gebietes variiert mit jährlichen Niederschlägen zwischen ca. 1000 mm bis ca. 150 mm (Fig. 5, 6). Unter den Komplexen orographischen, topographischen, geologischen, hydrologischen und klimatischen Verhältnissen des Gebietes konnte sich eine Vielfalt an Biotopen entwickeln, die von vielen Lebewesen mit ganz verschiedenen Ansprüche besiedelt werden.
2. Die wichtigsten Vegetationstypen des Parkes sind geschlossene und offene Wälder, Gebüsche, Bergwiesen, Steppen, Halophyten-, Hygrophyten-, Wasserpflanzen- und Farngesellschaften (Fig. 7-10). Die laubwerfenden (kältekahlen) geschlossenen Wälder lassen sich in Tieflandswälder (450-1000 m) und Bergwälder (1000-2250 m) einteilen. Die Tieflandswälder (450-1000 m) sind mit den Charakterarten *Parrotia persica*, *Zelkova carpinifolia* und *Diospyrus lotus* nur auf den Oberlauf des Madrasu-Flusses und den Nordwesten des Gebietes beschränkt. Die geschlossenen Bergwälder wurden in acht Zonen bzw. Gesellschaften untergegliedert: i) submontane Wälder (*Carpinus betulus-Quercus castaneifolia*-Zone); ii) *Carpinus betulus-Ilex spinigera*-Bestände; iii) *Sorbus torminalis-Fraxinus excelsior-Carpinus betulus*-Zone; iv) *Acer hyrcanum-Fraxinus excelsior*-Zone; v) *Carpinus orientalis*-Gesellschaft auf steilen Hängen; vi) *Quercus macranthera*-Wälder; vii) Übergangswälder zwischen *Quercus macranthera* und anderen montanen Gesellschaften und viii) montane auwaldartige Bestände. Die offenen Wälder und Gebüsche sind in Steinblock- und Felsgesellschaften, gebüschartige Gesellschaften (Sukzessionsstadien), Übergangsgesellschaften von *Acer*

monspessulanum subsp. *turcomanicum*, *Crataegus* spp. und *Paliurus spina-christi* Gebüsch und offenen *Juniperus excelsa*-Wälder gliedert. Wiesen, die sich im Bereich ehemaliger Kulturflächen im Wald etabliert haben, werden von *Hordeum bulbosum*, *Dactylis glomerata*, *Calamagrostis epigejos*, *Vicia variabilis* usw. dominiert. Bergwiesen in Montansteppen bestehen in erster Linie aus *Elymus elongatiformis*, *Cephalaria microcephala*, *Carex melanostachya*. Der Großteil des Nordens, Südens, Ostens sowie Teile des Zentralgebietes sind von Steppen bedeckt, u. a. *Artemisia*-Steppen und Montansteppen aus Dornpolsterpflanzen (*Onobrychis cornuta*, *Acantholimon raddeanum*) und Gräsern (*Poa densa*, *P. bulbosa*, *Festuca valesiaca*, *Stipa* spp.) oder *Stipa*-Steppen. Die halophytischen Gesellschaften in der Mirza-Baylu Ebene bestehen aus *Tamarix androssowii*-Beständen, *Salsola dendroides*, *Phragmites australis* (halophytischer Ökotyp), *Suaeda physophora*, *Anabasis aphylla* Gesellschaften, *Haloxylon ammodendron*-Gebüsch und Bereiche mit annuellen Halophyten. *Phragmites australis* und *Salix aegyptiaca* dominieren hauptsächlich die Ufervegetation im Steppen- und Bergsteppenteil des Gebietes. Die Wasserfläche des Sulukli-See (ein isolierter See mit einem pH von 6.5-6.6) wird von *Schoenoplectus lacustris*-*Lemna* bedeckt. Wasservegetation wird durch Feuchtwiesen und *Salix cf. caprea* zum Wald hin ersetzt. Der invasive Farn *Pteridium aquilinum* kommt in den früher zerstörten Wäldern und den Gebüsch im Zentrum, sowie im Westen und Nordwesten des Parks vor.

3. In dieser Arbeit werden 6 Arten sowie eine Unterart neu beschrieben, eine Umkombination und weitere 30 Arten als Neufunde für den Iran vorgestellt. Diese Arten werden im Detail in vier bereits publizierten bzw. noch im Druck befindlichen Artikeln behandelt (Akhani 1996, Akhani 1999, Akhani & Scholz 1999, Tzvelev 1997). Die neuen Arten sind meistens sehr isoliert und wahrscheinlich Relikte wie *Laser rechingeri*, *Eriocyclus ghafooriana*, *Plantago podlechii* und *Centaurea goletanica*.
4. Basierend auf dieser Untersuchung konnten 1302 einheimische bzw. eingebürgerte Gefäßpflanzenarten im Golestan National Park nachgewiesen werden, die 107 Familien und 542 Gattungen angehören. Etwa 700 Arten sind erste Nachweise für das Gebiet. Das ist erstaunlich, obwohl der Park nur 0.06% der iranischen Landfläche (919 km² von 1648000 km²) besitzt, findet man dort 19% der Arten, 45% der Gattungen und 69% der Familien der iranischen Gefäßpflanzenflora (Fig. 28). Die endgültige Artenzahl im Gebiet wird auf 1500 und einschließlich der umrahmenden Gebiete auf 2000 geschätzt. Die artenreichsten Familien sind die *Asteraceae* mit 161 Arten, die *Fabaceae* mit 121 Arten und die *Poaceae* mit 111 Arten, die insgesamt 30% der Flora des Parkes umfassen. Die Flora des Parkes enthält im Verhältnis zu der des Iran jeweils 30% aller Arten der Familien *Poaceen* im Iran, 24% der *Liliaceen*, 31% der *Chenopodiaceen*, 28% der *Rosaceen*, 29% der *Polygonaceen* und 48% der *Orchidaceen*. *Astragalus* mit 45 Arten ist die artenreichste Gattung im Gebiet, gefolgt von *Allium* mit 18 Arten, *Veronica* (17), *Silene* (16), *Vicia* (16), *Centaurea* und *Carex* (jeweils 15).
5. Die Analyse der Höhenspektren und der Artenvielfalt zeigt, daß die meisten Arten (335) den Höhenbereich zwischen 1000 und 1500 m bevorzugen, gefolgt von den Höhenbereichen 450-2000 m (199 Arten), 1000-2000 m (157), 450-1500 m (139), 450-1000 m (134), 1500-2000 m (103), 450-2400 m (88), 1000-2400 m (58), 1500-2400 m (36) und 2000-2400 m (25). Die Korrelation zwischen der vorhandenen Landfläche in dem jeweiligen Höhenbereich und der Artenvielfalt zeigt, daß im Höhenbereich von 450-1000 m die meisten Arten je Fläche vorkommen (Fig. 31-C). Die Höhenbereiche von 2000-2400 m und 1000-1500 m haben auch eine relativ hohe Artenvielfalt im Bezug auf die vorhandene Landfläche. Es ist deutlich, daß die Artenvielfalt eine negative Korrelation mit der Zunahme des Höhenbereiches hat. Viele Arten besitzen eine Höhenschwankung von ca. 500 m.
6. Untersuchungen der Wuchformspektren zeigen, daß die „Aufrecht-Beblätterte“-Hemikryptophyten („Schaft“-Hemikryptophyten im Sinne von Dierschke 1994) mit 265 Arten (20.4%) und „Aufrecht-Beblätterte“-Therophyten (Schaft-Therophyten im Sinne von Dierschke 1994) mit 258 Arten (19.8%) im Gebiet dominieren, gefolgt von grasartigen Hemikryptophyten mit 90 Arten (7%), Zwiebel- und Knollen-Geophyten und Rhizom-Geophyten jeweils mit 75 Arten (5.8%). Hemikryptophyten mit 463 Arten (35.6%) und

Therophyten mit 390 Arten (30%) stellen die Mehrzahl der Arten im Gebiet (Fig. 32). Es zeigt sich, daß das Gebiet einen höheren Prozentsatz an Phanerophyten (Bäume) besitzt als Mitteleuropa. Dies liegt vermutlich daran, daß die Wälder des kaspischen Raumes den Charakter tertiärer Reliktwälder aufweisen.

7. Der Gefährdungszustand der Arten im Park wurde anhand von ca. 20000 Daten von pflanzensoziologischen Aufnahmen sowie Herbarbelegen und Literaturangaben bewertet. 245 Arten (nur ein Fund), 140 Arten (zwei Funde) und 98 Arten (drei Funde) wurden als gefährdet (endangered) im Gebiet eingestuft. Weitere 297 Arten wurden als verwundbar (vulnerable) (bekannt von 4-8 Fundorten) und 164 Arten als selten (bekannt von 9-15 Fundorten), bezeichnet (Tab. 7). 31 Arten sind gefährdet im Park mit unklarem Gefährungsgrad und weitere 21 Arten konnten nicht bewertet werden. Andere Arten (290), die von mehr als 15 Fundstellen bekannt sind, wurden als im Gebiet häufig oder nicht gefährdet bezeichnet. Die Häufigkeitsverteilung der Arten, nach absteigender Fund-Häufigkeit sortiert, ergibt eine logarithmische Kurve (Fig. 33). Der Gefährdungszustand der Arten im Iran (Tab. 8) zeigt, daß 153 der gefährdeten Arten, 102 der verwundbaren Arten und 127 der seltenen Arten Irans im Golestan National Park vertreten sind. Die übrigen Arten verteilen sich wie folgt: 736 Arten sind im Iran nicht gefährdet, 54 Arten sind gefährdet mit unklarem Gefährungsgrad und weitere 108 Arten konnten nicht bewertet werden. Eine Liste der Arten mit hohem Schutzbedarf wurde im Kapitel 4.4 zusammengestellt, davon sind 20 Arten endemisch oder subendemisch, die nur im Park oder in den Nachbargebieten vorkommen. Ca. 90 Arten wurden bis jetzt entweder ausschließlich im Golestan Nationalpark im Iran gefunden oder es gibt nur ganz wenige Funde außerhalb des Parkes, einige mit bemerkenswerten Disjunktionen.
8. Eine pflanzengeographische Analyse (Tab. 9, Fig. 34, 35, 36) zeigt, daß ein großer Teil der Flora (40.6%) dem irano-turanischen Florengebiet angehört. Während auch die euro-siberischen Arten stark vertreten sind (15%), macht der Anteil mediterraner Taxa nur 0.5% aus. Die biregionalen irano-turanisch/mediterranen Arten mit 8%, euro-siberisch/mediterranen Arten mit 7%, euro-siberisch/irano-turanischen Arten mit 3% und irano-turanisch/saharo-sindischen Arten mit 1% bilden 19% der gesamten Flora. Ein beachtlicher Prozentsatz der Flora (9%) besteht aus triregionalen euro-siberisch/irano-turanisch/mediterranen Elementen. 10% der Arten sind multiregional, 3% kosmopolitisch bzw. subkosmopolitisch und 3% gehören zu anderen Florengebieten oder ihr Areal konnte nicht bestimmt werden. Die erwähnten Prozentzahlen zeigen deutlich, daß das Gebiet durch eine irano-turanische Flora im trockenen Teil und eine euro-siberische Flora im gemäßigten Teil charakterisiert ist. Ein beachtlicher Prozentsatz der irano-turanischen Arten (21%) kommen nur im Khorasan-Kopetdagh Teil des irano-turanischen Gebietes vor, und ein hoher Anteil der euro-siberischen Arten (30%) kommt nur im hyrkanischen Gebiet vor. Deshalb wird die Bewertung der beiden erwähnten Gebiete als Florenprovinz innerhalb des irano-turanischen Florengebietes bzw. des euro-siberischen Florengebietes hiermit bestätigt.
9. Die Bewertung des Naturschutzzustandes des Parkes zeigt, daß die jetzigen Schutzmaßnahmen nicht leistungsfähig genug sind. Deshalb ist eine Verbesserung des Schutzzustandes dringend erforderlich. Die größte Gefahr für das Gebiet ist die sogenannte „asiatische Straße“, die durch das Gebiet führt. Sie verhindert nicht nur jede Kontrolle der Besucher sondern ermöglicht illegale Ausbeutung der Parkressourcen. Feuer ist eine andere Gefahrenquelle für den Park, das allein in den letzten Jahren (1995, 1996) etwa 2500 Hektar der Wälder und Gebüsche im Gebiet vernichtet hat. Wilderei, Weiden, Mähen und eine Asphaltfabrik stellen eine zusätzliche Bedrohungen für den Park dar.

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11 Appendix: List of localities and collectors

The following pages list the localities, collectors, specimen numbers, collection dates, and the herbarium where the specimens are held for all examined material and partly for specimens of the literature not examined. The list is alphabetically arranged according to collectors. The specimens under each collector are furthermore arranged according to the specimen numbers. This was possible only for those collectors whose collections are regularly numbered according to the locality and date of collection. The author prefers to give the original data of the collectors without standardization of the geographical names or translation of the non-English labels. Additional data by the author or corrections are given in brackets [...]. The following data are indicated for each collector: The acronym of the collector in braces {...} (see also chapter 3.3.1.I), the number of cited specimens in parentheses (...) and the acronym of the herbarium according to Index Herbariorum (Holmgren & al. 1990). MMTT (acronym for Natural History Museum of Iran, Tehran), SBUH (acronym for Shahid Beheshti University Herbarium, Tehran) and MUH (acronym for Mashhad University Herbarium) are suggested abbreviations not yet included in the Index Herbariorum.

ABAI (5) IRAN, W

12242, 12244	Golestan, 8-9.8.1967
12353 & s.n.	Golestan, Na'leyan Wald, 8-9.8.1967
14052	Golestan, Abai (no date).

AKHANI, H. {A} (ca. 3500 + Akhani & Shahsavari and Ghorbanli & Akhani)

Original specimens collected from 1987 to 1989 are held in MMTT, many duplicates in M. Those of 1994, 1995 and 1996 are held in the private herbarium of the author (Hb. Akh., Tehran), most of the duplicates are in M, many in LI & W and partly in B, C, E, MMTT and elsewhere.

4308-4330	ca. 8 km between Mirza-Baylu and Soolegerd, ca. 1550 m, 37°25'N, 56°11'E, 1.7.1988
4331-4346	Soolegerd, 1350 m, 1.7.1988
4347-4366	ca 30 km W Soolegerd, Gorg-Meydan area, 1300 m, 1.7.1988
4367-4378	Dast-e Shah, 1500 m, 2.7.1988
4379-4441	ca 8-12 km N Dast-e Shah, 1500-1700 m, 2.7.1988
4442-4445	Bidak, 37°16'N, 55°55'E, 1250 m, 2.7.1988
4446-4456	ca. 10 km [? 20 km] km from Tangelol towards Mirza-Baylu, 37°20', 56°01', 950 m, 2.7.1988
4457-4483	ca. 12 km from Mirza-Baylu towards Soolegerd, 37°25'N, 56°11'E, 1400-1500 m, 2.7.1988
4484-4486	Soolegerd, ca. 1350 m, 37°27'N, 56°8'E, 2.7.1988
4487-4521	ca. 6 km W Soolegerd, 37°27'N, 56°5'E, ca. 1350 m, 2.7.1988
4522-4556	ca. 18 km SW Lohondor, Koilar, 1250-1500 m, 37°31'N, 55°51'E, 3.7.1988
4557	ca. 12 km from Mirza-Baylu towards Soolegerd, 1400-1500 m, 2.7.1988
4558-4559	ca 17 km E Soolegerd, 1550 m, 3.7.1988, 37°25'N, 56°11'E
6151-6160	ca. 5 km S [? E] Almeh, ca. 1350 m, 10.5.1989
6161-6205	ca. 7-12 km road from Mirza-Baylu towards Almeh, 56°9'N, 37°21'E, ca. 1300-1350 m [? 1500-1660 m], 10.5.1989
6206-6247	ca. 2-7 [? 5-7] km road from Mirza-Baylu towards Almeh, 1250-1300 m [? 1300-1400 m], 10.5.1989
9225-9230	Around Tangerang station, 37° 24'N, 55°48'E, 460 m, 3.7.1994
9231-9235	South Tangelol, 37°22'30"N, 55°56'E, 640 m, 4.7.1994

9236-9287	6 km E Tangerang station towards Tangegol, 1 km S of main road, Darre-e-Shahtiq (Shahtiq valley), 37°22'60"N, 55°52'E, 560-670 m, 4.7.1994
9288-9322	8 km W Tangerang towards Tangegol, Darre-e Golestan (Golestan valley), 37°23'N, 55°51'E, 550-600 m, 4.7.1994.
9323-9356	6 km E Tangerang station towards Tangegol, Darre-e-Shahtiq (Shahtiq valley), 37°22'60"N, 55°52'E, 560 m, 5.7.1994
9357-9374	1-2 km E Tangerang station, in lowland forest, 37°23', 30"N, 55°49'E, 460 m, 5.7.1994.
9375-9449	Around Almeh, 37°21'N, 56°8'E, 1700-1750 m, 6.7.1994
9450-9457	ca. 2 km SW Almeh towards Cheshmeh Khan, 37°20'N, 56°7'E, 1750-1850 m, 6.7.1994
9458-9469	ca. 2-4 km S Almeh towards Cheshmeh Khan, 1450-1700 m, 37°19'N, 56°7'E, 6.7.1994
9470-9474	ca. 1-2 km N Cheshmeh Khan towards Almeh, 1200-1300m, 37°18'N, 56°7'E, 6.7.1994
9475-9488.	14 km NW Mirza-Baylu towards Soolegerd, Darre-e Yakhtikalan, 37°25'N, 56°11'E, 1350 m, 7.7.1994
9489-9504	Around Soolegerd station, 37°27'N, 56°8'E, 1150 m, 7.7.1994
9405-9411	2-4 km SW Soolegerd, 37°26'N, 56°7'E, 1200-1350 m, 7.7.1994
9512-9516	5 km E Almeh towards Mirza-Baylu, 37°21'N, 56°11'E, 1400 m, 8.7.1994
9517-9559	Almeh, 37°21'N, 56°8'E, 1600-1720 m, 8.7.1994
9560	3 km E Almeh, 37°21'N, 56°10'E, 1500 m, 8.7.1994
9561-9569	3 km E Tangegol, Darre-e-Abshar (Abshar valley), 37°23'N, 55°58'30"E, 770 m, 8.7.1994
9570-9595	2 km S Golzar tourist center, 37°21'N, 56°00'E, ca. 900 m, 9.7.1994
9596-9639	6 km E Tangegol, Golzar, 37°22'N, 56°00'E, 800-950 m, 9.7.1994
9640-9662	8 km E Tangerang towards Tangegol, 37°23'N, 55°53'E, 1.8.1994
9663-9673	8 km E Tangerang, ca. 1-2 km N of the road, Baqloq valley, 37°23'60"N, 55°53'E, 800-850 m, 1.8.1994
9674-9708	8 km E Tangerang, Baghlogh (Takhti-e-Yek-e Toot), 950 m, 37°24'N, 55°53'E, 1.8.1994
9709-9754	8 km E Tangerang, Baghlogh (Yek-e-Toot), 1000-1100 m, 37°24'N, 55°53'E, 2.8.1994
9755-9756	4 WNW Tangegol, Darreh Adam-Chaqran, 37°23'N, 55°54'E, 790 m, 2.8.1994
9757-9769	4 km WNW Tangegol, Cheshme-e Adam-Chaqran (spring), 37°24'N, 55°54'E, 950 m, 2.8.1994
9770-9774	ca. 4 km WNW Tangegol, Cheshme-e Adam-Chaqran (spring), 37°24'N, 55°54'E, 950 m, 3.8.1994
9775-9825	ca. 5 km W Tangegol, ca. 1 km NE Cheshme-e-Adam-Chaqran (spring), 37°23'N, 55°54'E, 980 m, 3.8.1994
9826-9831	ca. 4 km W Tangegol, 37°23'N, 55°54'E, 800 m, 3.8.1994
9832-9846	5 km W Dasht, valley of Qez-Qale-e Dasht, 37°18'N, 55°58'E, 1050-1080 m, 4.8.1994
9847-9875	6-7 km W Dasht, valley of Qez-Qale-e Dasht, 37°18'N, 55°56'E, 1080-1100 m, 4.8.1994
9876-9895	7 km after Kondeskuh towards Loveh, 37°20'N, 55°40'E, 1400-1450 m, 5.8.1994
9896-9944	ca. 3 km E Kondeskuh, in valley of Qez-Qaleh, 800-850 m, 37°19'N, 55°47'E, 5.8.1994
9945-9959	ca. 3 km E Kondeskuh, 900-950 m, W-facing limestone steep slopes, 37°19'N, 55°47'E, 5.8.1994
9960-9966	Western border the Park (off the Park), near Kondeskuh, 37°18'30"N, 55°46'E, 1000 m, 5.8.1994
9967-10025	ca. 1 km S Kondeskuh (off the Park), 1020-1180 m, 37°18'N, 55°46'E, 6.8.1994
10199-10226	Almeh, 37°21'N, 56°8'E, 1700 m, 17.4.1995
10226-10244	8 km from Mirza-Baylu towards Soolegerd, Yakhtikalan pass, 37°24'N, 56°12'E, 1600-1700 m, 18.4.1995
10245-10247	6 km SE Soolegerd towards Mirza-Baylu, Yakhtikalan valley, 37°25'N, 56°11'E, 1400 m, 18.4.1995

10248-10281	Soolegerd, 37°27'N, 56°8'E, 1200 m, 18.4.1995
10282	ca. 3 km N Soolegerd, 37°29'N, 56°8'E, 1100 m, 18.4.1995
10283-10286	5 km NW Soolegerd; 37°29'30"N, 56°7'E, 1100 m, 19.4.1995
10287-10310	ca. 14 km SW Lohondor, Koilar region, 37°30'N, 55°50'E, 1400-1450 m, 19.4.1995
10311-10321	9 km NW Soolegerd towards Lohondor, 37°29'40"N, 56°4'30"E, 1150 m, 19.4.1995
10322-10361	Sharleq, 37°20'N, 56°2'E, 1000-1200 m, 20.4.1995
10362-10392	Tangerah, 37°24'N, 55°48'E, 450-500, 21.4.1995
10393-10403	Tangerah, 37°24'N, 55°48'E, 500-600; forests N of the Building Office, 21.4.1995
10404-10437	1-2 km NW Dasht, 1000-1100 m, 37°18'30"N, 55°59'30"E, 22.4.1995
10438-10463	3 km NW Dasht, 1100-1250 m, 37°19'N, 56°00'E, 22.4.1995
10464-10472	4 km NW Dasht, Khajeh-Narenj mountain, 1250-1400 m, 37°20'N, 55°59'E, 22.4.1995
10473-10496	Around Soolegerd station, 37°27'N, 56°8'E, 1200 m, 27.4.1995
10497-10519	W Soolegerd station, 37°27'N, 56°8'E, 27.4.1995
10520	2-3 km SW Soolegerd, 37°26'N, 56°7'E, 28.4.1995
10521-10543	ca. 7 km W. Soolegerd, 37°27'N, 56°4'E, 1300-1600 m, 28.4.1995
10544-10578	ca. 8 km NW Soolegerd, beginning of Nekarbandi valley, 37°29'N, 56°4'E, 1000-1100 m, 30.4.1995
10579-10583	Sharleq, 37°20'N, 56°2'E, 1000 m, 1.5.1995
10584-10585	Around Dasht-e Shah station, 37°18'N, 55°49'E, 1450 m, 13.5.1995
10586-10629	ca. 2 km NE & N Dast-e Shah station, ca. 5-6 km E of Kondeskuh, southern slopes of Shakha mountain, 37°19'N, 55°49'E, 1350-1450 m, 14.5.1995
10630-10662	ca. 3 km NE Dast-e Shah station, ca. 6 km E Kondeskuh, southern slopes of Shakha mountain, around Shakha Spring, 37°19'N, 55°50'E, 1450 to 1550 m, 15.5.1995
10663-10674	ca. 4 km E. Kondeskuh, valley North of Dast-e Shah station, 37°18'N, 55°49'E, 1200-1400 m, 16.5.1995
10675-10686	ca. 5 km E Kondeskuh, 2 km N of Dast-e Shah station, 1350-1450 m, 37°19'N, 55°49'E, 16.5.1995
10687-10735	4-5 km NW Bidak, margin and around of Cheshme Derazi (Derazi spring) 37°17'N, 55°54'E and S-facing slopes of Alu-Baq foothills, 37°18'N, 55°53'E, 1300-1500 m, 17.5.1995
10736-10759	4 km North Bidak, along Derazi valley, 37°18'N, 55°54'E - 37°18'N, 55°55'E, 1100-1200 m, 18.5.1995
10760-10771	2-7 km West Dasht, along Qez-qaleh valley, from 37°18'N, 55°56'E to 37°18'N, 55°59'E, 1000-1100 m, 18.5.1995.
10772-10791	2-3 km East Sharleq towards Almeh, 37°20'N, 56°4'E, 1400-1500 m, 22.5.1995
10792-10809	ca. 2 km West Almeh towards Sharleq; 37°20'N, 56°6'E, 1700-1750 m, 22.5.1995
10810-10823	S. Almeh, 37°20'N, 56°8'E, 1700-1900 m, 23.5.1995
10824-10858	ca. 2-4 km S Almeh, southern slopes of Chondeh-Abbas mountain, from 37°20'N, 56°8'E to 37°18'N, 56°8'E, 1200-1600, 23.5.1995
10859-10901	Mirza-Baylu planis, North Armadlu, northern side of Mirza-Baylu plains, 37°19'N, 56°11'E; 37°20'N, 56°11'E; 37°21'N, 56°12'E; 1200-1250 m, 24.5.1995
10902-10919	Almeh valley, 7-9 km from Mirza-Baylu towards Almeh, 37°21'N, 56°11'E, 1350-1400 m, 24.5.1995
10920-10927	ca. 6 km W Mirza-Balyu, at top of the hill at the beginning of Almeh valley (southern slopes), Northern exposed, small sand dune, 37°21'N, 56°12'E, 1450-1500 m, 24.5.1995
10928-10929	ca. 5 km W Mirza-Baylu, 37°21'N, 56°12'E, 1250-1300 m, undulating slopes northern side of Mirza-Balyu plain, 24.5.1995
10930-10931	Mirza-Baylu, 1200 m, 37°21'N, 56°16'E, 24.5.1995
10933-10948	W Mirza-Balyu station, from 37°20'N, 56°14'E to 37°21'N, 56°15'E, 1200 m, 27.5.1995

10949-10957	Tangerah, 37°24'N, 55°48'E, around guesthouse of the Park, 450 m, 26.5.1995
10958-10968	1-2 km N Almeh, 37°22'N, 56°8'E, 1850-1900 m, 27.5.1995
10969-10991	Almeh, 37°21'N, 56°8'E, 1700-1900 m, 28.5.1995
10992-10998	Almeh flats, 37°21', 56°7'E, 1700-1800 m, 29.5.1995
10999-11021	2-4 km NW Almeh, N Almeh flats and S slopes of Qara-Gineh mountain, 1800-1950 m, 37°22'N, 56°6'E, 29.5.1995
11022-11034	E Almeh; undulating slopes Northern side of Almeh valley, 1700-1820 m, 30.5.1995
11035-11049	ca. 5 km E Almeh, Northern slopes of Almeh valley, 37°21'10"N, 56°11'E, 1500-1700 m, 30.5.1995
11050-11071	1-2 km N Mirza-Baylu towards Soolegerd, ca. 1200-1350 m, 37° 21'N, 56°15'E, 1.6.1995
11072-11136	ca. 14 km SW Lohondor, Koilar, 37°30'N, 55°50'E, 1350-1550 m, 2.6.1995
11137-11185	8-10 km SW Lohondor, along Qortoy valley from 37°29'N, 55°55'E to 37°30'N, 55°54'E, 1220-1400, 3.6.1995
11186-11214	ca. 14 km SW Lohondor, Koilar, 37°30'N, 55°50'E, 1350-1550 m, 4.6.1995
11215-11239	ca. 2 km S Koilar, 1600-1750 m, 37°29'N, 55°50'E, 1600-1750 m, 4.6.1995
11240	ca. 6 km SE Lohondor, 37°31'N, 56°00'E, ca. 1150 m, 5.6.1995
11241-11244	ca. 9-11 km NW Soolegerd, 37°30'N, 56°4'E, 1150-1200 m, 5.6.1995
11245-11247	ca. 7 km NW Soolegerd, 37°30'N, 56°6'E, 1120 m, 5.6.1995
11248-11249	ca. 14 km SW Lohondor, Koilar region, 37°30'N, 55°50'E, 1380 m, 15.6.1995
11250-11273	Chartongi and Besh Jakhdan area, 37°29'N, 55°52'E, 1750-1950 m, 16.6.1995
11274-11280	East Besh-Jakhdan, Northwestern side of Ghortoy valley, 37°28'N, 55°53'E, 1900-2000 m, 16.6.1995
11281	Qortoy valley, 37°27'N, 55°54'E, bottom of the valley, margin of dry stream, 1650 m, 16.6.1995
11282-11294	Southern side of Qortoy valley (1600-1650 m) and Northern slopes of Ayar-Qashi mountain (1650-1800 m) and near Cheshmeh-e Pudan-Ali (spring), 37°26'N, 55°55'E, 17.6.1995
11295	Eastern slopes of Ayar-Qashi mountain, 1850 m, 37°26'N, 55°56'E, 17.6.1995
11296-11301	ca. 2 km W Cheshmeh Janlar, 37°26'N, 55°57'E, 1720 m, 17.6.1995
11302-11310	Near Janlar spring and <i>Quercus macranthera</i> forest southern side of the spring, 37°26'20"N, 55°57'30"E, 1750-1950 m, 18.6.1995
11311-11317	Morq-Zar spring, Northern side of Divar-Kaji mountain, 37°25'N, 56°1'E, 1900 m, 18.6.1995
11318-11348	ca. 11 km ENE Tangegol, summit of Divar Kaji mountain, 2200-2370 m, 37°24'20"N, 56°3'E, 18.6.1995
11349-11354	ca. 11 km ENE. Tangegol, northern side of Divar Kaji mountain, 37°24'30"N, 56°3'N, 2100-2200 m, 19.6.1995
11355-11360	Ca. 12 km ENE. Tangegol, Northern slopes of Divar Kaji mountain (Agh-Mazar), 37°25'N, 56°3'30"E, 1900-2100 m, 19.6.1995
11361-11364	ca. 7 km SW Soolegerd, bottom of the Qore-Darreh (Dry valley), 37°25'N, 56°05'E, 1420-1550, 19.6.1995
11365-11419	9 km NW Mirza-Baylu towards Soolegerd, Yakhtikalan pass, 37°24'N, 56°11'E-37°24'N, 56°11'E, 1540-1850 m, 21.-22.6.1995
11420	ca. 3 km NW Mirza-Baylu, 37°22'N, 56°15'E, 1300 m, 22.6.1995
11421-11441	Tangegol, 37°22'30"N, 55°56'E, limestone rocks above guesthouses, 750-900 m, 24.6.1995
11442-11464	ca. 2-3 km W Tangegol, Adam-Chaqran limestone cliffs, 37°22'30"N, 55°54'30"E, 25.6.1995
11465-11478	3 km E Tangegol, N. side of the road, W Abshar, 37°22'20"N, 55°58'E, 780-1000 m, limestone rocks 26.6.1995
11479-11488	1 km E Quch-Cheshmeh 37°27'N, 55°45'E, 980 m, 28.6.1995
11489-11500	ca. 4 km ENE Quch-Cheshmeh, Qorqon forest, 37°28'N, 55°47'E, 900-1100 m, 28.6.1995

11501-11529	ca. 8 km NE Tangerang, Qorqon forest, NE Khojeh Galdi, 37°28'N, 55°49'40"E, 1150-1580 m, 29.6.1995
11530-11535	ca. 9 km NE Tangerang, Qorqon forest, Suleraqa, 37°27'N, 55°51'E, 1350-1450 m, 30.6.1995
11536-11547	ca. 3 km NEN Tangerang, Afrali, 37°25'N, 55°48'E, 1000-1100 m, 30.6.1995
11548-11549	N Tangerang, 37°24'N, 55°48'E, 700 m, 30.6.1995
11550-11569	SE Tangerang, Khan-Dushan, 37°23'N, 55°49'E, 450-550 m, 1.7.1995
11570-11582	ca. 4 km SE Tangerang, Lateh-Khodaqoli, 37°22'N, 55°49'30"E, 900-950 m, 3.7.1995
11583-11585	ca. 6 km SE Tangerang, Northern side of Shakha mountain, Galesha slopes, 37°21'30"N, 55°50'30"E, 1150-1200 m, 3.7.1995
11586-11592	ca. 7 km SE Tangerang, Northern side of Shakha mountain, 37°21'N, 55°50'E, 1550-1750, near Cheshmeh-Qolam, 4.7.1995
11593-11606	Northern sides of Shakha mountain, 37°20'N, 55°50'E, 1750-1900 m, 4.7.1995
11607-11650	Eastern extension of Shakha mountain, Lateh Tas, 37°19'30"N, 55°51' E, 1850-1900 m, 5.7.1995
11651-11654	Shakha mountain, margin of Cheshmeh Qasem-Ali, 37°19'30"N, 55°50' E, 1800 m, 5.7.1995
11655-11667	ca. km 3 NE Dast-e Shah station, ca. 6 km E Kondeskuh, southern slopes of Shakha mountain, around Shakha spring, 37°19'N, 55°50'E, 1500-1550 m, 5.7.1995
11668-11694	ca. 2-3 km NE Dast-e Shah station, 37°19'N, 55°51'E, 1500-1700, 6.7.1995
11695	Dast-e Shah station, 37°18'N, 55°49'E, 1450 m, 7.7.1995
11696-11703	1.5-2 km NW Mirza-Baylu, 1250-1300, margin and bottom of a dry stream, along the eastern border of the Park, 8.7.1995
11704-11705	ca. 14 km SW Lohondor, Koilar, 37°30'N, 55°50'E, 1300 m, 9.7.1995
11706-11707	ca. 10 km SW Lohondor, 5 km E Gorg-Meydan and Koilar, 37°31'N, 55°54'E, 1250 m, 9.7.1995
11708	ca. 12 km NE Soolegerd, 37°31'N, 56°3'E, 1200 m, 9.7.1995
11709	ca. 8 km NW Soolegerd, beginning of Nekarbandi valley, 37°29'N, 56°4'E, 1100 m, 9.7.1995
11710-11714	Near Soolegerd station, 37°27'N, 56°8'E, 1200 m, 9.7.1995
11715-11716	Soolegerd station, 37°27'N, 56°8'E, 1200 m, 10.7.1995
11717, 11719, 11725, 11726, 11727, 11728	3 km SES Soolegerd, eastern most of Degarmanli valley and river, 37°25'30"N, 56°9'E, 1320m, 10.7.1995
11724	4 km S. Soolegerd, margin of Degarmanli river, 37°25'N, 56°8'E, 1400 m, 10.7.1995
11718, 11720, 11721, 11722, 11723, 11728	6 km S Soolegerd, Degarmanli river bed, 37°24'N, 56°8'E, 1500 m, 10.7.1995
11729-11732	6 km S Soolegerd, Hammamli valley, 37°23'30"N, 56°9'E, 1600 m, 10.7.1995
11733-11738	8 km SW Soolegerd, ca. 5 km NWN of Almeh, western side of Degarmanli river, 37°23'N, 56°6'E, 1700 m, 11.7.1995
11739-11749	6 km NE Almeh, western most of Dagarmanli valley, 37°23'N, 56°5'E, 2000-2050 m, 11.7.1995
11750-11769	ca. 6 km NW Almeh, Northern slopes of Qarah Gineh mountain, 37°23'N, 56°4'E, 2100-2150 m, 11.7.1995
11770-11795	Southern slopes of Divar Kaji mountain, 37°24'N, 56°2'E, 2200-2300 m, 12.7.1995
11796-11797	Eastern border of Qarah Gineh mountain, 37°22'20"N, 56°6'E, 2100-2150 m, 12.7.1995
11798-11799	2.5 km NEN Almeh, Cheshme Bid, 37°22'N, 56°22'E, 12.7.1995
11800-11802	1 km East Tangegol, limestone rocks northern side of the road, 37°22'20"N, 55°57'E, 670-730 m, 14.7.1995
11803-11806	6 km E Tangegol, 1 km E Aq-Su, 37°22'N, 56°00'E, limestone rocks, 790-810, 14.7.1995

11807-11808	6 km E Tangerang, 800-950 m, Qameshli, 37°24'N, 55°50'30"E, 15.7.1995
11809-11813	6 km E Tangerang, 1160-1250 m, Qameshli, 37°24'N, 55°50'30"E, 15.-16.7.1995
11814-11815	7 km E Tangerang, East Bozaqan valley, 37°24'N, 55°51'30"E, 850-1000 m, 16.7.1995
11816-11821	Tangerah, 37°24'N, 55°48'E, 450 m, around guesthouse of the Park, 17.7.1995
11822-11833	SE Tangerang, margin of Khan-Dushan stream, 37°23'N, 55°49'E, 500 m, 29.7.1995
11834-11845	5 km E Tangeqol, Aq-Su valley, 37°22'30"N, 55°59'30"E, 750-900 m, 30.7.1995
11846-11849	6 km E Tangerang, Golestan tourist center, 37°23'N, 55°51'E, 480-500 m, 31.7.1995
11850-11853	3 km E Tangerang, 37°23'30"N, 55°50'E, 450 m, margin of the road, 31.7.1995
11854-11862	7 km E Tangeqol, Golzar valley, 37°21'30"N, 56°1'E, 900-1150 m, 1.8.1995
11863	Tangeqol, 37°22'30"N, 55°56'E, margin of the road, 670 m, 2.8.1995.
11864-11865	Dast-e Shah station, 37°18'N, 55°49'E & 37°22'N, 56°15'E, 1450 m, 5.8.1995
11866	2 km N Dast-e Shah station, S-facing slopes of Shahkha mountain, 37°19'N, 55°49'E, 1350 m, 5.8.1995
11867-11868	2 km NW Dast-e Shah station, 37°19'N, 55°48'E, 1100-1200 m, 5.8.1995
11869-11875	ca. 3 km NE Dast-e Shah station, around and near Ilanli spring, 37°18'30"N, 55°51'E, 1400-1500 m, 6.8.1995
11876-11882	Eastern slopes Shakha mountain, Lateh Tas and Qarni-Areq, 37°19'30"N, 55°52' E, 1800-1820 m, 6.8.1995
11883-11884	Between Cheshmehe Qarni-Areq and Cheshmehe Alu-Baq, 37°19'N, 55°53'E, 1650-1700 m, 6.8.1995
11885-11886	Between Cheshmehe Qarni-Areq and Cheshmehe Alu-Baq, 37°19'N, 55°53'E, 1650-1700 m, 6.8.1995
11887-11898	Southern slopes of Alu-Baq mountain: around Cheshmehe Alu-Baq (spring), 1600-1650 m, 37°19'N, 55°53'15"E, 7.8.1995
11899-11916	Top of Alu-Baq mountain, 1900-2100 m, 37°19'30"N, 55°54'E, 7.8.1995
11917-11919	ca. 500 m E Alu-Baq spring, 1700 m, 37°19'N, 55°53'30"E, 8.8.1995
11920-11921	Southeastern slopes of Alu-Baq mountain, above Darrehe Mara (valley of Snakes) valley, 37°19'N, 55°54'E, 8.8.1995
11922-11941	Southeastern slopes of Alu-Baq Mountain, Yelaq plain from 37°19' to 37°20'N and from 55°56' to 55°57'E, 1400-1800 m, 9.8.1995
11942-11949	Eastern side of Yelaq flats, ca. 4 km SW Golzar, 37°20'N, 55°58'N, 1450-1550, 10.8.1995
11950-11951	ca. 2 km W Pich-e Soleyman Koshte, 37°20'N, 55°59'E, 1350 m, 10.8.1995
11952	Pich-e Soleyman Koshte, 37°20'N, 56°00', 1250 m, 10.8.1995
11953-11959	SE Zav, 37°31'N, 55°46'E, 950-1200 m, 14.8.1995
11960-11994	Sulukli Lake, 37°29'30"N, 55°46'20"E, 1380 m, 15.8.1995
11995-11997	ca. 0.5-1 km E Sulukli Lake, beginning of Kore-Maklan valley, 37°30'N, 55°47'E, 1250-1330 m, 16.8.1995
11998-12001	W sides of Kore-Maklan valley, 1100-1200 m, 37°31'N, 55°47'E, 16.8.1995
12002	NW border of the Park (off the Park), steep rocks cliffs NW of Zav, 37°31'30" N, 55°45'E, 650-800 m, 17.8.1995
12003-12020.	Chartongi and Besh-Jakhdan area, 37°28'30"N, 55°52'30"E, 1950-2000 m, 19.8.1995
12021-12036	Eastern corner of Kamarha-ye Qorghon (Qorghon cliffs), above Suleraqa, 55°51'20"N, 37°28'20"E, vertical limestone cliffs, 1980-2010 m, 19.8.1995
12037-12041	ca. 11 km NE Tangerang, W Qortoy valley, 1650-1700 m, 37°27'N, 55°53'E, 21.8.1995
12042-12054	Westernmost of Qortoy valley, ca. 9 km NE Tangerang, 37°27'20" N, 55°51'30"E, 1800-1850 m, 21.8.1995
12055-12056	Qortoy valley, 37°27'N, 55°54'E, 1650 m, 22.8.1995
12057-12059	Eastern slopes of Ayar-Qashi mountain, between Cheshmehe Pudan-Ali and Gerieh-Sar 1800-

	1900 m, 37°26'N, 55°56'E, 22.8.1995
12060-12075	7 km NEN Tangegol, Gerieh-Sar, 1950-2080 m, 37°26'N, 55°57'E, 23.8.1995
12076-12080	ca. 8 km NEN Tangegol, margin of Janlar stream, 37°26'20"N, 55°57'30"E, 1700 m, 23.8.1995
12081-12086	ca. 8 NE Tangegol, ca. 4 km N Golzar, around and near Cheshmehe Soltan Hoopi, 37°24'N, 56°1'E, 1800-1900 m, 26.8.1995
12087-12093	8 km NE Tangegol, 5 km N Golzar, western slopes of Divar-Kaji mountain, northern side of Soltan Hoopi, 37°24'20"N, 56°00'20"E, 2050-2100 m, 27.8.1995
12094	6 km NE Tangegol, Joyoloq 37°25'N, 55°59'E, 1900 m, 27.8.1995
12095	5 km N Tangegol, Ilkhi-e Bala, 37°25'N, 55°57'E, 1900 m, 28.8.1995
12096-12101	2-3 km N Tangegol, above Savar-Baqi, 37°24'N, 55°56'E, 1350-1650 m, 28.8.1995
12102-12108	ca. 6 km E Tangerang, near Golestan Parking, 37°23'N, 55°51'E, limestone rocks north of the road, 600-700 m, 8.9.1995
12109-12116	Tangerah, 37°24'N, 55°48'E, 450 m, around office building of the Park, 8.9.1995
12117-12125	7 km W Mirza-Baylu towards Cheshme Khan, 37°19'30"N, 56°11'30"E, saline plain, 1200 m, 5.10.1995
12126-12128	4 km W Mirza-Baylu towards Cheshme Khan, 37°20'N, 56°14'E, saline plain, 1200 m, 5.10.1995
12129-12152	North Mirza-Baylu plains, Cheshme Shur, around saline spring, 1250, 37°21'N, 56°12'E, 6.10.1995
12153-12154	Almeh valley, 7 km from Mirza-Baylu towards Almeh, 37°21'N, 56°11'E, 1350 m, 6.10.1995
12155-12177	Mirza-Baylu, 1200 m, 37°21'N, 56°15'E, 6.10.1995
12178-12182	Westernmost Almeh flats, around Cheshme Karkouli, 37°21'N, 56°5'40"E, 1720 m, 7.10.1995
12183	E Tangegol, 37°22'20"N, 55°56'30", 670 m, 7.10.1995
12184-12186	1 km S Tangegol, 900 m, 37°22'N, 55°56'E, 8.10.1995
12187-12194	Northern slopes of Alu-Baq mountain, 37°20'N, 55°54'E, 9.10.1995
12195	4 km SW Tangegol, Shahtiq slopes, 37°21'N, 55°54'E, 1200 m, 10.10.1995
12196-12202	3 km WSW Tangegol, Takhti-e Korda, 37°21'30"N, 55°54'E, 850 m, 10.10.1995
12203	Tangerah, 37°24'N, 55°48'E, 450 m, weed in garden of office building of the Park, 11.10.1995
12204-12205	6 km E Tangegol, Tunnel, 37°22'N, 56°00'E, 1000 m, 11.10.1995
12206-12213	Westernmost of Qorgon mountain, northwestern slopes of Beili-Kuh, 37°28'N, 55°45'E, 12.10.1995
12214-12229	Cheshme Khan, 1220-1240 m, 37°18'N, 56°7'E, salty soils, 14.10.1995
12230-12233	ca. 2 km E Tangerang, north side of the road, 650-700 m, 37°24'N, 55°49'E, 14.10.1995
12234-12237	Tangerah, 37°24'N, 55°48'E, 450 m, weed in garden of office building of the Park, 14.10.1995
12238	200-5 km E Tangerang, 37°23'20"N, 55°50'E, 600 m, 15.10.1995
12244-12247	Tangerah, in ruderal places, 37°24'N, 55°48'E, 450, 13.11.1996
12248-12258	SE Tangerang, Khan-Doushan, 37°23'N, 55°49'E, 500 m, 13.11.1996
12259-12273	Adam-Chaqran rocks, S-facing slopes ca. 2 km W Tangegol, 37°22'30"N, 55°54'30"E, 700-1000 m, 14.11.1996
12274-12275	W Tangegol, S-facing slopes near the road, 37°22'30"N, 55°56'E, 640 m, 14.11.1996
12276-12292	Mirza-Baylu plains, dry and saline soils N Armadlu village, 1200 m, 15.11.1996
12293	Mirza-baylu plain, road to Almeh, 1200 m, 15.11.1996
12294	Almeh valley, margin of the road, 37°21'N, 56°8'E, 1250 m, 15.11.1996
12295-12309	Tangegol, 37°22'30"N, 55°56'E, margin of the road, 670 m, 16.11.1996 (the collection date of 12309 is 21.11.1996)

12310	Above Tangeqol, Savar-Baqi, 37°23'N, 55°56'E, 16.11.1996
12311-12314	Between Dasht and Yelaq, 1100-1350 m, 16.11.1996
12315-12317	Southeastern slopes of Alu-Baq Mountain, Yelaq plain, 37°19'N, 55°58'E, 1350 m, 9.8.1995
12318	N Tangerang, margin of the road towards Quch-Cheshmeh, 700 m, 17.11.1996
12319	NW off the Park: between Savar and Zav, 500 m, 17.11.1996
12320-12333	Northwestern border of the Park (outside the official border), steep cliffs NW Zav, 550-650 m, 37°31'30"N, 55°45'E, 17.11.1996
12334-12347	SE Zav, 37°31'N, 55°46'E, 900-1200 m, 14.8.1995
12348-12360	Sulukli Lake, 37°29'30"N, 55°46'20"E, 1380 m, 18.11.1996
12361-12362	Above Qorqon rocks, 55°47'N, 37°28'30"E, 1600, 18.11.1996
12363	3 km N Mirza-Baylu towards Soolegerd, 1300m, 20.11.1996
12364-12368	Near Soolegerd, 37°27'N, 56°8'E, 1200 m, 20.11.1996
12369	5 km N Soolegerd towards Behkadeh, Chalbash (off the Park), conglomerate rocks, 1000, 20.11.1996
12370-1238	5 km E Tangerang, 15 km W Tangeqol, 37°23'30"N, 55°50'E, on S-facing limestone slopes, 600-800 m, 21.11.1996
12382-12393	Above Tangeqol, Savar-Baqi, 37°23'N, 55°56'E, 21.11.1996
12394	Around Tangerang station, 37° 24'N, 55°48'E, 460 m, 21.11.1996

AKHANI, H. & SHAHSAVARI, A {AS} (See notes under Akhani (above) and Shahsavari (below))

5907-5941	Mirza-Baylu, ca. 1200 m, 7.5.1989
5942-5945	14 km W Mirza-Baylu, road towards Sharleq, ca. 1200 m, 37°18'N, 56°7'E, 7.5.1989
5946-6002	ca. 20 km E Mirza-Baylu, 7 km W Golzar, 1200-1250 m, 37°20'N, 56°3'E, 7.5.1989
6003-6024	ca. 10 km E Golzar turist centre, ca. 1000 m, 7.5.1989
6025-6051	ca 3-4 km NE Tangeqol, 1000-1200 m, 8.5.1989
6052-6086	ca. 6-7 km NE Tangeqol, 8.5.1989
6087-6115	ca. 8-10 km NEN Tangeqol, western border of Agh-Mazar mountain, Soltan Hoopi, 37°24'10"N, 56°00'30"E, ca. 2000 m, 9.5.1989
6116-6121	ca 6-7 km NEN Tangeqol, Cheshmeh Yelkhi-e Pain, 37°24'N, 55°58'E, ca. 1600 m, 9.5.1989
6122-6150	ca 2-4 km N Tangeqol, 1000 m, 9.5.1989

ANDERSON, J. S. & PETERSON, I. C (5) W

309, 312-315	125-140 km W Bojnurd, 1100-1200 m, 8.7.1969
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BAMDADIAN (1) W

12135	Golestan, Bamdadian, 19.5.1967
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BABAKHANLOU, P. & PABOT, H. (1)

23721	118 km from Gonbad-e Kavus to Bojnurd, Babakhanlou & Pabot
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COLO STATE UNIVERSITY (1) MMTT

1311	Almeh, 1500 m, 22.7.1969, Colo State University Team
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DANESHPAJOUH, B. (=DANESHPAZHUH) {D}, (7) IRAN, W

38553	Jangal-e Golestan, Tunnel, 29.April 1978
38623	Tange Gol, 600 m
38550, 38637, 38639, 38640, 38641, 38642	Almeh, 1400-1700 m

DEWEY, D. R. LOGAN, UTAH (1) MSB

869	On road towards Sulgerd, 1400-1600, D. R. Dewey, Logan, Utah, 1972. (cultivated based on seeds collected from Golestan National Park by Saufferer 6.20.1990)
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DRD, UNIT LEADER (2) (MMTT)

1309, 1287	Almeh, June 1969, DRD unit Leader
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EDMONDSON, J. R. {D} (16), K. Dupl. partly W

702, 704, 706, 708, 705, 712, 714	60-80 km ENE of Gonbad-e-Qabus, valley bottom, 2 km E of Tangar, 350 m, 56°E, 37°30'N, 18.7.1971
716	Tangerah 380m
725, 726	60-80 km ENE of Gonbad-e Gabus, 55°52'E, 37°20'N, foot of limestone cliff at head of valley running 6 S. Tangerah, 1050 m, 19.7.1971
768, 770, 771, 785, 786, 789	Almeh, 10 km NE Dasht, 56°5', 37°20', 1700-1900 m 26.7.1971

FERGUSON (2) MMTT

1190	Almeh spring, 26.7.1967
1194	Golestan, vic, Yekkepar Mahl, 29.7.1967

FIRUZNIA {F} (115), MMTT

1002	Dast-e Shah, 1600 m, 30.5.1975	1108, a-b	Soolegerd, 20.5.1975
1003-1004	Sharlou 950 m, 22.4.1975	1110-1113	Tangegol, 650, 5.5.1975
1007	Dast-e Shah, 1600 m, 30.5.1975	1117	Dast-e Shah, 1600 m, 30.5.1975
1009	Soolegerd, 1160 m, 20-5-1975,	1119	Almeh, 1650 m, 18.7.1975
1014	Dast-e Shah, Ilanli, 1600 m, 30.5.1975	1120	Dast-e Shah, 1600 m, 30.5.1975
1017	Almeh, 1600 m, 19.5.1975	1121	Dast-e Shah, 1540 m, 3.6.1975
1018-10121	Soolegerd, 1160 m, 20.5.1975	1122	Almeh, 1750 m, 19.5.1975

1023	Dast-e Shah, Cheshmeh Shakha, 1600 m, 30.5.1975	1124	Almeh
1024	Tangegol, 650 m, 5.5.1975	1126	Dast-e Shah, Chesme-Mar, 1340 m
1025	Golestan: 300 m, 4.5.1975	1128	Dast-e Shah
1027-1030	Tangegol, 650 m, 5.5.1975	1129	Dast-e Shah, Ilanli, 1600 m, 30.5.1975
1033	Dast-Shah, 1600 m, 30.5.1975	1132	Dast-e Shah, 1600 m, 30.5.1975 p.p.
1034	Almeh, 17.4.1975	1134	Soolegerd, 1160 m, 20.5.1975
1036	Soolegerd, 20.5.1975, 1160 m	1135-1137	Almeh, 1600 m, 19.5.1975
1037	Dast-e Shah, 1600 m, 30.5.1975	1138	Sharlou, 950 m, 17.4.1975
1038	Tang-e Gol, 650 m, 5.5.1975	1139	Sharlou, 950 m, 4.2.1975
1041	Abshar, 750 m, 16.5.1975	1140	Almeh, 1600 m
1042-1043	Sharlou, 950 m, 17.4.1975	1141	Dast-e Shah, Cheshmeh Gholam, 1770 m, 30.5.1975
1045-1046	Soolegerd, 1160 m, 20.5.1975	1143	Tangegol, 460 m
1049	Daste-Shah, 1600 m, 30.5.1975	1146	Dast-e Shah, Yelagh, 1540 m, 3.6.1975
1050	Sharlou, 950 m, 17.4.1975	1147	Tang-e Gol, 750 m
1053	Tang-e Gol 750 m, 15.6.1975	1148	Almeh, 1600 m, 18.5.1975
1056-1057	Sharlou, 950 m, 17.4.1975	1149	Dast-e Shah, 1540 m
1058	Dast-e Shah, Tcheshmeh-e Mar, 1540 m, 24.5.1975	1150	Almeh, 1800 m, 22.4.1975
1059	Tangegol, 750 m, 15.6.1972	1154	Tangegol, 650 m, 5.5.1975
1060	Dast-e Shah, Tcheshmeh-e Shah, 30.5.1975	1155-1156	Soolegerd, 1160 m, 20.5.1975
1061	Dast-e Shah, Cheshmeh Mar, 1540 m, 3.6.1975	1157	Tangegol, 650 m, 20.4.1975
1062	Golestan, 450 m, 15.6.1975	1159-1160	Dast-e Shah, Cheshmeh Mar, 3.6.1975, 1450- 1540 m
1067	Dast-e Shah, Ilanly, 1600 m, 30.5.1975	1162	Soolegerd, 1160 m, 20.5.1975
1068	Daste- Shah, 1600 m, 30.5.1975	1167	Dast-e Shah, Cheshmeh-Gholam, 1770 m, 30.5.1975
1069, 1072	Soolegerd, 1160 m, 20.5.1975	1170	Dast-e Shah, Cheshme-ye Shah, 1040 m, 10.5.1975
1073-1074	Dast-e Shah, 1540 m, 31.5.1975	1174-1175	Almeh, 1600 m, 19.5.1975
1076	Dast-e Shah, Tcheshmeh-Mar, 1540 m, 3.6.1975	1178	Dast-e Shah, Cheshmeh Shakha, 30.5.1975
1080	Dast-e Shah, Ilanly, 1600 m, 30.5.1975	1179	Dast-e Shah, Ilanli, 1600 m, 30.5.1975
1081	Sharlou, 950 m, 17.4.1975	1180	Daste- Shah, Rig Cheshmeh, 1770 m, 30.5.1975
1082	Dast-e Shah, 30.5.1975	1182	Tangegol, 750 m, 15.6.1975
1084	Mirza-Baylu, 1600 m, 19.5.1975	1184	Daste-Shah, Shakha, 1600 m, 30.5.1975
1088	Dast-e Shah, Ilanly, 1600 m, 30-5.1975	1186	Dashte- Shah, Telagh, 1540 m, 3.6.1975
1090	Soolegerd, 20.5.1975	1187	Dasht-e Yelaq, 1540m, 3.6.1975

1093	Sharlou, 950 m, 17.4.1975	1188, 1192	Almeh, 1600-1750 m, 19.5.1975
1094	Almeh, 1150 m, 17.4.1975	1199	Dast-e Shah, Ilanly, 1600 m, 30.5.1975
1095	Sharlou, 950 m, 17.4.1975	1377	Dast-e Shah, Cheshmeh-Shakha, 1600 m, 30.5.1975
1097	Tangegol, 650 m, 17.4.1975	s. n.	Soolegerd, 1160 m, 20.5.1975,
1102	Sharlou, 950 m, 4.5.1975	s. n.	Tangegol, 750 m, 15.6.1975,
1103, 1105	Dast-e Shah, 1600 m, 30.5.1975	s.n.	Sharlou, 950 m, 17.4.1975
1107	Tangegol, 650m, 5.5.1975		

FOROUGH, (2), TARI, Dupl. W

7326	Almeh, 1680-1800 m
8121	Almeh, 1800 m, 19.6.1972

FURSE, P. {FU} (28), K. Dupl. partly M, W

5089, 5090, 5091, 5093, 5095, 5096, 5114, 5115, 5117, 5120, 5121, 5123, 5129, 5140, 5142	Gulestan [Golestan] forest, about 35-45 miles [55-72 km] ENE Gonbad-e Cabus 2000'-3000' [600-920 m], 29-31.3.1964
7270, 7275, 7282, 7288, 7298, 7314, 7368, 7371, 7383, 7394, 7398	Gulistan forest, 40-70 miles [65-120 km] E Gonbad-e Kavus, 750-1500 m
8988, 9020	Gulistan forest, 3000 ft., 18-20.8.1966

GHORBANLI, M. & AKHANI, H. {GA} (see notes under Akhani)

4831-4849	ca. 23 km W Mirza-Baylu, ca. 950 [1100], 37°18'N, 56°5'E, 21.8.1987
4850-4862	Mirza-Baylu, ca. 1200 m, 37°21'N, 56°15'E, 21.8.1987
4863-4898	Almeh, 56°8'N, 37°21'E, 1700-1750m, 21.8.1987
4899-4904	5 km from Almeh to Mirza-Baylu, 37°21'N, 56°11'E, 21.8.1987
4905-4906	ca. 5 km W Mirza-Baylu, ca. 1200 m, 21.8.1987
4907-4939	ca. 12 km E Tangerang, ca. 800 m, 37°23'N, 55° 53'E, 22.8.1987
4940-4963	ca. 4 km E Tangerang, ca. 800 m, 37°23'N, 55°51'E, 22.8.1987
4964-4986	Tangegol, mountains above the station, ca. 700-900 m, 23.8.1988
4987-4999	Around Nahre Tangegol, ca. 850 m, 23.8.1987
5000-5012	Around Tangegol, ca. 850 m, 37°22'N, 55°56'E, 23.8.87

IRANSHAHR, M. {I}, (11) IRAN. Dupl. W

4834, 7071, 7072, 7074, 7078, 8017, 8019, 8148, 12294, 12295, 12668	Golestan forest, 18.3.1967, 12. 4. 1967, 6.5.1973
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IRANSHAHR, M. & DEZFOULIAN (6) IRAN. Dupl. W

7070, 7066, 7078, 7067, 8010, 7069	Golestan
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IRANSHAHR, M. & ZARGANI {IZ} (14) IRAN. Dupl. W

15153, 15214, 15245, 15247, 15247, 15289, 15308, 15345, 16271, 16271, 34090, 35536, 40464, s. n. (27.7.1972)	Golestan forest, 500 m, 27.7.1972
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JAFARI, B (3) (In akhani) Hb. Akh.

12240	Aq-Su, at the beginning of Spring, 23.2.1995
12241	Tangerah, mountains above office building, 6.2.1995
12242	E Tangerah, Golshan tourist center, 21.12.1995

KIABI, B. H. (2), SBUH (see notes under Zehzad)

83/203, 83/202	Savar Baghi, 17.2.1983, Kiabi
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KORHONEN, M. (6). H. DUPL. (partly W)

1034, 1095, 1093, 1035, 1092, 1086	Tangegol, 600-1000 m, 1.5.1972, M. Korhonen
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KOWALSKI, G. (2) (MMTT)

1246, 1310	Golestan, May 1970
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KUKKONEN, I. {K} (45) H. Dupl. mostly W

38, 5665, 5666, 5671, 5673 a, 5675, 5682., 5689, 5691, 5693, 5699, 5700, 5747*, 5749*, 5755*, 5756*, 5757*, 5758*, 5769*, 5771*, 5781*	Tangegol, ca. 30 km E of Mohamad Reza Shah Wild Life Park station (Tang-e Rah), 650-1050 m, 30.4.1972 (* = date uncertain)
4894, 5704, 5712, 5714, 5717, 5727, 5734	Almeh, along the road to the side station, 1500-1750 m, 30.8.1972
7665, 7681, 7682, 7685, 7688, 7700, 7752, 7762	Tang-e Gol, 650-900 m, 3.8.1972
7701, 7705, 7707, 7712, 7732, 7734, 7736, 7742, 7746	Almeh, 1250-1750 m, 4.8.1972

MAASSOUMI A. A. R. {MA} (30) TARI, Dupl. MSB

Either altitudes or localities given by Maassoumi are inaccurate. For example the altitude range of Almeh falls between 1700 and 1800 m and that of Sharlegh between 1000 and 1100 m.

47538, 47540, 47546, 47547, 47548, 47549, 47550, 47551, 47553, 47554	Between Sharlegh & Cheshm-e Khan, 1350 m, 7.5.1984, Maassoumi
47556, 47557, 47559, 47560, 47562, 47563, 47564, 47569	Almeh 1100 m, 8.5.1984
47570, 47571, 47572, 47573, 47574, 47575, 47576, 47577, 47578, 47584, 47587, 47591	Sharlegh station, 1300 m, 8.5.1984, Maassoumi

MERTON (2) (literature record, incomplete information)

3071, 3965	Golestan, Merton
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MOGHADAM, A. Z. (3) MMTT*, W*

1296*	Golestan, 37°20'N, 50°07'E, 1000 m, 26.8.1974
1354*	Golestan, 1200 m, 28.8.1974
s.n. **	N. Tang-e Gol, 1500 m, 4.8.1972

MOZAFFARIAN, V. & ABUHAMZEH. (2) TARI. Dupl. MSB

59651, 59654	Tangerah to Tangegol 750 m, 29.10.1987
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NOLL (5) MMTT

s. n., 1228, 1231, 1269, 1363	Golestan (without exact locality), 8.4.1971
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PABOT, H. (4) IRAN, TARI, W

7789	101-118 km E Gonbad-e Kavus, 1100-1260 m, 10.7.1965
7792, 7808	100-127 km E Gonbad-e Kavus, 1240-1340 m
12545	100 km E Gonbad, 1100 m, 14.5.1966

POLUNIN, O. (3) K

11883, 11805, 11864	Near Dasht, May 1973
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RECHINGER, K. H. {R} (590) W. Dupl. partly M

33125	Loveh, 37°24'N, 55°45'E, in silvis frondosis, 400 m, 19.4.1967
33126, 33127, 33129, 33131, 33133, 33134, 33135, 33136, 33141, 33142, 33145, 33147, 33148, 33149, 33150, 33151, 33152, 33153, 33154, 33155, 33158, 33162, 33163, 33167, 33170, 33171, 33172, 33173,	62 km E Loveh, 37°24'N, 55°45', versus Dasht, 37°17'N, 56° 00'E, 1200 m, 19.4.1967
37599, 37600, 37601, 37602, 37604, 37606, 37608, 37612, 37613, 37618, 37619, 37621	Inter Dasht 37°17'N, 56°07'E et Loveh, 125-130 km W Bojnurd 37°28'N, 57°20'E, 1200 m, 10.8.1967
37624, 37625, 37627, 37628, 37628, 37630, 37632, 37633, 37633, 37634, 37636, 37637, 37638, 37640	Golestan, 160 km W Bojnurd, , 37°28'N, 57°20'E, substr. calc. 800 m (p.p. 500-1000), 10.8.1967
52406, 52407, 52408, 52410, 52412, 52413, 52414, 52415, 52416, 52417, 52418, 52419, 52421, 52422, 52425, 52426, 52427, 52429, 52430, 52431, 52432, 52434, 52435, 52436, 52437, 52438, 52439, 52440, 52441, 52442, 52443, 52444, 52445, 52447, 52448, 52450, 52453, 52456, 52457, 52458, 52459, 52463, 52465, 52466, 52467, 52468, 52469, 52470, 52471, 52472, 52473, 52475, 52476, 52477, 52479, 52480, 52481, 52482, 52483, 52485, 52486, 52487, 52488, 52490, 52491, 52494, 52495, 52496, 52498, 52499-b, 52499-a, 52501, 52503, 52504, 52505, 52508, 52509, 52510, 52511, 52512, 52513	Tang-e Rah, in declivibus austrlibus et in silvis frondosis et ad versuras, 400-4580, 2.6.1975
52514 , 52515, 52516, 52517, 52518, 52520, 52522, 52523, 52524, 52526, 52528, 52532, 52533, 52534, 52536, 52538, 52539, 52540, 52542, 52543, 52544, 52545, 52546, 52548, 52549, 52550, 52551, 52552, 52553, 52554, 52555, 52556, 52557, 52558, 52561, 52562, 52563, 52564, 52565, 52566, 52569, 52572, 52574, 52577, 52578, 52580, 52581, 52585, 52587, 52591, 52592, 52593, 52594, 52595, 52596, 52598, 52599, 52600, 52601, 52606, 52607, 52608, 52609, 52610, 52612	Inter Tang-e Rah 37°25'N, 55°45'E, et Tang-e Gol, in silvis frondosis, substr. calc. 400-600 m, 3.6.1975
52614, 52615, 52616, 52617, 52618, 52619, 52620, 52621, 52622, 52624, 52625, 52628 , 52629, 52630, 52632, 52634, 52635., 52637, 52638, 52638, 52641, 52642, 52644, 52647, 52649, 52652, 52653, 52654, 52656, 52658, 52659, 52660, 52661, 52664, 52666, 52668, 52669, 52670, 52671, 52673, 52676, 52677	In quercetis (<i>Quercus castaneifolia</i>) apertis ad cascades E Tang-e Gol, substr. cacl., 750-1100 m, 4.6.1975
52735, 52736, 52740, 52742, 52746, 52747, 52749, 52750, 52751, 52752, 52754, 52755, 52756-a, 52758, 52759, 52760, 52761-b, 52761, 52762, 52763, 52764, 52765, 52766, 52767, 52768, 52769, 52770, 52771-a, 52771-b, 52772, 52773, 52774, 52775, 52776, 52777, 52779, 52780, 52781, 52782, 52783, 52784, 52786, 52787, 52788, 52789, 52791, 52793, 52795, 52797, 52799, 52800, 52802, 52803, 52804, 52808, 52809, 52810, 52811, 52811, 52813, 52814, 52816, 52817, 52818, 52819, 52822, 52823, 52824	23-26 km E Tang-e Rah, 37°25'N, 55°45'E, 900-1000 m, in saxosis calc., et in in alveo arenoso-glareoso in fruticetis (<i>Paliurus spina-christi</i>), 4.-5.6.1975

52825, 52826, 52827, 52829, 52830, 52831, 52831, 52832, 52835, 52836, 52838, 52840, 52841, 52842, 52843, 52844, 52845, 52846, 52849, 52850, 52851, 52852, 52853, 52855, 52857, 52858, 52859, 52860, 52862, 52863, 52864, 52865, 52866, 52869, 52871, 52872, 52874, 52874, 52875, 52876, 52877, 52878, 52879, 52880, 52880, 52881, 52882, 52883, 52884, 52885, 52888, 52889, 52890, 52894, 52896, 52897, 52899, 52900, 52900a, 52901, 52902, 52904, 52907, 52908, 52911, 52912, 52913, 52914, 52915, 52916, 52917, 52918, 52919, 52921, 52923, 52924, 52925, 52927, 52928, 52929, 52930, 52931, 52932, 52933, 52934, 52935, 52936, 52941, 52942, 52944, 52945, 52948, 52950, 52951, 52952, 52953	In planitie "dasht" ad viam versus Almehr ducentem, N Robat-e Qareh Bil, 37°19'N, 56°26'E, 1200 m, 5.6.1975
52955, 52956, 52957, 52959, 52960, 52961, 52962, 52963, 52965, 52966, 52967, 52969, 52970, 52972, 52973, 52975	Ad viam N. Robat-e-Qareh Bil, 37°19'N, 56°26'E, versus Almehr ducentem, 1300 m, 6.6.1975
52977, 52978, 52980, 52981, 52984, 52985, 52988, 52989, 52990, 52991, 52992, 52993, 52994, 52996, 52997, 52998, 53000, 53001, 53003, 53004, 53005, 53006, 53007, 53008, 53009, 53010, 53012, 53013, 53015, 53017, 53018, 53019, 53020, 53022, 53023, 53024, 53029	In planitie ("dasht") ad viam N Robat-e Qareh Bil, 37°19'N, 56°26'E, versus Bekadeh ducentem, 1200 m, 7.6.1975
53030, 53031, 53032, 53033, 53034, 53036, 53037, 53038, 53040, 53041, 53042, 53043, 53044, 53045, 53046, 53047, 53048, 53049, 53052, 53053, 53054, 53063, 53064, 53065, 53069, 53070, 53072, 53073, 53074, 53075, 53076, 53077, 53078, 53079, 53080, 53081, 53083, 53084, 53085, 53086, 53087, 53088, 53089, 53090, 53091, 53092, 53093, 53094, 53095, 53098, 53099, 53100, 53101, 53102, 53103, 53104, 53104, 53106, 53107, 53108, 53109, 53110, 53111, 53112, 53116, 53118, 53119, 53120, 53121-b, 53121-a, 53123, 53125, 53128, 53130, 53134, 53135, 53136, 53137, 53138, 53139, 53140, 53142, 53143, 53144, 53145, 53146, 53147, 53148, 53149, 53150, 53151, 53154, 53155, 53156, 53158, 53159, 53161, 53161, 53162, 53163, 53165, 53167, 53169, 53171, 53170, 53172, 53175-b, 53175, 53200, 53203, 53204, 53205, 53206, 53208, 53209, 53210, 53211, 53212, 53213, 53214, 53215, 53216, 53217, 53218, 53219, 53220, 53035, 63113	Almehr, 1400-1800 m, 8.-10.6.1975
53774, 62631	Tang-e Gol, 750-800, 18.6.1975

REMAUDIÈRE (2) IRAN, W

6798, 6799	Wald von Golestan, May, Juni 1966
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RENZ, J. {RZ} (43) 10740-10970: Hb. Renz, Basel (not seen); s. n. & 52176-53980 in Rechinger, W

s.n.	Abshar inter Minudasht et Dasht, 900-1000 m, 19.4.1973
s.n. (x 2)	Almeh-Tall, 1300-1400 & 1900 m, 16.4.1973
10740, 10741	Tang-e Rah, 600-700 m
10757, 10759, 10825	Golestan, in silvis (<i>Quercus</i> , <i>Crataegus</i>), 900 m
10762	8 km E Tang-e Gol, 1000 m
10823, 10947	Inter Tang-e Rah et Tang-e Gol, 500-600 m, in quercetis
10846	Prope Abshar, 800 m, in quercetis
10954	Golestan, W specu viae, 800 m
10970	Abshar, 750 m
53176, 53178, 53179, 53180, 53181, 53182, 53183, 53184, 53185, 53187, 53188, 53189, 53191, 53192, 53193, 53194,	In montibus N Almeh, 2100 m, 9.6.1975
52836, 53968, 53970, 53971, 53972, 53974, 53975, 53976, 53977, 53977, 53978, 53980	Ad viam N Robat-e Qareh Bil, 37°19'N, 56°26'E, versus Bekadeh ducentem, 1300-1500 m, 21.5.1975

RIEDL, H. & ERSHAD, J. {RE}, ERSHAD, J. & RIEDL, H. {ER} (16) IRAN, Dupl. W.

s.n., 15796, 16199	In silva Golestan prope Loveh, 700 m, 22.4.1974
15797, 15798, 15856, 15909, 15956, 16155, 16155, 16156, 16176, 16203, 16205, 16209, 16209	Golestan forest, 20.4.1974

SABETI, H. (9) TARI, W

4364, 5469, 5644, 8039, 8110, 8104, 10447	Almeh, 1650-1720
5649, 8575,	Golestan, 940 m, Sabeti

SALEHI (1) MMTT

3364	Tangegol, 25.3.1990, Salehi
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SHAHSAVARI, A. (35)

None of the below cited specimens have been seen (only a few have been included in the annotated list of the flora). All belong to the orchids which were reported by Shahsavari (1990). They are held in the Institut für Systematische Botanik und Pflanzengeographie der Freien Universität Berlin. Parts of the specimens have been collected during a joint excursion from 6 to 9 April 1989.

14532	Golzar, 900-950 m, 23.5.1987	17150	Tang-e Gol, 1000 m, 6.5.1989
17002	Golsar, 1200 m, 20.4.1987	17153	Golzar, 900 m, 23.5.1987
17003	Sawarbaghi, 1100 m, 25.5.1989	17158	Tang-e Gol, 600 m, 11.5.1989
17005	Afrali, 1000 m, 21.4.1987	17159	Tang-e Gol, 900 m, 20.4.1987

17006	Golsar, 900 m, 20.4.1987	17160	Afrali, 1000-1200 m, 21.4.1987
17036	Golsar, 900-1150 m, 6.5.1989	17167	Golsar, 900 m, 6.5.1989
17037	Abshar, 1150-1300 m, 23.4.1987	17168	Golsar, 900 m, 20.4.1987
17064	Afrali, 1000-1200 m, 21.4.1987	17238-17239	Abshar, 1200 m, 23.4.1987
17080-17081	Golsar, 900 m, 6.5.1989	17240	Tang-e Gol, 900 & 1200 m, 1200 m, 22.4.1987
17092	Sawarbaghi, 1000 m, 25.5.1987	17250	Tang-e Rah, 1150 m, 22.4.1987
17101	Tang-e Gol, 750 m, 4.5.1989	17251	Afrali, 1000 m, 21.4.1987
17120	Golsar, 900 m, , 20.4.1987	17256	Abshar, 900 m, 23.5.1987
17126	Afrali, 1200 m, 21.4.1987	17259	Sawarbaghi, 1000 m, 7.5.1989
17140	Afrali, 1000-1200 m, 29.5.1989	17260	Tange Gol, 700 m, 7.5.1989
17145-17146	Soltanhoppie, 1500-1750m, 7-8.5.1989	17262	Cheshme-Jelkhi, 1250 m, 7.5.1989
17148-171749	Cheshme-Jelkhi, 1500 m, 8.5.1989		

SOJÁK, J. {SO} (29), PR. Dupl. partly W.

s. n., 7887, 7935, 8300, 8362, 8363, 8464, 8913, 8997, 11240, 7023, 7030, 7057, 7058, 7194, 7195, 7232, 7235, 7321, 7322, 7823, 7284, 7206, 7199, 7202, 11236, 11237, 11238, 11243	locis stepposis et in silvis reservati „Golestan“ sive Shah Mohammad Reza Wildlife Park, ca. 3 km ab Oppido Dasht, 37°19'-56°01', 18.6.1977
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TERMEH (= TERMÉ, TERME) {T} (35), IRAN. Dupl. W

Most of the Termeh's collections are not regularly numbered according to the respective collection dates and localities. As the author has not seen all specimens, therefore is not possible to provide a complete list of his gatherings with exact dates.

s. n.	Jangal-e- Golestan, Kuhha-ya-Almeh, Termeh, 10.6.1975
31906, 36866, 36867, 40459, 40461, 41412, 41415, 41420, 41447, 41451 and probably 33965, 34042, 34052, 34058, 34227, 34228, 35652, 35660, 37060	Inter Shahpassand et Bodjnour, Almeh, 1200-1680, 6.7.1975, 7.6.1975, 10.6.1975
34741, 34797, 34799, 34800, 35673	Tang-e Rah, 580 m, 17.5.1976
34262, 40460, 41538, 41539, 41541, 41544, 44509	L ébranchement de la route Almeh (Dasht), 1200-1350 m, 6.-7.6.1975
41542	Between Tang-e Rah and Tang-e Gol, 420-470 m, 4.6.1975
41549	La route de Behkadeh-e Radji (Dasht), 8.6.1975
52591	Inter Tang-e Rah et Tang-e Gol, 400-600 m, 4.6.1975

TERMEH, F. & MATIN, F. {TM} (94) IRAN. Dupl. W. (See notes under Termeh)

34677, 34872, 34876, 34877, 34880, 34881, 34882, 34840, 34841, 34928, 34929, 34931, 34943, 41530	Tang-e Rah, 580 m, no date (partly 17.5.1976)
34753, 34764, 34765, 34779, 34780, 34803, 34806,	Tang-e Rah, 400-580 m, 17.6.1976

34807, 34808, 34811, 34823, 34824, 34825, 34827, 34828, 34829, 34829, 34831, 34832, 34833, 34834, 34836, 34837	
34754	Golestan (no date)
34757, 34760, 34760, 34883, 34890, 34917	Almeh, 1600-1700 (no date)
34767, 34769, 34942, 35093	Tang-e Gol, (no date), 500-900 m
34593, 34776, 34777, 34786, 34853, 34854, 34859, 34916, 43932, s.n.	Dasht-e Kalpush, 920-1000 m, 21.5.1976
34768, 34770, 34784, 34785, 34788, 34834, 34839, 34936, 34937	Tang-e Gol, 580-650 m, 19.5.1976
34865	Jangal-e Golestan, Kuha-ye Almeh, 1600-1700 m, 24.4.1976
34934, 34935	Tang-e Gol, 600-650 m, 10.5.1976
35071, 35072, 35076, 35085, 35086, 35087, 35088,	Tang-e Gol, 600-700 m, 13-14.10.1976
35075, 35078, 35081, 35101, 35102, 41540	Kouha-ye Almeh (Almeh mountains), 1450-1580 m, 23.10.1976
35080, 35089	Tang-e Rah, 420-500 m, 12.10.1976
35090, 35092	Kouha-ye Almeh, 1300-1680 m, 21.11.1976
35096, 35097, 35098, 35103	Dasht-e Kalpush, 15.10.1976
35099, 35105, 35106, 35104	Dasht-e Almeh, 1380-1450 m, 24.10.1976

TERMEH, F. & MOUSSAVI, M (1) IRAN

34789	Tangerah, 580 m, Terme & Moussavi, 17.5.1976
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UOTILA, P. {U} (67), H. Dupl. mostly W

15999, 16001, 16002, 16026, 16028, 16029, 16030, 16033 and probably 14902, 14903	Tangegol, 10 km E of the station area, alt. 500-1000 m, 29.4.1972
16045, 16050, 16070	Almeh, along the road to the side station, steppe, 1500-1600 m, 30.4.1972
16051, 16055	Tangegol, 750-900 m, 3.8.1972
16074, 16075, 16077, 16079, 16079, 16084, 16085, 16085, 16095, 16095	Tangegol, ca. 30 km E of Golestan station (Tang-e Rah), 1050 m, 30.4.1972
16100, 16105, 16109, 16114, 16120, 16123, 16124, 16136, 16139, 16147, 16150, 16153, 16156, 16170, 16171, 16178, 16194, 16195, 16277	Tangegol, 650-1000 m, 1.5.1972
18945, 19019, 19028, 19031, 19037 a, 19038, 19041, 19043, 19106, 19203	Tang-e Gol, 650 m, 3.8.1972
18170, 19135, 19136, 19140, 19151, 19160, 19162, 19164, 19168, 19175, 19177, 19179, 19183	Almeh (or road to Almeh), (1050-) 1600-1700 m, 4.8.1972

WALTON, D. {WA} (23). E

152, 219, 185, 206, 182, 174, 173, 176, 170, 217, 220, 181, 178, 200, 158, 205, 146, 162, 204, 157, 151-A, 161, 184	Gulistan forest, 1000 m, 22-24.8.1967
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WENDELBO, P. (2). W

14223	Almeh, 1700 m, 27.7.1974	12639	Almeh 1750m, 19.6.1974
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WENDELBO, P. & COBHAM {W&C} (88), TARI, W

14200, 14201, 14204, 14206, 14207, 14210, 14215, 14216, 14218, 14221, 14222, 14224, 14225, 14226, 14227, 14228, 14232	Almeh, 1700 m, 27.7.1974
14235, 14237, 14238, 14239, 14240	Between road to Almeh and Bekadeh, 1300 m, 28.7.1974
14241, 14243, 14243, 14248, 14253, 14255, 14256, 14257, 14259, 14260, 14261, 14386	Almeh, 1600-1750 m, 28.7.1974
14263	Steppe on road to Tang-e Gol, 1200 m, 29.7.1974
14264, 14267, 14269, 14271, 14275	Abshar, 700 m, 29.7.1974
14277, 14279, 14281, 14283, 14286, 14290, 14291, 14293, 14295, 14297, 14298, 14300, 14301, 14303, 14304	SE of Abshar, 800-900 m, 29.7.1974
14308, 14309, 14310, 14311, 14313, 14315, 14316, 14317, 14318, 14319, 14321, 14323, 14325, 14326, 14328, 14331	Golestan valley, 500-1000 m, 29.7.1974
14303, 14339, 14372, 14373, 14374, 14376, 14382, 14387, 14388, 14390, 14391, 14392, 14393, 14395, 14401, 14408, 14409	Forest south of Tang-e Gol, 700-1990 m, 1.8.1974

WENDELBO, P. & FOROUGHI {WF} (120), TARI, W

10957	Tang-e Gol, 30.4.1974
12261, 12571, 12610, 12612, 12622, 12624, 12625, 12627, 12629, 12630, 12631, 12632, 12636, 12641, 12642, 12644, 12645, 12647, 12650, 12651, 12652, 12655, 12657, 12658, 12660, 12668, 12670, 12673, 12675, 12677, 12678, 12680, 12681, 12682, 12683, 12684, 12685, 12687, 12688, 12689, 12690, 12691, 12692, 12694, 12695, 12696, 12699, 12700, 12703, 12730, 12851, 12626, 12679, 12693, 12702, 12744	Almeh 1600-1900 m, 19.6.1974
12708, 12709, 12710, 12711, 12713, 12715, 12716, 12720, 12724, 12727, 12729, 12772	Below Almeh, 1250-1500 m, 20.6.1974
12733, 12735, 12738, 12742, 12746, 12750, 12753, 12755, 12756	Almeh, 1500-1750 m, 20.6.1974
12766, 12773, 12774, 12777, 12778, 12780, 12781, 12782, 12783, 12792, 12793, 12794, 12795, 12798, 12800, 12801, 12802, 12804, 12810, 12811	Forest S of Tang-e Gol, 700-1000 m, 21.6.1974
11091, 12820, 12822, 12823, 12824, 12825, 12827, 12833, 12834, 12835, 12821	Road to Behkadeh, 1250-1300 m, 21.6.1974
12241, 12838, 12842, 12842, 12845, 12776,	Above Tang-e Gol, 900 m, 21.6.1974
11096, 12847, 12848, 12849	Tang-e Gol, 720 m, 22.6.1974

WENDELBO, P., FOROUGH, SANII & SHIRDELPUR {W&al} (78) TARI, W

10933, 10934, 10935, 10936	Tang-e Rah, margin of forest, 450 m, 30.4.1974
10937, 10938, 10941, 10944, 10947, 10951, 10952, 10953, 10958, 10958, 10959, 10963	6 km E of Tang-e Gol, 820 m, 30.4.1974
10964, 10966, 10968, 10970, 10972, 10972-b, 10972-a, 10974, 10975, 10976, 10977, 10978, 10979, 10980, 10983	Plain along lower part of road to Alneh, 1200-1400 m, 30.4.1974
10989, 10990, 10991	Above Alneh, 1750 m, 30.4.1974
10993, 10995, 10996, 11000, 11003	Alneh, 1700-1750 m, 30.4.1974
11004, 11005, 11006	Below Alneh, 1600 m, 30.4.1974
11013, 11017, 11020, 11021, 11024, 11025, 11026, 11027, 11028, 11030, 11031, 11032, 11033, 11034, 11035, 11036, 11039, 11042, 11043, 11044, 11046, 11047, 11048	Forest S of Tangerang, 450-600 m, 1.5.1974
11056, 11057, 11067, 11068, 11073, 11074	Near Bojnurd road, along side road to Bekadeh, <i>Artemisia</i> steppe, 1200-1250 m, 2.5.1974
11077, 11088	Road to Bekadeh 1450-1600 m, 2.5.1974
11078, 11079, 11081, 11082	Between Alneh and main road (or below Alneh), 1250-1600 m, 2.5.1974

ZANGUI & ALVANI {ZA} (7), MUH (Mashahad University Herbarium), Dupl. Hb. Akh.

15837, 15839	After Tunnel, 8.9.1987
15846, 15849	Near Abshar, 8.9.1987
15863	At the beginning of Dasht road, 8.9.1987
15875	Southern border of the Golestan National Park, 1200 m, 8.9.1987
18021	Western border of Golestan National Park, between Loveh and Kondeskuh, 26.9.1989

ZEHZAD {Z}, (112), SBUH, Dupl. partly M, Hb. Akh.

The two first numbers of Zehzad's (et al.) collections (like 82, 83 etc.) indicate the year of collection. These are not separated with accession number in original labels. The author has separated them by a slant "/".

82/121, 82/125	Tang-e Gol, around the camp station, 680 m, 4.8.1982
82/147, 82/149	Mirza-Baylu, near tourist center, 1.8.1982
82/174, 82/177, 82/178, 82/179, 82/180, 82/183, 82/209, 82/210, 82/211, 82/212, 82/213, 82/214, 82/215, 82/216, 82/223, 82/225, 82/227, 82/228, 82/230, 82/233	ca. 22-24 km before Mirza-Baylu towards Tang-e Gol, Sharleq, 900 m, 1.8.1982
82/200, 82/202, 82/203, 82/206, 82/208, 82/210, 82/212	Tang-e Gol, 29.7.1982
82/237, 82/247, 82/249, 82/251, 82/255, 82/256, 82/259, 82/263, 82/267, 82/267, 82/274, 82/275, 82/276, 82/281, 82/282, 82/283, 82/285, 82/286, 82/290, 82/294, 82/295, 82/299, 82/300, 82/302, 82/308	Between Sharlegh & Tcheshmeh-ye-Khan, 8.7.1982

82/1186, 82/1187, 82/1192, 82/1194, 82/1195	Between Sharlegh & Tang-e Gol, 7.9.1982
83/1350, 83/1352, 83/1353, 83/1354, 83/1354, 83/1359	Tang-e Gol, 700 m, in forest, 3.4.1983
83/1360, 83/1361, 83/1362, 83/1364, 83/1365, 83/1367, 83/1369, 83/1373, 83/1375, 83/1377, 83/1379, 83/1381, 83/1382, 83/1384, 83/1385, 83/1387, 83/1389, 83/1772,	Darreye, Ghare-Ghiagh, 1200m, 17.7.1983
84/02	Mirza-Baylu, 1200 m, 20.7.1984
84/10, 84/16, 84/17, 84/19	Soolgerd, 1200-1250 m, 17-21.7.1984
84/31	Almeh, 1650 m, 20.7.1984
84/34, 84/38, 84/40	Khandoshan, 650 m, 20.7.1984
85/139, 85/140	Between Soolegerd & Mirza-Baylu, 18.7.1985
85/157, 85/164	Soolegerd, 18.7.1985
85/175, 85/178, 85/182, 85/184, 85/187, 85/189 , 85/190, 85/197, 85/200, 85/203	Ghouch-Cheshmeh, 11.7.1985
85/258, 85/264	Tang-e Gol, S side of the road towards river, 15.7.1985

ZEHZAD & KIABI {ZK}: (28), SBUH, Dupl. partly M, Hb. Akh. (see notes under Zehzad)

82/101, 82/102, 82/104, 82/105, 82/106, 82/110, 82/115, 82/119, 82/123, 82/124	Tang-e Gol, around the camp station, 680 m, 4.8.1982
82/127, 82/127, 82/134	In the valley towards Almeh, 30.7.1982
82/156, 82/157, 82/158, 82/159, 82/165	Savar Baghi, 800-900 m, 2.8.1982
82/313, 82/316, 82/317, 82/326	Mirza-Baylu towards Almeh, 11.7.1982
82/327, 82/328, 82/328	Almeh valley, 11.7.1982
86/2925, 86/2932, 86/2934	Tang-e Gol, 650-700 m, 23.5.1986

ZEHZAD, AZIZIAN, TAHERI & KIABI {Z&a} (27), SBUH, Dupl. partly M. (see notes under Zehzad)

86/2587, 86/2588, 86/2590, 86/2591, 86/2592, 86/2594, 86/2595, 86/2599, 86/2605, 86/2608, 86/2611, 86/2618, 86/2621, 86/2622, 86/2600, 86/2628, 86/2629, 86/2630, 86/2649	Between Mirza-Baylu & Almeh, 1300-1670 m, 24.5. 1986
86/2926, 86/2927, 86/2935, 86/2939, 86/2944, 86/2947, 86/2949, 86-2931	Tang-e Gol, 650-700 m, 23.5.1986

New combination:

Cynoglossum kandavanensis (BORNH. & GAUBA) AKHANI, Stapfia 53:80 (1998)