



**ISLAMIC REPUBLIC OF IRAN:
COUNTRY REPORT TO THE FAO
INTERNATIONAL TECHNICAL
CONFERENCE ON PLANT
GENETIC RESOURCE**

(Leipzig, 1996)

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Teheran, Spring 1995



Note by FAO

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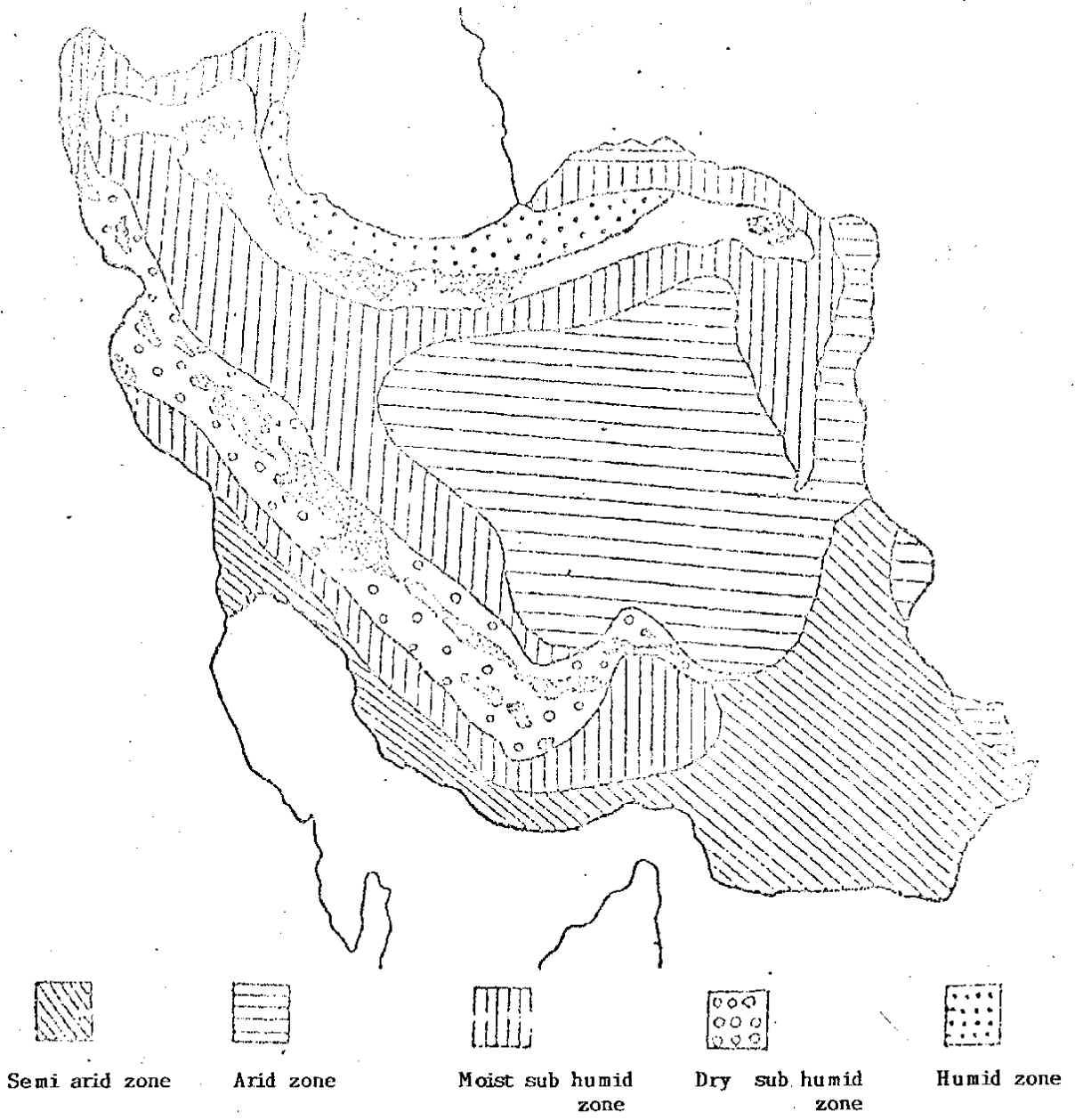


Fig. 1.1 Climatical zones of Iran.



CHAPTER 1

Introduction to I.R. Iran and its Agricultural Sector

1.1 GENERAL INTRODUCTION

The Islamic Republic of Iran is a vast expanse of land, being 1,648,195 square km, located between 25°3 and 39°47 north latitude. More than half of the country is covered with mountains and highlands, about 1/4 with deserts and the rest with arable land. The country is bounded on the north by the former USSR and Caspian sea, on the east by Afghanistan and Pakistan, on the south by the Persian Gulf and Oman sea, and on the West by Iraq and Turkey.

1.2 AGRICULTURAL SECTOR

Iran enjoys a remarkable climatic diversity. Yet, due to such hindering factors as a low average rainfall rate, inappropriate distribution, limited water resources, and the general unevenness of the land, the optimum utilization of the country's cultivable lands has, to date, been rendered impossible.

Approximately, 30% of Iran's total area (around 51 million ha) is characterized with a high or medium degree of cultivability. However, a large part, about 62%, of its cultivable soil resources, amounting to 33 million hectare has not yet been put to agricultural utilization and the 18.5 million hectares (Table 1.1.) of which is the land now under cultivation has been utilized at a productivity rate of 50-60 percent. There are 13.4 million hectare under forests and 90 million hectare under pasture and range species. The agricultural sector contribute over 20% to, 1 the Gross Domestic product (GDP).



Table 1.1 Total agricultural land use in 1992

Type of plantation	Crop area (1000 ha)	% of the total cultivated land
Irrigated annual crops	5813.3	31.4
Rain-fed annual crops	7152	38.7
Fruit bearing permanent crops	1384.8	7.5
Fruitless permanent crops	146.4	0.8
Fallow land	4003.5	21.6

1.3 POPULATION

The average annual rate of population in 1993-1994 has fall to 1.8, the latest census conducted in 1991 revealed that Iran's population was 55.8 million of which 57% lived in urban areas, 42% were inhabitants of rural areas and the rest were non-inhabitants. At the same time, 62.2% of the total population of the country is over ten years of age and socially active. It was also estimated that 33.8% of the urban, population, 33.9% of the rural population, and 35% of non-inhabitants were employed. Of the total employed population, 30% were involved in agricultural activities.

1.4 SOIL AND WATER

Pedological and land classification research, carried out on 24 million hectare of land have deemed 9.79 million hectares fit for irrigation .The total precipitation of the country is estimated to be around 400 billion cubic meter, out of Which 70 % is lost through evaporation and some 30% is left as surface or groundwater (Table 1.2).



Table 1.2 Water supplies utilized by the agricultural sector (billion m).

Type of water	1991
I. Surface waters	30.73
Storage dam water	15.05
Water supplied by pump stations	1.42
Diversion dams	4.98
Traditional methods	9.28
II. Ground waters	41.20
Well water	32.36
Water supplied through subterranean conduit and spring	8.84
	71.93

1.5 CLIMATE

The country is divided into five agro-ecological zones as follows:

- 1 **Arid zone:** Areas where the annual rainfall is less than 100 mm.
- 2 **Semi arid zone:** Areas where the annual rainfall is between 200-250 mm.
- 3 **Dry Sub-humid zone:** Areas where the annual rainfall is between 250-500 mm.
- 4 **Moist Sub-humid zone:** Areas where the annual precipitation is between 500-1000 mm.
- 5 **Humid zone:** Areas where the annual precipitation is over 1000 mm.

Despite the above agro-ecological classification (Fig. 1.1), isolated spots within the country are found with extreme of cold, heat and drought. This climatic variability has made the country a suitable place for the growth of many different crop plants (Table 1.3).



Table 1.3. Agricultural and horticultural products, major crops in the cropping season 1992-1993.

Crop	Crop area Ha	Yield (MT)	Performance Kg/ha
Wheat	6,800,025	10,710,101	2,775.88
Barley	1,962,076	3,058,047	2,641.34
Paddy	590,967	2,282,220	3,861.84
Grains	1,044,924	638,400	1,269.91
Cottons	136,878	266,031	1,997.82
Sugar beet	179,720	5,407,658	30,089.35
Oil seeds	295,496	315,993	1,324.22
Sugar straw	26,156	1,867,770	aw408.85
Vegetables	345,866	7,240,355	21,755.73
Provender crops	286,359	4037,173	16,630.35
Other crops	193,783	432,226	6,664.56

* "Production" and "Crop area" figures have been computed for both rain-fed and irrigated crops, while performance rates relate to irrigated products only.

1.6 EXPORTS

In 1993, 910./8 thousand tones of agricultural products valued at 44159 million Rials wereexported to foreign markets (Table 1.4).

The total non-oil exports of Iran surpassed 2.5 million tones in 1991 with a value of 176 billion Rials. The major portion of agricultural exports goes to horticultural products which in 1991 reached to 454 thousand tones in weight and 30 billion Rials in value.



Table 1.4 Export of agricultural commodities 1993 - 1994

Major	Weight (x 1000 tones)	Value (x million Rials)
Cotton	6.27	129.7
Dried Fruit	73.4	4275.7
Pistachio & Pistachio	104.19	25020.2
Fresh Fruit	312.8	5813.4
Vegetables & Summer	181.24	1747.7
Potatoes, Garlic & Onions	32.86	715.3
Peas & Legumes	78.16	2123.2
Sugar Cane Molasses	74.26	221.2
Coriander seeds	7.28	420.8
Saffron	0.06	1387.4
Cumin	18.46	1429.3
Henna	1.54	57.0
Miscellaneous	19.66	818.1

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CHAPTER 2

Indigenous Plant Genetic Resources

Iran is located in an area which is the center of origin for many crop plants (see appendix 1). Although the country is primarily classified as a dry and warm area, within it, different climates and often in extreme forms are found. This has helped the survival of a diverse plant species in the wild. It is estimated by Iranian botanists that there are as many as 12,000 species in Iran. These species are in the process of collection and identification by the Research Institute for the Forestry and Range Management. Amongst the Iranian flora, there are some of the most important food crops such as wheat and its wild relatives (see appendix 2). The relatives of these species are still available in the wild.

Taking into the account that agriculture is as old as nearly 7000 years in this country, and also the subsistence nature of it, which is still practiced in many areas, the country is considered to be a rich source of landrace. This genetic pool of diversity is however under threat. During the past few decades the environmental degradation has proceeded at an unprecedented speed. Pasture exploitation, forest degradation and the introduction of intensive agriculture along with the use of chemicals and improved varieties of crop plants has accelerated the erosion of a large part of the diversity. Most conspicuous are the vanishing of many of the land races previously known to exist, particularly in cereals and their replacement with high yielding cultivars. However, there is no quantitative data available on the extent of this genetic erosion.

With increasing concern over the environmental degradation, the Government of the Islamic Republic of Iran has taken a series of steps to protect the wild life. At the present, three governmental organizations are engaged in the wild life protection:

- 1 The Organization for the Protection of Environment is an agency under the direct supervision of the presidential office. This organization is responsible for the management of 77 protected areas in the country, amongst which there are 7 national parks and 24 wild life sanctuary.
- 2 The Forest and Range Organization, together with the Research Institute of Forestry and Range Management, under the Ministry of Jihad, are responsible for the management of 64 forest reserves.



- 3 The National Plant Gene Bank of Iran (NPGBI) which is located in the Department of Genetics and Genetic Resources the Seed and Plant Improvement Institute, under the Ministry of Agriculture . The NPGBI is responsible for the collection, evaluation and conservation of the plant genetic resource of the country with the exception of forest genetic resource for which the former organization is responsible.

Although the importance of plant genetic resources is fully recognized now, the awareness on the importance of plant genetic resource collection goes as far back as to 1948. At this time about 16,500 land races of cereals were collected at the Faculty of Agriculture, Tehran University. Unfortunately, at the time that the NPGBI was established, only 6,500 of this collection was available which is now preserved.



CHAPTER 3

National Conservation Activities

3.1 *IN SITU* CONSERVATION ACTIVITIES

Biodiversity and *in situ* conservation has become an issue only in recent years in Iran and it is now in a planning phase. However, a collection of more than 800 land races of pomegranate is available in the form of field gene bank at Yazd and Saveh, which are managed by the NPGBI representatives at the site.

3.2 *EX SITU* CONSERVATION ACTIVITIES

Prior to the establishment of the NPGBI, some collection activities had been done, mainly in cereals in 1948. Some parts of these collections are still available at Tehran and Shiraz universities. But, only after the establishment of the NPGBI the systematic collection, evaluation and conservation of plant genetic resources were started.

3.3 HISTORY OF NPGBI

In October 1977 two FAO gene bank specialists were sent to Karaj to help local personnel of SPII with technical aspects of germplasm conservation. This collaboration was eventually lead to the sign of an agreement between SPII and the FAO on plant genetic resources conservation on 1978. A small gene bank with a few staff and minimal laboratory facilities was established in SPII at Karaj. According to this agreement, this establishment was called Plant Genetic Resource Unit (PGRU).

Following the formation of PGRU, the government of the Islamic Republic of Iran made a strong commitment to conservation of genetic resources and in 1983 the National Plant Gene Bank of Iran was established by using the resources of PGRU plus some additional investments. The NPGBI is located in



the Department of Genetics and Genetic Resources of SPII and is funded by the Agricultural Research, Extension and Education Organization (AREEO) of the Ministry of Agriculture. Realizing the importance of germplasm conservation, the government plan to expand the NPGBI in the near future by making it an independent institute under AREEO.

The NPGBI is a permanent member of the International Plant Genetic Resource Institute (IPGRI) and is also an active member of the Regional Net-Work of Plant Genetic Resources Activities for West Asian and North African Countries (WANANET). Representatives of NPGBI are members of the specialized working groups of WANANET and it's steering committee.

NPGBI operates on a net work basis, a planing and organizing committee for plant genetic resources is operational in each of the 26 provinces of the country. Few acting sub-committees in each province are responsible for performance and execution of NPGBI policies. There are at least two permanent NPGBI staff in each province and many colleagues from other organizations and departments take part in meeting the NPGBI programs.

At the present, a total of 155 species are presently conserved in the NPGBI. These species belong to 125 crops, of which more than 40,000 samples are available (Table 3.1). The collection at NPGBI contains mainly indigenous material, nevertheless it contains some material received from ICARDA, ICRECAT and various sources in Canada, Japan, China, Russia, USA and India. We also have some material stored in our cold room for Afghanistan.

Although the size of collection in different species varies, less than 5% of the total stocks in the NPGBI have a foreign origin. The material in NPGBI are equally important, however the cereal collection with it's vast number of samples is regarded as one of the best sets.



Table 3.1 List of available germplasm in NPGBI and their conservation type

Crop	N° of acces.	Type of material	Type of conserv.
Wheat	14,827	seed	LT & ST
Barley	6,636	seed	LT & ST
Rice	2,312	seed	LT & ST
Chickpea	5,459	seed	LT & ST
Lentil	2,020	seed	LT & ST
Beans	1,549	seed	LT & ST
Forage	2,144	seed	LT & ST
Cucurbits	1,511	seed	LT & ST
Leaf Vegetables	484	seed	LT & ST
Fruit Vegetables	427	seed	LT & ST
Root & Tuber crops	1,281	seed	LT & ST
Industrial crops	1,281	seed	LT & ST
Seed Fruits	306	live plant	Field bank
Stone Fruits	432	live plant	Field bank
Pomegranates	760	live plant	Field Bank
Grapes	391	live plant	Field Bank
Citrus	211	live plant	Field Bank
Almonds	229	live plant	Field Bank
Date palm	102	live plant	Field Bank
Pistachios	300	live plant	Field Bank
Other agri. crops	489	seed	LT & ST
Other hort. crops	125	live plant	Field Bank

LT = Long term storage at -20 C

ST = Short term storage at 0 -4 C

Very little stocks in the NPGBI are referred to and used each year. The users are mainly research students who are working on their research project. About 5 % of the total stocks in the collection have been send to foreign users. In the past six years, more than six thousand samples have been received from other gene bank whereas only one thousand five hundred samples have been send abroad. More than 90% of the germplasm received during this period has been Iranian germplasm held in foreign gene banks.

Although much afford has been put into the NPGBI to build it's collection, the size of the collection i.e. 155 species, is far less than the expected 12,000 species and it is not the representative of the genetic diversity found in the country. However, at the present this collection is more than adequate for our own purpose. Although the activities of the NPGBI during the short period of time since it was established has been satisfactory, the investment made by the government on the NPGBI has not been yet returned in terms of crop improvement. But, realizing the long term use and benefits, the government has not been discouraged from further investments into this matter.



3.4 COLLECTION ACTIVITIES

The germplasm collection is done both by individuals as well as collecting teams. In any case, it is primarily policy oriented, planned and executed either by the NPGBI net-work staff or in collaboration with foreign organizations. So far the material collected at the NPGBI does not contain any sample regarded as invaluable, nevertheless we expect some duplicated material particularly in our cereal collection which was collected during forties.

3.5 STORAGE FACILITIES

The storage conditions at NPGBI comply with international recommendations set by IPGRI. The cold storage facilities includes 7 cold storage room with a total capacity of 7,000 samples of 300 grams each. Five of the storage rooms are maintained at -15°C to -20°C and 2 are at $0 - 5^{\circ}\text{C}$. This temperature is maintained at all time through the use of an emergency electricity generator, should the power is cut off for any reason. The samples of the base collection are held for long storage at $-15 - 20^{\circ}\text{C}$ where there is no humidity control. The samples of active collection are held under short storage $0 - 5^{\circ}\text{C}$ in which the humidity is kept between 30 - 35%. Aluminum packets or jars are used for holding the samples in long storage, whereas paper packets are used for short storage. The amount of seed for each entry varies between 5 - 300 grams.

The storage at Karaj does not contain any safety duplicate. New cold storage at Mashhad is build for holding the Safe Duplicates. It is in our program to send a duplicate of 20 grams to Mashhad from the specimens when rejuvenated.

3.6 PROCESSING OF COLLECTIONS

Upon receiving a sample, it is first identified, weighted, cleaned and dried if necessary. The germination percentage and moisture content are determined and the sample is divided into two parts, one as the base material and the other as active material. These materials are weighted again and put into appropriate packing and placed in the storage. At the same time receipt of the material is acknowledged to the sender and the standard data sheet are filled in and stored in



the computer. A record of the next rejuvenation occasion is also made for future use. The above computer does not take more than one week and there is no backlog material at the NPGBI.

3.7 DOCUMENTATION

Computerized documentation of the NPGBI activities is well established. About 40% of the plant material held at NPGBI is entered into the computer database. In addition to passport data, information on characterization and evaluation are entered into the system when available. The computer system of NPGBI is not connected to any international network and users can obtain information only in a print out format on the basis of a written request. Computerization of information on *in situ* activities is started, but it is not over yet. The information in the data base is duplicated both in the NPGBI as well as in the main frame of the Ministry of Agriculture. Lack of expert taxonomist, particularly at provinces is a major problem in the documentation of wild species.

3.8 EVALUATION AND CHARACTERIZATION

Evaluation of the material in the collection is a routine duty of staff at NPGBI, farmers are not involved in this matter. Evaluation is based on the internationally recommended descriptors of IBPGR/IPGRI, however, we feel that additional parameters, specially those important in the breeding programs inside the country, are required to take notice of. We are now working on the listing and description of such parameters.

About 40% of the collection has been characterized using international descriptors and less than 5 % have been evaluated. Characterization is done as a routine work, whereas evaluation is done under research projects which are to be approved first by the scientific board of the SPII.

Evaluation usually takes place at the SPII fields near Karaj. However, studies such as those requiring exposing a plant material to pathogen inoculum, could take place any where in the country at SPII sub-stations. Evaluation parameters are mostly agronomic readings, nevertheless biochemical data such as those related to baking quality of wheat also are measured when required.



It is a usual practice to produce a project report upon the completion of a project at SPII, a copy of these reports are held in the library. Evaluation results, when produced in research projects are no exception to this rule. NPGBI carry out very few evaluation test for other gene banks and users, nevertheless if such test are done, the results are always send to the users. However users of material from NPGBI, rarely return back their results.

Evaluation data, so far, have not had any impact on our applied plant breeding work yet, however, we hope further integration of NPGBI into the breeding system would have some positive impact in future. Therefore we are reviewing our policies on evaluation and trying to coordinate and integrate it more into our breeding system. More over we are not able to evaluate all of our material, particularly that of cereal.

3.9 REGENERATION

Regeneration and rejuvenation interval are based on the amount of seed available and the decline in the germination percentage. Out cross material are particularly problematic when the amount of seed is not sufficient enough to preserve the original genetic identity or in cases where there are various morphotypes in a seed population. We have not found a satisfactory solution to this problem yet. Regeneration is carried out by qualified personnel of the NPGBI and precautions are taken to prevent any contamination. at each regeneration occasion, the details are recorded for computerized documentation. When there are more than one regenerated population, in any one stock, it is the last lot which is taken for the next regeneration, however older regenerated stocks are maintained as long as they are alive.



CHAPTER 4

In-Country Use of Plant Genetic Resources

4.1 USE OF PLANT GENETIC RESOURCE COLLECTIONS

Very little of our collection has been used in our applied breeding program. In this year, 120 specimens belonging to *Aegilops* were taken for rust breeding program and some 20 genotypes of hexaploid wheat taken for tolerance to pre sprouting. We expect these specimens would be referred again in the future as rust and pre sprouting problem are two of important breeding objectives in Cereal Department of the SPII. Other plant material in use in the research departments of SPII are usually triose received from CGIAR institutes. Farmers do not play any role in collection, evaluation or the used of plant genetic resources. Species asked for in the last three years in order of the number of accessions which were referred to are : *Oriza sativa*, *Triticum spp.*, *Aegilops spp.*, *Hordeum vulgare*, *Citrus lanatus*, *Beta vulgaris*, *Phaseolus vulgaris*, *Heliantus annus*, *Vicia spp.*

4.2 CROP IMPROVEMENT PROGRAMS AND SEED DISTRIBUTION

SPII is the only organization responsible for the breeding of improved cultivars of crop plants and their release in I.R. Iran. However, it is planned to involve the private sector in this matter in the future. The breeding objectives in the country are: breeding for higher yield, higher quality, resistance to pest and disease, tolerance to environmental stresses and when required, introduction of a new crop plant to the country. The national breeding activities are mainly focused on meeting the national needs. The material produced by SPII are increased in bulk by other governmental organization or commercial contractors firms and then distributed to the farmers. Improved varieties are available to all the farmers and as a result of a good extension work done during the recent years, many of the subsistence farmers adopted improved cultivars in their fanning. In this extension work policy, farmers are directly involved in assessing and evaluation of a would be cultivar.



4.3 BENEFITS DERIVED FROM THE USE OF PLANT GENETIC RESOURCES

Although the breeding work going on at SPII is based on using a genetic variability, NPGBI has not been directly involved in providing the required genetic variability, except some limited activities which was started last year (see 4. 1). It was only last year that eleven requests from breeding departments were received for some germplasm and a total of 1,455 specimens were send. The departments have their own collection of germplasm which could be indigenous or foreign in origin. This is the collection most often used in breeding works.

4.4 IMPROVING PLANT GENETIC RESOURCES UTILIZATION

The main achievements of NPGBI could be it's effect in bringing into the notice the importance of conserving the national plant genetic resources. Although the NPGBI is a young establishment, it has helped the introduction of the conservation technology into the country. We think that the NPGBI will be integrated into our applied plant science system eventually. To speed up this process, reforms both at national level as well as international one are required. At a national level, the FAO can help countries with less experience in utilization of plant genetic resources to plan, finance and integrated their plant gene bank into their applied plant science system. In this respect, training of the users of plant genetic resources are as important as the training of the gene bank staff. At an international level, the FAO can propose international laws to guarantee the access to the universal plant genetic resource collections by all the countries and users, provided the original right of ownership is preserved.



CHAPTER 5

National Goals, Policies, Programs and Legislation

5.1 NATIONAL PROGRAMS

The plant genetic resource activities is organized into a national program. The head of this program is the head of AREEO who is the deputy to the Minister of Agriculture as well. The managing committee of this program include members from the Ministry of Jihad and the Organization for the Protection of Environment. This committee is responsible for drafting legislation and policies related to the conservation and use of plant genetic resources in the country.

Realizing the importance of plant genetic resources in applied plant breeding, the NPGBI was placed in the SPII. SPII has been in the front line of agricultural development in the First Five Year Plan of Economical Development of I.R. Iran. It is expected that by establishing the NPGBI in the SPII, genetic resources would strengthen the role of SPII in agricultural development. In the second Five Year Plan, agriculture is regarded as the major basis of the country's economy, therefore the task of SPII and expectation from it would be greater.

The head of the NPGBI is the head of the Department of Genetic and Genetic Resources of SPII and it is the head of the SPII who make decision about this position. Each member of the National Program committee draft his own budget based on it's requirement which has already been worked out as maintenance and expansion plan. The budget has to be approved by the parliament through the appropriate higher ministry or authority. In any case the Government is committed in providing a secure level of funding from year to year. As a member of the IPGRI, the government of the Islamic Republic of Iran is committed to implement all the standards set by IPGRI, however within the country, genetic resource collections are not protected by any legislation and the genetic resources collections are the property of the owners. Within the food security plan, the government judge the genetic resources as a support to back up the organizations responsible for increasing agricultural production.

The central gene bank at SPII in Karaj has a total of 16 scientists, 18 technicians and 22 lower 19 grade staff. In addition, there are 52 other staff at provinces through out the country. The head of the department is a Ph.D. in genetics



from Cambridge University, other staff are graduate of Iranian universities. Four of the personnel have an M.Sc. degree in plant breeding and agronomy, two M.Sc. in botany and taxonomy, one M.Sc. in cytogenetics, two B.Sc. in mathematics and computer, one B.Sc. in economics, five B.Sc. in agriculture including an officer responsible for quarantine. Arrangements on training course are decided when required. However, within the country there are various skills available for teaching courses. Skilled personnel in plant genetics, physiology, biotechnology, soil science environmental sciences, biochemistry, botany and taxonomy are available at SPII as well as the universities. Teaching courses at M.Sc. level could be organized, however international input is required particularly on matters specifically related to gene bank activities in an international context. Some of our training courses in the past have been in collaboration with IPGRI in which men and women took part in an equal basis. These training courses are exclusively for the personnel at SPII, nevertheless there is no legislation banning any other person from attending if such interest exist. The staff turnover training in the NPGBI at Ph.D. level is not rapid and we require more Ph. D. s particularly in plant pathology, soil science, entomology, and biochemistry.

5.2 NATIONAL LEGISLATION

The I.R. Iran has a quarantine law came into effect since 1967. This law allows the import of live plant material only after fulfilling certain requirements. Any plant part is subjected to quarantine rule including *in vitro* material. The quarantine office function under the Ministry of Agriculture, this office has a representative at the NPGBI who is responsible to facilitate the fast handling of material exchanged through the NPGBI.

All the seed imports and distribution is done either directly by the ministry of agriculture or by private companies after receiving permission from the Ministry. Although the use of recommended varieties by the farmers have been encouraged by the government, there is not any legal prohibition preventing them from using a farmer's variety.

The country has an intellectual property right legislation. This law has some weaknesses as far as plant genetic resources are concerned and it is under review at the moment.

The policy of the I.R. Iran has been to strengthen the international collaboration among countries. Exchange of plant genetic resources has always been encouraged among the plant scientists. At the NPGBI it is the head of the department who makes decision on sending a plant material.



5.3 OTHER POLICIES

Privatization has been the policy of the government of the I.R. Iran in the recent years. Production of certified seed is given to private sector for the past many years. These seeds are purchased from these companies at a premium rate and distributed to the farmers at a subsidized rate. The only impact of this policy on plant genetic resources would be the replacement of farmer's varieties with improved high yielding ones. Other subsidized input to agriculture includes pesticides, however the use of integrated pest management is encouraged in order to reduce the use as well as the environmental damage caused by these chemicals.



CHAPTER 6

International Collaboration

6.1 EXPERIENCE WITH UNCED

Islamic republic of Iran was represented by the first deputy to the President at the UNCED meeting in 1992. Some steps have been taken since then towards adopting the resolution. Legislation are being prepared for submission to the parliament for full implementation of the resolution. We also believe that the convention on biological diversity forum could only complement the present role of FAO in conservation activities . The full authority should, however, be given to FAO as the overall in charge of plant genetic resources .

6.2 FAO GLOBAL SYSTEM

The Islamic Republic of Iran is a member of FAO commission. Promotion of scientific collaboration and exchange, management and utilization of genetic resources, beyond political boundaries are the reason why we joined the FAO. Our expectation is that the FAO should help the member countries to framed their policies such that they pave the way for fulfilling the above goal. So far the only direct benefit we have received from the FAO program of genetic resources has been the initial help in setting up the NPGBI. Also being in FAO commission, has helped the government to follow up the international agreements and issues.

In order to strengthen the FAO role in fulfilling it's commitments on plant genetic resources, we believe an international fund could speed up this process. Iran is willing to be a beneficiary as well as a donor to this fund, details of which require further studies.



6.3 INTERNATIONAL AGRICULTURAL CENTERS

Islamic Republic of Iran is among the donating countries to some of CGIAR institutes. At the present, we have agreements with ICARDA, CIMMYT, CIP, CIAT and IRRI. Exchange of germplasm and training are two of the important items in all of these agreements. Staff at the NPGBI have received training at ICARDA on collection, evaluation and documentation of plant genetic resources. Each CGIAR institute has a collaborative links with appropriate research department of the SPII. Exchange of germplasm in the form of breeding blocks or cultivars is a routine collaboration amongst them. These collaborations have been useful in our breeding work. Many new varieties have been selected from breeding blocks or from crosses made between foreign germplasm and native adapted lines of Iranian germplasm.



CHAPTER 7

National Needs and Opportunities

7.1 NATIONAL NEEDS

- Expansion of the computerized documentation system and its integration into an international network.
- Expansion of cold storage facilities.
- Training of at least 4 Ph.D.s for the NPGBI.
- Inclusion of biotechnological tools, particularly, *in vitro* techniques and the use of chromosomal markers (RFLP, RAPD, Isozymes) in conservation and evaluation of plant genetic resources.
- Studies relating environmental parameters and species distribution.
- Development of *in situ* conservation and evaluation facilities.

7.2 OPPORTUNITIES

- I.R. Iran has the facilities in terms of skilled personnel, laboratory equipments and natural plant genetic resources to play a central role in activities related to plant genetic resources and other related fields of plant science in the Central Asia. The Government of the I.R. Iran is prepared to offer training and service to the regional countries and also wishes that the FAO establish a regional center for plant genetic resources activities in Iran.



CHAPTER 8

Proposals for a Global Plan of Action

- I.R. of Iran propose that genetic resources be treated as natural national resources of countries and the originating country should have a right to the use of it's resources by any other country.
- The genetic resources in the less developed countries be protected from extinction through some international effort. FAO is proposed to take the responsibility.
- All countries to have a right to access genetic resources any where on the globe, provided they pay a property right to the originating country.
- Free flow of information through an international network of information and documentation, related to genetic resources.
- Closer collaboration between. the countries possessing the technology of using genetic resources and those having the genetic resources.



ANNEX 1

Forest Genetic Resources

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1 BIOGEOGRAPHICAL REGIONS OF IRAN

Iran is located in the palaeartic realm and is considered the center of origin for many genetic resources of the world. Biodiversity of the country is influenced by its various climates (from alpine to sub-tropical), altitude, geological formation and physiography. Many plant species, some unique to Iran, thrive throughout the country. In fact Iran among the south western countries of Asia is the most diversified biological regions. Biogeographical provinces of Iran include:

- 1 **Pontic:** Hyrcanian 3.08%; Arassbaranian 0.16%
- 2 **Irano-Anatolian:** Irano -Touranian 64.09% Zagrosian- 6.57%
- 3 Nubo-Syndian and Arabian- Saharo 26.07%.



2 NATURAL DISTRIBUTION OF THE MAIN FOREST SPECIES

Hyrcanian Region: Lowland species elevation up to 300 m: *Populus caspica*, *Alnus glutinosa*, *Cetis australis*, *Buxus hyrcanus*, *Pterocarya fraxinifolia*, *Gleditsia caspica*, *Quercus castaneifolia*, *Acer velutinum*. Elevation up to 700-900 m: *Parrotia persica*, *Carpinus betulus*, *Zelkova carpinifolia*, *Celtis caucasica*, *Tilia platyphyllos*, *Taxus baccata*, *Acer cappadocicum*, *Diospyrus lotus*. Elevation up to 1800-2000 m. Mainly *Fagus orientalis* plus *Alnus subcordata*, *Ulmus glabra*, *Sorbus torminalis*. Over 2000 m: *Quercus macranthera*, *Carpinus orientalis*, *Juniperus communis*, *Juniperus sabina*, *Cotoneaster spp.*, *Crataegus spp.*

Arassbaramian Region: *Quercus macranthera*, *Q. komarovii*, *Viburnum lantana*, *Cornus mas*, *Cotinus coggyria*, *Viburnum opulus*, *Juniperus foetidissima*, *Pyrus elaeagnifolia*. Zagross Region: Endemic species include: *Quercus spp.*, *Crataegus spp.*, *Pyrus communis*, *Pyrus glabra*, *Pyrus syriaca*, *Amaggyrus foetida*, *Acer cineraescens*, *Myrtus communis*, *Amygdalus communis*, *Fraxinus persica*. Irano- Touranian Region: Comprises the entire mountainous center of

Iran: *Amygdalus scoparia*, *Onobrychis cornuta*, *Acantholimon spp.*, *Acanthophyllum spp.*, *Astragalus spp.*. Lowland areas: *Aretemisia herba-alba*, *Zygophyllum spp.*, *Amygdalus spp.*, *Salsola tomentosa*, *Rosa persica*, *Tamarix spp.*. Khalidjo-Ommanian region: Consist of all southern coastal area of Iran. *Capparis decidua*, *Acacia ehrenbergiana*, *Prosopis cineraria*, *Rhizophora mucromata*, *Avicinia officinalis*.

The total forest and woodland cover of Iran is estimated at 18.04 million hectares. Out of this 3.8 million hectares is forest and the rest is categorized as woodlands. Most of the commercial forests of the country are located in the north. Recent studies indicated that out of 1.9 million hectares of northern forests, only 1.3 million hectares can be classified as commercial forests.



Status of important Forest species

Important tree species	volume million cubic meter	volume percent
Fagus orientalis	132	32.7
Carpinus betulus	126.2	31.2
Quercus castaneifolia	34.2	8.5
Alnus subcordata	30.6	7.6
Acer velutinum	26.5	6.5
Tilia begonifolia	11.5	2.8
Diospyrus lotus	6	1.5
Parrotia persica	15.8	3.9
Other high quality species	15.1	3.8
Other low quality species	6.6	1.6
Total	405	100

3 STATUS OF RANGELANDS IN IRAN

The total cover of rangelands in Iran is estimated at 90 million ha. According to the table below, only 14 million hectares of rangelands are considered productive

Type Capability	Area million ha	Percent to total	Mean annual dry weight kg/ha	Total product million	Percentage to total
grass medium to good	14	15.5	290	4.06	40.6
heath poor to medium	60	66.5	92	5.52	55.2
desertic poor to very poor	16	18	26.2	0.42	4.2
total	90	100	111.5	10	100

Rare species of the Iranian rangelands includes: *Stipa barbata*, *Artemisia herba alba*, *Poa bulbosa*, *Carex stenophylla*, *Noea macronata*.

In the last decade, the total area of plantations has been 2.27 times of all areas planted since 1960. During the past 2 decades 2 million ha of land have been planted and restored, At the present, afforestation continues at a rate of 54,000 ha per year. By the year 1993 plans have been to achieve a total of forest plantations of 337,000 ha and 6.9 million ha of rangeland restoration.



4 RESEARCH INSTITUTE OF FORESTS AND RANGELANDS (RIFR)

RIFR was established in 1968 to carry out research covering various disciplines of forestry and rangeland management. Institutional frame work consists of 10 research divisions:

- 1 Forest Research Division: to carry out research on forest management, silviculture, afforestation and reforestation
- 2 Range Research Division: to carry out research on range management , range ecology, species improvement and range utilization.
- 3 Botany Research Division: research on taxonomic plant cover of the country and their characteristics features, establishment of botanic gardens and management of the central herbarium.
- 4 Forest & Range protection: to conduct pure and applied research concerning biotic and mon-biotic agents damaging Forests and rangelands
- 5 Wood and paper science: to conduct research on physical, chemical properties of wood as well as development of wood industry.
- 6 Poplar & Fast Growing trees: research concerning plantation and production of high quality and fast growing wood and to introduce suitable species and clones for different ecological areas
- 7 Desertification control and sand dune fixation: to fulfil research concerning desertification , soil erosion , appropriate technique to stop sand dunes and desertification
- 8 Medicinal plants and non-wood products: conducting research on identification, distribution and utilization of medicinal, aromatic as well as gum producing plants
- 9 Genetic and plant physiology: to investigate and identify species characteristic governing resistance, adaptability, palatability and growth and their possible use through hybridization, vegetative propagation and tissue culture and also management of the Institute gene bank.
- 10 Natural Resources Mechanization: To increase know-how of machineries currently used in forestry and to introduce appropriate machines when required. RIRE fulfils it's mandates through 20 research center for natural resources and 15 research stations across the country.



5 NATIONAL PARKS AND PROTECTED AREAS

Conservation and protection of natural resources are administered by two government institutions. The Forest and Range Organization is the body responsible for Forest Reserves and Natural Forest parks. The Organization for the Protection of Environment is the appropriate body for national parks, wildlife refuges, national/natural monument & protected Areas. The objectives of these organization are: sustainable conservation of representative samples of the country ecosystems, conservation of genetic resources and biodiversity, protection of major species particularly threatened, endangered and rare ones, providing opportunities for scientific, educational and recreational uses. Today there are seven national parks, four national nature monuments, twenty-four wildlife refuges and forty-two protected areas which cover approximately eight million hectares. Supervision of these seventy-seven protected areas is the responsibility of the Organization for the Protection of Environment. The Forests and Range Organization has jurisdiction over Iran's sixty-four forest reserves and fifteen national forest parks.

Environmental Threats to protected areas

The activities which most seriously threaten the preservation of the country's protected areas include over-grazing, removal of shrubs and bushes for fuel and conversion of land for other uses particularly agriculture followed by cutting trees for fuel and construction purpose.

Frequency of 7 different threats against protected areas

Type of Threat	No. of areas facing threat	% of total no. areas	Rank
Poaching	70	91	1
Over grazing	63	82	2
Removal of shrubs and bushes	61	79	3
Land conversion	59	77	4
Road construction	45	58	5
Cutting trees	43	55	6
Mining	21	27	7
Power lines	22	28	8
Military activity	7	9	9



6 THREATEN, & ENDANGERED SPECIES

Caspian Forests

Castanea sativa, *Juniperus communis* var. *depressa*, *J. sabina*, *Cercis siliquasterum*, *Taxus baccata*, *Corylus colurna*, *C. avellana*.

Arassbaran Forests

Juniperus foetidissima, *Sorbus torninalis*, *Cotinus coggyria*, *Spiraea crenata*, *Viburnum lantana*, *Pyrus salicifolia*, *Sorbus graeca*.

Zagross Forests

Anagyris foetida, *Ziziphus vulgaris*, *Sorbus luristanica*, *Fraxinus syriaca*, *Mespilus germanica*.

Scattered Forests

Zygophyllum atriplicoides, *Calligonum comosum*, *Pistacia* spp., *Juniperus polycarpus*.

Khalidjo Omani Forests

Prosopis spicigera, *Ziziphus numularia*, *Ziziphus spina_christi*, *Grewia* sp., *Salvadora oleoides*, *S. persica*, *Capparis decidua*, *Acacia nilotica*, *A. seyal*.

7 NATIONAL BOTANIC GARDEN OF IRAN

The Botanic garden was founded in 1968. An area of about 150 ha. was allocated to the garden which is situated by the Freeway between Tehran and Karaj at an altitude of 1,320 m. Garden area include several lakes, man made slopes and hills representing Alborz, Zagros and Himalaya mountains as well as rock garden and a special section for Iranian bulbous plants and a section to display ornamentals. A section for desert plants, with sand dunes, a salt lake, and a valley and an area of about 5 hectares representing the Caspian forests have been constructed. A herbarium of Iranian endemic plants is gradually being built up and it is currently consists of over 124,000 specimens. It also maintain 4,000 specimens of south west Asia and Europe.

The botanical garden & herbarium which are named as the National Botanical Garden and Central Herbarium of Iran are continuing their activities in the Botany Research Department of (RIFR). Studies on flora and phytogeography



are the ongoing activities of the division . It is also planned to build up 6 more Botanical Garden in 6 phytogeographically different provinces. Endemic plant list of the Garden is published annually by RIFR which is send to over 350 botanic gardens and gene banks across the world.

Research on native and exotic species and clones of poplars is vastly conducted in RIFR . In this regard, native cultivars are collected and planted in research stations. These collections are further used as germplasm for various research activities.

Species and clones of poplars at RIFR include:

Species	colone native	colone native	total
<i>Populus caspica</i>	1	-	1
<i>P. euphratica</i>	1	-	1
<i>P.nigra</i>	4	11	15
<i>P.alba</i>	9	3	12
<i>P.deltoides</i>	-	9	9
<i>P.euramericana</i>	-	19	19
<i>P.termula</i>	-	1	1
<i>P.ciliata</i>	-	1	1
<i>P.candicans</i>	-	1	1
<i>P.suaveolens</i>	-	1	1
<i>P.simonii</i>	-	1	1
<i>P.tricocarpa</i>	-	1	1
<i>P.jacki</i>	-	1	1
<i>P.generosa</i>	-	1	1
<i>P.maximowiczii</i>	-	1	1
<i>P.szchonica</i>	-	1	1
<i>P.yunanensis</i>	-	1	1
Total	15	53	68



Isfahan Station

Species	colone native	colone exotic	total colone
<i>Populus alba</i>	8	5	13
<i>P.nigra</i>	10	8	18
<i>P.deltoides</i>	-	5	5
<i>P.euramerican</i>	-	10	10
<i>P.tricocarpa</i>	-	1	1
<i>P.ciliata</i>	-	1	1
<i>P.suaveolens</i>	-	1	1
<i>P.simonii</i>	-	1	1
<i>P.candicans</i>	-	1	1
Total	18	33	51

Kermanshah Station

Species	colone native	colone exotic	colone total
<i>Populus alba</i>	5	-	5
<i>P.nigra</i>	15	10	25
<i>P.deltoides</i>	-	6	6
<i>P.euramerican</i>	-	12	12
<i>P.tricocarpa</i>	-	1	1
<i>P.ciliata</i>	-	1	1
<i>P.suaveolens</i>	-	1	1
<i>P.simonii</i>	-	1	1
<i>P.candicans</i>	-	1	1
Total	20	33	53

Gilan Station

Species	colone native	colone esotic	total
<i>Populus caspica</i>	4	-	4
<i>P.nigra</i>	5	7	12
<i>P.deltoides</i>	-	7	7
<i>P.euramerican</i>	-	15	15
<i>P.tricocarpa</i>	-	1	1
<i>P.ciliata</i>	-	1	1
<i>P.suaveolens</i>	-	1	1
<i>P.candicans</i>	-	1	1
<i>P.simonii</i>	-	1	1
Total	9	34	53



Oromieh Station

<i>Species</i>	colone native	colone exotic	total
<i>P.nigra</i>	9	12	21
<i>P.alba</i>	5	7	12
<i>P.deltoides</i>	-	5	5
<i>P.euramerican</i>	-	3	3
<i>P.simonii</i>	-	1	1
Total	14	28	42



Appendix 1¹

Plant species including some crops known to have at least one of their centers of origin in I.R. Iran

- 1 *Diospyros lotus*
- 2 *Narcissus jonquilla*
- 3 *Lallemantia royleana*
- 4 *Fritillaria imperialis*
- 5 *Jasminium officinale*
- 6 *Amygdalus persica*
- 7 *Amygdalus vavilovii*
- 8 *Rosa moschata*
- 9 *Pyrus spp.*
- 10 *Mespilus germanica*
- 11 *Prunus cerasifera*
- 12 *Allium ampeloprasum*
- 13 *Symphytum asperum*
- 14 *Beta corolliflora*
- 15 *Beta macrorrhiza*
- 16 *Beta trigyna*
- 17 *Beta vulgaris*
- 18 *Spinacea oleracea*
- 19 *Aegilops columnaris*
- 20 *Aegilops crassa*
- 21 *Aegilops cylindrica*
- 22 *Aegilops juvenalis*
- 23 *Aegilops kotschyi*
- 24 *Aegilops lorentii*
- 25 *Aegilops ovata*
- 26 *Aegilops triuncialis*
- 27 *Aegilops triaristata*
- 28 *Aegilops umbellulata*
- 29 *Agropyron intermedium*

¹ Extracted from: Dictionary of cultivated plants and their regions of diversity. eds. Zeven C. & de Wet J.M.J., pub. pudoc, Wageningen 1982.



- 30 *Hordeum vulgare*
- 31 *Secale anatolicum*
- 32 *Secale cereale*
- 33 *Secale montanum*
- 34 *Triticum aestivum*
- 35 *Triticum timopheevi*
- 36 *Triticum turgidum*
- 37 *Avena clauda*
- 38 *Sorghum bicolor*
- 39 *Sorghum halepense*
- 40 *Cicer arietinum*
- 41 *Lens esculenta*
- 42 *Medicago sativa*
- 43 *Pisum sativum*
- 44 *Vicia villosa*
- 45 *Vicia calcavata*
- 46 *Trifolium subterraneum*
- 47 *Lathyrus cicera*
- 48 *Cercis siliquastrum*
- 49 *Alophotropis formosum*
- 50 *Chrysanthemum coccineum*
- 51 *Cnicus benedictus*
- 52 *Linum bienne*
- 53 *Nelumbo nucifera*
- 54 *Vitis vinifera*
- 55 *Aesculus hippocastanum*
- 56 *Hyssopus officinalis*
- 57 *Melissa officinalis*
- 58 *Mentha pulegium*
- 59 *Salvia sclarea*
- 60 *Salvia viridis*
- 61 *Teucrium chamaedrys*
- 62 *Ammi majus*



Appendix 2²

Wild relatives of crop plants known to exist in Iran

Onobrychis

- 1 *O.comuta* (L.) Desv. subsp. *comuta*.
- 2 *O. elymaitica* Boiss. & Hausskn.
- 3 *O. arnacantha* Bunge.
- 4 *O. caput-galli* (L.) Lam.
- 5 *O. aequidentata* (Sibth. & SM) Urv.
- 6 *O. crista-galli* (L.) Lam.
- 7 *O. micrantha* Schrenk.
- 8 *O. pulchella* Schrenk.
- 9 *O. verae* Sirj.
- 10 *O. major* (Boiss.) Hand. MZT.
- 11 *O. bungei* Boiss.
- 12 *O. luristanica* Rech.f.
- 13 *O. persica* Sirj. & Rech.f.
- 14 *O. ptychophylla* Sirj. & Rech.f.
- 15 *O. transcaspica* V.Nikitin.
- 16 *O. megataphros* Boiss.
- 17 *O. altissima* Grossh.
- 18 *O. shahpurensis* Rech.f.
- 19 *O. laxiflora* Baker subsp. *taftanica* Rech.f.
- 20 *O. acaulis* Bornm.
- 21 *O. susiana* Nab.
- 22 *O. longipes* Bunge.
- 23 *O. tavernieraefolia* stocks ex Boiss.
- 24 *O. rechingerorum* wendelbo.
- 25 *O. nummularia* stocks ex Boiss.
- 26 *O. szovitsii* Boiss.
- 27 *O. atropatana* Boiss.
- 28 *O. scrobiculata* Boiss.
- 29 *O. depauperata* Boiss.

² Extracted from : Rechinger, K.H. (Ed.), Flora Iranica, Vol.1-165, Akademische Druck-U, Verlagsantalt, Graz-Austria.

There are some more species which are in the process of adding to this list.



Onobrychis

- 30 *O. buhseana* Bunge ex Boiss.
- 31 *O. haussknechtii* Boiss.
- 32 *O. lunata* Boiss.
- 33 *O. gypsicola* Rech.f.
- 34 *O. gaubae* Bornm.
- 35 *O. andalanica* Bornm.
- 36 *O. oxyptera* Boiss.
- 37 *O. melanotricha* Boiss. var. *melanotricha*.
- 38 *O. melanotricha* Boiss. var. *villosa* Bornm.
- 39 *O. kertmanensis* (Sirj. & Rech.f.) Rech.f.
- 40 *O. plantago* Bornm.
- 41 *O. iranshahrii* Rech. f.
- 42 *O. sojakii* Rech.f.
- 43 *O. psoraleifolia* Boiss. var. *psoraleifolia*.
- 44 *O. psoraleifolia* Boiss. var. *pleiophylla* Bornm.
- 45 *O. aucheri* Boiss. subsp. *aucheri*.
- 46 *O. aucheri* Boiss. subsp. *teheranica* (Bornm.) Rech.f.
- 47 *O. aucheri* Boiss. subsp. *psammophila* (Bornm.) Rech.f.
- 48 *O. subacaulis* Boiss.
- 49 *O. heliocarpa* Boiss.
- 50 *O. ptolemaica* (Del.) DC.
- 51 *O. sintenisii* Bornm.
- 52 *O. amoena* M.Pop. & Vved. subsp. *amoena*.
- 53 *O. amoena* M.Pop. & Vved. subsp. *meshhedensis* Sirj. & Rech.f.
- 54 *O. subnitens* Bornm.
- 55 *O. galegifolia* Boiss.
- 56 *O. schahuensis* Bornm.
- 57 *O. michauxii* DC.
- 58 *O. hohenackeriana* C.A. Mey.
- 59 *O. mazanderanica* Rech. f.
- 60 *O. talagonica* Rech. f.
- 61 *O. chorassanica* Bonge.

Pisum

- 1 *P. sativum* L.
- 2 *P. sativum* L. subsp. *sativum*.
- 3 *P. sativum* L. subsp. *elatius* (M.B.) Ascherson & Graebner.
- 4 *P. formosum* (Stev.) Alef.

Lens

- 1 *L. culinaris* Medik.
- 2 *L. orientalis* (Boiss.) Hand. MZT.
- 3 *L. cyanea* (Boiss. & Hohen.) Alef.



Cicer

- 1 *C. arietinum* L.
- 2 *C. chorassanicum* (Bunge in Boiss.) M.Pop.
- 3 *C. incisum* (Willd.) K.maly.
- 4 *C. anatolicum* Alef.
- 5 *C. kermanense* Bornm.
- 6 *C. oxyodon* Boiss. & Hohen.
- 7 *C. spiroceras* Jaub. & Spach.
- 8 *C. subaphyllum* Boiss.
- 9 *C. stapfianum* Rech.f.
- 10 *C. tragacanthoides* Jaub. & Spach var. *tragacanthoides*.
- 11 *C. tragacanthoides* Jaub. & Spach var. *turcomanicum* M.Pop.

Medicago

- 1 *M. varia* Martyn. *M.falcata* x *sativa* L.
- 2 *M. coronata* (L.) Bartalini.
- 3 *M. sativa* L.
- 4 *M. lupulina* L.
- 5 *M. radiata* L.
- 6 *M. orbicularis* (L.) Bartalini.
- 7 *M. laciniata* (L.) Miller.
- 8 *M. laciniata* (L.) Miller var. *laciniata*.
- 9 *M. laciniata* (L.) Miller var. *brachycantha* Boiss.
- 10 *M. minima* (L.) Bartalini.
- 11 *M. polymorpha* L.
- 12 *M. rigidula* (L.) All.
- 13 *M. rigidula* (L.) All. conf. var. *rigidula*.
- 14 *M. rigidula* (L.) All. conf. var. *submitis* (Boiss.) Heyn.
- 15 *M. rigidula* (L.) All. conf. var. *agrestis* Burn.
- 16 *M. constricta* Durieu.
- 17 *M. graniflora* (Grossh.) Vassilcz.
- 18 *M. caucasica* Vassilcz.

Trigonella

- 1 *T. teheranica* Bornm.
- 2 *T. elliptica* Boiss.
- 3 *T. stenocarpa* Rech.f.
- 4 *T. subnervis* Rech.f.
- 5 *T. latialata* (Bornm) Vassilcz.
- 6 *T. aphanoneura* Rech. f.
- 7 *T. disperma* Bornm.
- 8 *T. uncatata* Boiss. & NOE
- 9 *T. stellata* Forssk.
- 10 *T. anguina* delile.
- 11 *T. turkkmena* M. Popov.



Trigonella

- 12 *T. spruneriana* Boiss.
- 13 *T. filipes* Boiss.
- 14 *T. strangulata* Boiss.
- 15 *T. aurantiaca* Boiss.
- 16 *T. fischeriana* Ser.
- 17 *T. persica* Boiss.
- 18 *T. astroites* Fisch. & C.A. Mey.
- 19 *T. crassipes* Boiss.
- 20 *T. arcuata* C.A. Mey.
- 21 *T. monantha* C.A. Meyer Subsp. *monantha*.
- 22 *T. monantha* C.A. Meyer Subsp. *noeana* (Boiss.) Hubermorath.
- 23 *T. monantha* C.A. Meyer Subsp. *geminiflora* (Bunge) Rech.f.
- 24 *T. monantha* C.A. Meyer Subsp. *incisa* (Benth.) Ali.
- 25 *T. macroglochin* Durieu.
- 26 *T. orthoceras* Kar. & Kir.
- 27 *T. uncinata* Banks & Soland.
- 28 *T. monspeliaca* L.
- 29 *T. calliceras* Fisch.
- 30 *T. spicata* sibth. & SM.
- 31 *T. capitata* Boiss.
- 32 *T. coerulescens* (M.B.) Halacsy.
- 33 *T. foenum-graceum* L.

Trifolium

- 1 *T. hybridum* L. var. *hybridum*.
- 2 *T. hybridum* L. var. *elegans* (Savi) Boiss.
- 3 *T. hybridum* L. var. *anatolicum* (Boiss.) Boiss.
- 4 *T. nigrescens* Viv. Subsp. *petrisavii* (Clem.) Holmboe.
- 5 *T. radicosum* Boiss. & Hohen. var. *radicosum*.
- 6 *T. repens* L.
- 7 *T. repens* L. var. *repens*.
- 8 *T. repens* L. var. *giganteum* Lagreze-Fossat.
- 9 *T. repens* L. var. *macrorrhizum* (Boiss.) Boiss.
- 10 *T. ambiguum* M.B.
- 11 *T. montanum* L. Subsp. *humboldtianum* (A.BR. & Ascherson) Hossain.
- 12 *T. globmeratum* L.
- 13 *T. suffocatum* L.
- 14 *T. spumosum* L.
- 15 *T. badium* Schreb.
- 16 *T. aureum* pollich
- 17 *T. compestra* Schreb.
- 18 *T. micranthum* Viv.
- 19 *T. grandiflorum* Schreb.
- 20 *T. sebastianii* Savi.



Trifolium

- 21 *T. spadiceum* L.
- 22 *T. bullatum* Boiss. & Hausskn.
- 23 *T. bullatum* Boiss. & Hausskn. var. *bullatum*.
- 24 *T. bullatum* Boiss. & Hausskn. var. *macrospheerum* Zoh.
- 25 *T. clusii* Godron & Gren. var. *Kahiricum* Zoh.
- 26 *T. fragiferum* L. var. *fragiferum*.
- 27 *T. fragiferum* L. var. *pulchellum* Lange.
- 28 *T. physodes* stev. ex M.B. var. *physodes*.
- 29 *T. physodes* stev. ex M.B. var. *psilocalyx* Boiss.
- 30 *T. resupinatum* L. var. *resupinatum*.
- 31 *T. resupinatum* L. var. *microcephalum* Zoh.
- 32 *T. resupinatum* L. var. *majus* Boiss.
- 33 *T. tomentosum* L.
- 34 *T. tomentosum* L. var. *tomentosum*.
- 35 *T. tomentosum* L. var. *curmisepalum* (Tackh.) Thieb.
- 36 *T. tumens* Stev. ex M.B.
- 37 *T. tumens* Stev. ex M.B. var. *tumens*.
- 38 *T. tumens* Stev. ex M.B. var. *tayschense* (Chalilov) Zoh.
- 39 *T. alpestre* L. var. *alpestre*.
- 40 *T. angustifolium* L. var. *angustifolium*.
- 41 *T. arvense* L. var. *arvense*.
- 42 *T. arvense* L. var. *gracile*(Thuill). DC.
- 43 *T. canescens* wild.
- 44 *T. caasicum* Tausch.
- 45 *T. cherleri* L.
- 46 *T. dasyurm* C. presl.
- 47 *T. echinatum* M.B.
- 48 *T. hirtum* All.
- 49 *T. lappaceum* L.
- 50 *T. lappaceum* L. var. *lappaceum*.
- 51 *T. lappaceum* L. var. *zoharyi* Eig.
- 52 *T. leucanthum* M.B.
- 53 *T. mazanderanicum* Rech. f.
- 54 *T. medium* L. var. *medium*.
- 55 *T. leucum* Hudson.
- 56 *T. phleoides* pourr. ex willd.
- 57 *T. pratense* L.
- 58 *T. pratense* L. var. *pratense*.
- 59 *T. pratense* L.. var. *americanum* Harz.
- 60 *T. pratense* L. var. *sativum* Schreb.
- 61 *T. purpureum* Loisel. var. *purpureum*.
- 62 *T. scabrum* L.
- 63 *T. squamosum* L.
- 64 *T. stellatum* L.



Trifolium

- 65 *T. stellatum* L. var. *stellatum*.
- 66 *T. stellatum* L. var. *adpressum* Turrill.
- 67 *T. stellatum* L. var. *xanthinum* (Frey) Bald.
- 68 *T. striatum* L.
- 69 *T. trichocephalum* M.B.
- 70 *T. vavilovii* Eig.
- 71 *T. alexandrinum* L.
- 72 *T. pilulare* Boiss.
- 73 *T. subterraneum* L. Subsp. *subterraneum* var. *subterraneum*.

Vicia

- 1 *V. ervilia* (L.) Willd.
- 2 *V. hirsuta* (L.) S.F.Gray
- 3 *V. tetrasperma* (L.) Schreb.
- 4 *V. cappadocica* Boiss. & Bal.
- 5 *V. monantha* Retz.
- 6 *V. cinerea* M.B.
- 7 *V. crocea* (Desf.) B.Fedtsch.
- 8 *V. pseudocassubica* Rech.f.
- 9 *V. venulosa* Boiss. & Hohen.
- 10 *V. kotschyana* Boiss.
- 11 *V. cracca* L.
- 12 *V. variabilis* Freyn & Sint.
- 13 *V. villosa* Roth.
- 14 *V. persica* Boiss.
- 15 *V. armena* Boiss.
- 16 *V. variegata* Willd.
- 17 *V. akhmaganica* Kazar.
- 18 *V. rechingeri* chrtkova-zertova.
- 19 *V. gregaria* Boiss. & Heldr.
- 20 *V. aucheri* Jaub. & Spach.
- 21 *V. subvillosa* (Ledeb.) Trautv.
- 22 *V. iranica* Boiss.
- 23 *V. multijuga* (Boiss.) Rech.f.
- 24 *V. ciceroidea* Boiss.
- 25 *V. sojakii* chrtkova-zertova.
- 26 *V. koeieana* Rech. f.
- 27 *V. hybrida* L.
- 28 *V. pannonica* Crantz.
- 29 *V. anatolica* Turrill.
- 30 *V. truncatula* Fischer ex M.B.
- 31 *V. hyrcanica* Fisch. & C.A. Mey.
- 32 *V. michauxii* spreng. var. *michauxii*.
- 33 *V. michauxii* spreng. var. *stenophylla* Boiss.



Vicia

- 34 *V. mollis* Boiss. & Hausskn.
- 35 *V. assyriaca* Boiss.
- 36 *V. aintabensis* Boiss. & Hausskn. ex Boiss.
- 37 *V. sericocarpa* Fenzl.
- 38 *V. lutea* L.
- 39 *V. hirta* Balbis ex DC.
- 40 *V. peregrina* L. var. *peregrina*.
- 41 *V. peregrina* L. var. *latifolia* Rouy.
- 42 *V. sativa* L. var. *sativa*.
- 43 *V. sativa* L. var. *cordata* (Wulf. ex Hoppe) Arcangeli.
- 44 *V. angustifolia* L.
- 45 *V. amphicarpa* Lam.
- 46 *V. grandiflora* Scop.
- 47 *V. lathyroides* L.
- 48 *V. cuspidata* Boiss.
- 49 *V. narbonensis* L. var. *narbonensis*.

Lotus

- 1 *L. tenuis* Waldst. & Kit.
- 2 *L. krylovii* Schischk. & Serg.
- 3 *L. corniculatus* L. Subsp. *corniculatus* var. *corniculatus*.
- 4 *L. corniculatus* L. Subsp. *corniculatus* va. *Kochii* Chrtkova-Zertova.
- 5 *L. corniculatus* L. Subsp. *corniculatus* va. *hirsutus* W.D.J. Koch.
- 6 *L. corniculatus* L. Subsp. *corniculatus* va. *brachyodon* Boiss.
- 7 *L. corniculatus* L. Subsp. *frondosus* Freyn.
- 8 *L. angustissimus* L.
- 9 *L. gebelia* Vent. va. *gebelia*.
- 10 *L. gebelia* Vent. va. *villosus* Boiss.
- 11 *L. gebelia* Vent. va. *lanatus* Chrtkova-Zertova.
- 12 *L. michauxianus* Ser. va. *Michauxianus*.
- 13 *L. michauxianus* Ser. va. *glabratus* Chrtkova-Zertova.
- 14 *L. schimperi* Steud.
- 15 *L. garcinii* DC.

Melilotus

- 1 *M. officinalis* (L.) Pall.
- 2 *M. albus* Medicus.
- 3 *M. indicus* (L.) All.
- 4 *M. messanensis* (L.) All.

**Coronilla**

- 1 *C. scorpioides* (L.) W.D.J. Koch.
- 2 *C. orientalis* Miller.
- 3 *C. parviflora* Willd.
- 4 *C. varia* L. Subsp. *varia*.
- 5 *C. varia* L. Subsp. *hirta* (Bunge ex Boiss.) Rech.f.

Aegilops

- 1 *Ae. speltoides* Tausch.
- 2 *Ae. juvenalis* (Thell.) Eig.
- 3 *Ae. crassa* Boiss. va. *crassa*.
- 4 *Ae. crassa* Boiss. va. *macrathera* Boiss.
- 5 *Ae. tauschii* cosson.
- 6 *Ae. cylindrica* Host.
- 7 *Ae. kotschyi* Boiss. va. *kotschyi*.
- 8 *Ae. kotschyi* Boiss. va. *hirta* Eig.
- 9 *Ae. triuncialis* L.
- 10 *Ae. columnaris* Zhuk.
- 11 *Ae. lorentii* Hochst.
- 12 *Ae. triaristata* willd.
- 13 *Ae. umbellulata* Zhuk.
- 14 *Ae. ovata* L.

Hordeum

- 1 *H. turkestanicum* Nevski.
- 2 *H. violaceum* Boiss. & Huet.
- 3 *H. brevisubulatum* Link.
- 4 *H. geniculatum* All.
- 5 *H. marinum* Hudson va. *pubescens* (Guss.) Nevski.
- 6 *H. glaucum* Steud.
- 7 *H. leporinum* Link.
- 8 *H. spontaneum* C.Koch.
- 9 *H. bulbosum* L.
- 10 *H. distichon* L.
- 11 *H. vulgare* L.

Triticum

- 1 *T. boeoticum* Boiss. Subsp. *boeoticum*.
- 2 *T. monococcum* L.
- 3 *T. dicoccoides* (Koern. ex Ascherson & Graebner) Aaronsohn.
- 4 *T. dicoccum* (Schrank) Schubler.
- 5 *T. durum* Desf.
- 6 *T. turgidum* L.
- 7 *T. polonicum* L.
- 8 *T. carthlicum* Nevski.

**Triticum**

- 9 *T. orientale* percival.
- 10 *T. aestivum* L. emend Fiori & Paol.
- 11 *T. spelta* L.

Agropyron

- 1 *A. bulbosum* Boiss.
- 2 *A. pectiniforme* Roemer & Schultes.
- 3 *A. imbricatum* (M.B.) Roemer & Schultes.
- 4 *A. cognatum* Hack.
- 5 *A. caespitosum* C.Koch.
- 6 *A. kosaninii* Nab.
- 7 *A. libanoticum* Hack.
- 8 *A. tauri* Boiss. & Bal.
- 9 *A. intermedium* (Host) P.Beauv.
- 10 *A. trichophorum* (Link) Richter.
- 11 *A. pulcherrimum* Grossh.
- 12 *A. podperae* Nab. va. *podperae*.
- 13 *A. afghanicum* Melderis.
- 14 *A. gentryi* Melderis.
- 15 *A. elongatiforme* Drobov.
- 16 *A. repens* (L.) P.Beauv.
- 17 *A. longearistatum* (Boiss.) Boiss.
- 18 *A. canaliculatum* Nevski.
- 19 *A. caucasicum* (C.Koch) Grossh.
- 20 *A. panormitanum* Parl.
- 21 *A. brachyphyllum* Boiss. & Hausskn. ex Boiss.
- 22 *A. leptourum* (Nevski) Grossh.

Secale

- 1 *S. montanum* Guss.
- 2 *S. ciliatiglume* (Boiss.) Grossh.
- 3 *S. anatolicum* Boiss.
- 4 *S. cereale* L.
- 5 *S. afghanicum* (Vavilov) Roshev.
- 6 *S. segetale* (Zhuk.) Roshev.

**Avena**

- 1 *A. clauda* Durieu.
- 2 *A. eriantha* Durieu.
- 3 *A. wiestii* Steud.
- 4 *A. barbata* pott ex Link.
- 5 *A. fatua* L. va. *fatua*.
- 6 *A. sativa* L.
- 7 *A. ludoviciana* Durieu.
- 8 *A. macrantha* (Hack.) Nevski.
- 9 *A. meridionalis* (Malz.) Roshev.
- 10 *A. byzantina* C.Koch.

Phalaris

- 1 *Ph. arundinacea* L.
- 2 *Ph brachystachys* Link.
- 3 *Ph minor* Retz.
- 4 *Ph paradoxa* L. va. *paradoxa*.
- 5 *Ph. paradoxa* L. va. *praemorsa*.(Lam.),Cosson & Durieu.

Panicum

- 1 *P. paludosum* Roxb.
- 2 *P. antidotale* Retz.
- 3 *P. miliaceum* L.
- 4 *P. turgidum* Forssk.

Sorghum

- 1 *S. halepense* (L.) pers.

Dactylis

- 1 *D. glomerata* L. Subsp. *glomerata*.
- 2 *D. glomerata* L. Subsp.*hispanica* (Roth) Nyman.

Agrostis

- 1 *A. canina* L.
- 2 *A. olympica* (Boiss.) Bor.
- 3 *A. tenuis* Sibth.
- 4 *A. stolonifera* L.
- 5 *A. gigantea* Roth.

Echinochloa

- 1 *E. colonum* (L.) Link.
- 2 *E. crus-galli* (L.) P.Beauv. va. *crus-galli*.
- 3 *E. crus-galli* (L.) P.Beauv. vat. *submutica* Neilr.

**Festuca**

- 1 *F. ovina* L.
- 2 *F. pinifolia* (Hack.) Bornm.
- 3 *F. sulcata* (Hack.) Beck.
- 4 *F. rubra* L.
- 5 *F. pratensis* Hudson.
- 6 *F. arundinacea* Schreb.
- 7 *F. altissima* All.
- 8 *F. drymeia* Mert. & Koch.
- 9 *F. gigantea* (L.) Vill.

Paspalum

- 1 *P. dilatatum* Pair.
- 2 *P. distichum* L.

Alopecurus

- 1 *A. myosuroides* Hudson var. *myosuroides*.
- 2 *A. myosuroides* Hudson va. *breviaristatus* Marchesetti ex Ascherson & Graebner.
- 3 *A. dasyanthus* Trautv.
- 4 *A. textilis* Boiss.
- 5 *A. himalaicus* Hook.f.
- 6 *A. aucheri* Boiss.
- 7 *A. vaginatus* (Willd.) Pall.
- 8 *A. mucronatus* Hack. ex Paulsen.
- 9 *A. apiatus* Ovez.
- 10 *A. arundinaceus* Poir. va. *arundinaceus*.
- 11 *A. seravshanicus* Ovez.

Poa

- 1 *P. bulbosa* L.
- 2 *P. bulbosa* L. va. *vivipara* Koel.
- 3 *P. timoleontis* Heldr. ex Boiss.
- 4 *P. glabriflora* Roshev.
- 5 *P. sinaica* Steud.
- 6 *P. annua* L.
- 7 *P. infirma* H.B.K.
- 8 *P. supina* Schrad.
- 9 *P. angustifolia* L.
- 10 *P. pratensis* L.
- 11 *P. Aitchisonii* Boiss.
- 12 *P. alpina* L.
- 13 *P. masenderana* Freyn & Sint.
- 14 *P. trivialis* L.
- 15 *P. silvicola* Guss.
- 16 *P. araratrica* Trautv.
- 17 *P. sterilis* M.B.
- 18 *P. nemoralis* L.

**Bromus**

- 1 *B. brachystachys* Hornung.
- 2 *B. japonicus* Thunb. va. *japonicus*.
- 3 *B. japonicus* Thunb. va. *valutinus* (Koch) Bornm.
- 4 *B. rechingeri* Melderis.
- 5 *B. commutatus* Schrad.
- 6 *B. scoparius* L. va. *scoparius*.
- 7 *B. briziformis* Fisch. & C.A. Mey.

Bromus

- 8 *B. intermedius* Guss.
- 9 *B. squarrosus* L. va. *squarrosus*.
- 10 *B. lanceolatus* Roth va. *lanceolatus*.
- 11 *B. lanceolatus* Roth va. *lanuginosus* (Poir.) Dinsm.
- 12 *B. oxyodon* Schrenk.
- 13 *B. tectorum* L. va. *tectorum*.
- 14 *B. tectorum* L. va. *hirsutus* Regel.
- 15 *B. sericeus* Drobov.
- 16 *B. sterilis* L.
- 17 *B. rubens* L. va. *rubens*.
- 18 *B. rubens* L. va. *glabriglumis* Maire.
- 19 *B. fasciculatus* presl va. *alexandrinus* Thell.
- 20 *B. madritensis* L. va. *madritensis*.
- 21 *B. gracillimus* Bge.
- 22 *B. danthoninae* Trin. va. *danthoninae*.
- 23 *B. danthoninae* Trin. va. *lanuginosus* Roshev.
- 24 *B. tomentellus* Boiss.
- 25 *B. cappadocius* Boiss. & Bal.
- 26 *B. biebersteinii* Roemer & Schultes.
- 27 *B. tomentosus* Trin.
- 28 *B. benekenii* (Lange) Trimen.
- 29 *B. stenostachys* Boiss.
- 30 *B. variegatus* M.B.
- 31 *B. erectus* Hudson.
- 32 *B. frigidus* Boiss. & Hausskn. ex Boiss.
- 33 *B. confinis* Nees ex Steud.
- 34 *B. kopetdaghensis* Drobov.

Lolium

- 1 *L. loliaceum* (Bory & Chaub.), Hand.-MAT.
- 2 *L. multiflorum* Lam.
- 3 *L. perenne* L.
- 4 *L. persicum* Boiss. & Hohen. ex Boiss.
- 5 *L. rigidum* Gaudin.
- 6 *L. temmulentum* L.

**Daucus**

- 1 *D. carota* L. Subsp. *carota*.
- 2 *D. carota* L. Subsp. *maximus* (Desf.) Ball.
- 3 *D. microscias* Bornm. & Gauba.
- 4 *D. broteri* Ten.
- 5 *D. guttatus* Smith.
- 6 *D. littoralis* Smith Subsp. *hyrcanicum* Rech.f.
- 7 *D. subsessilis* Boiss.

Apium

- 1 *A. graveolens* L.
- 2 *A. nodiflorum* (L.) Lag.

Coriandrum

- 1 *C. sativum* L.

Petroselinum

- 1 *A. crispum* (Miller) A.W.Hill.

Anetum

- 1 *A. graveolens* L.

Solanum

- 1 *S. pseudocapsicum* L.
- 2 *S. nigrum* L.
- 3 *S. carmanicum* Schonbeck-Temesy.
- 4 *S. transcaucasicum* Pojark.
- 5 *S. olgae* Pojark.
- 6 *S. alatum* Moench.
- 7 *S. luteum* Miller.
- 8 *S. kieseritzkii* C.A.Mey.
- 9 *S. persicum* willd. ex Roemer & Schultes Subsp. *persicum*.
- 10 *S. persicum* willd. ex Roemer & Schultes Subsp. *pseudopersicum* (Pojark.)
Schonbeck-Temesy.
- 11 *S. asiae-mediae* Pojark.
- 12 *S. incanum* L.
- 13 *S. surattense* Burm.f.

Allium

- 1 *A. brachyodon* Boiss.
- 2 *A. scabriscapum* Boiss. & KY.
- 3 *A. xiphopetalum* Aitch. & Baker.
- 4 *A. hymenorrhizum* Ledeb.
- 5 *A. schoenoprasum* L.
- 6 *A. oschaninii* O.Fedtsch.

**Allium**

- 7 *A. callidictyon* C.A.Mey. ex kunth.
- 8 *A. kirindicum* Bornm.
- 9 *A. capitellatum* Boiss.
- 10 *A. longivaginatatum* Wendelbo.
- 11 *A. lalesaricum* Freyn & Bornrn.
- 12 *A. sabulosum* stev. ex Bunge.
- 13 *A. bungei* Boiss.
- 14 *A. fibrosum* Regel.
- 15 *A. chloroneurum* Boiss.
- 16 *A. synthamanthum* C.Koch.
- 17 *A. rubellum* M.B.
- 18 *A. umbilicatum* Boiss.
- 19 *A. kopetdagense* Vved.
- 20 *A. kotschyi* Boiss.
- 21 *A. borszczowii* Regel.
- 22 *A. aucheri* Boiss.
- 23 *A. viride* Grossh.
- 24 *A. affine* ledeb.
- 25 *A. subvineale* Wendelbo.
- 26 *A. longicuspis* Regel.
- 27 *A. erubescens* C.Koch.
- 28 *A. rotundum* L.
- 29 *A. subnotabile* Wendelbo.
- 30 *A. qaradaghense* Feinbr.
- 31 *A. laeve* Wendelbo & Von Bothmer.
- 32 *A. atroviolaceum* Boiss.
- 33 *A. ampeloprasum* L. Subsp. *iranicum* Wendelbo.
- 34 *A. paniculatum* L.
- 35 *A. lenkoranicum* Misez.
- 36 *A. kunthianum* Vved.
- 37 *A. convallarioides* Grossh.
- 38 *A. myrianthum* Boiss.
- 39 *A. stamineum* Boiss.
- 40 *A. vescum* Wendelbo.
- 41 *A. eriophyllum* Boiss. var. *eriophyllum*.
- 42 *A. eriophyllum* Boiss. var. *laceratum* (Boiss. & Noe) Wendelbo.
- 43 *A. paradoxum* (M.B.) G.DON.
- 44 *A. monophyllum* Vved.
- 45 *A. derderianum* Regel.
- 46 *A. breviscapum* Stapf.
- 47 *A. haemanthoides* Boiss. & Reut ex Regel.
- 48 *A. akaka* Gmelin.
- 49 *A. shelkovnikovii* Grossh.
- 50 *A. materculae* Bordz.

**Allium**

- 51 *A. minutiflorum* Regel.
- 52 *A. cristophii* Trautv.
- 53 *A. bodeanum* Regel.
- 54 *A. ellisii* J.D.Hook.
- 55 *A. elburzense* Wendelbo.
- 56 *A. noeanum* Reut. ex Regel.
- 57 *A. olivier.* Boiss.
- 58 *A. kharputense* Freyn & Sint.
- 59 *A. fedtschenkoi* Nab.
- 60 *A. chrysaetherum* Boiss. & Reut.
- 61 *A. cardiostemon* Fisch.
- 62 *A. colchicifolium* Boiss.
- 63 *A. brachyscapum* Vved.
- 64 *A. scotostemon* Wendelbo.
- 65 *A. altissimum* Regel.
- 66 *A. jesdianum* Boiss. & Buhse.
- 67 *A. hirtifolium* Boiss.
- 68 *A. sarawschanicum* Regel.
- 69 *A. chelotum* Wendelbo.
- 70 *A. giganteum* Regel.
- 71 *A. capsicam* (pall.) M.B.
- 72 *A. helicophyllum* Vved.
- 73 *A. cathodicarpum* Wendelbo.
- 74 *A. regelii* Trautv.

Brassica

- 1 *B. elongata* Ehrh.
- 2 *B. deflexa* Boiss. Subsp. *leptocarpa* (Boiss.) Hedge.
- 3 *B. tournefortii* Gouan.
- 4 *B. napus* L.
- 5 *B. rapa* L.
- 6 *B. nigra* (L.) Koch.

Sinapis

- 1 *S. alba* L.
- 2 *S. arvensis* L.
- 3 *S. aucheri* (Boiss.) O.E. Schulz.

Raphanus

- 1 *R. sativus* L.



Hibiscus

- 1 *H. syriacus* L.
- 2 *H. trionum* L.
- 3 *H. cannabinus* L.
- 4 *H. richardii* I.Riedl.

Pistacia

- 1 *P. atlantica* Desf. Subsp. *cabulica* (Stocks) Rech.f. 2 *P. atlantica* Desf. Subsp. *matico* (Fisch. & Mey.) Rech.f.
- 3 *P. atlantica* Desf. Subsp. *cowardice* (Zonary) Rech.f.
- 4 *P. khinjuk* Stocks.
- 5 *P. vera* L.

Amygdalus

- 1 *A. communis* L.
- 2 *A. trichamygdalus* (Hand-Mazz.) Woronow.
- 3 *A. wendelboi* Freitag.
- 4 *A. korshinskyi* (Hand-Mazz.) Bornm.
- 5 *A. fenzliana* (Fritsch) Lipsky
- 6 *A. haussknechtii* (C.K.Schneider) Bornm.
- 7 *A. orientalis* Dub.
- 8 *A. kotschyi* Boiss. & Hohen.
- 9 *A. carduchorum* Bornm.
- 10 *A. paboti* Browiez.
- 11 *A. elaeagnifolia* Spach Subsp. *elaegnifolia*.
- 12 *A. elaeagnifolia* Spach Subsp. *leiocarpa* (Boiss.) Browiez.
- 13 *A. reticulata* Runemark ex khatamsaz.
- 14 *A. scoparia* Spach.
- 15 *A. glauca* Browiez.
- 16 *A. arabica* Oliv.
- 17 *A. nairica* Fed. et Takht.
- 18 *A. spinosissima* Bge. Subsp. *spinosissima*.
- 19 *A. spinosissima* Bge. Subsp. *turcomanica* (Linez.) Browiez.
- 20 *A. brahuica* Boiss.
- 21 *A. lycioides* Spach var. *lycioides*.
- 22 *A. lycioides* Spach va. *horrída* (Spach) Browiez.
- 23 *A. eburnea* Spach.
- 24 *A. erioclada* Bornm.

Mespilus

- 1 *M. germanica* L.

Malus

- 1 *M. domestic* Borkh.
- 2 *M. orientalis* Ugl.

**Pyrus**

- 1 *P. boissieriana* Buhse.
- 2 *P. kandevanica* Ghahreman & Khatamsaz.
- 3 *P. communis* L.
- 4 *P. grossheimii* Fedor.
- 5 *P. hyrcana* Fedor.
- 6 *P. turcomanica* Maleev.
- 7 *P. farsistanica* Browiez.
- 8 *P. syriaca* Boiss. Va. *Syriaca*.
- 9 *P. syriaca* Boiss. Va. *oxyprion* (Wor.) Diap.
- 10 *P. syriaca* Boiss. Va. *omicrophylla* Zoh. ex Browiez.
- 11 *P. mazanderanica* Schonbeck-Temesy.
- 12 *P. glabra* Boiss.
- 13 *P. salicifolia* Pall.
- 14 *P. elaeagnifolia* (errore *elaeagnifolia*) Pall.

Cydonia

- 1 *C. oblonga* Miller.

Fragaria

- 1 *F. vesca* L.
- 2 *F. viridis* Duch. Subsp. *campestris* (Steven) Powl.

Prunus

- 1 *P. spinosa* L.
- 2 *P. divaricata* Ledeb. Subsp. *divaricata*.
- 3 *P. divaricata* Ledeb. Subsp. *caspiaca* (Kov. & Ekim.) Browiez.

Armeniaca

- 1 *A. vulgaris* Lam.

Persica

- 1 *P. vulgaris* Miller.

Cerasus

- 1 *C. brachypetala* Boiss. Va. *brachypetala*.
- 2 *C. brachypetala* Boiss. Va. *bornmulleri* (Schneider) Browiez.
- 3 *C. incana* (Pall.) Spach.
- 4 *C. araxina* Pojark. Va. *araxina*.
- 5 *C. araxina* Pojark. Va. *Sintenisii* (Schneider) Browiez.
- 6 *C. pseudoprostrata* Pojark.
- 7 *C. chorassanica* Pojark.
- 8 *C. microcarpa* (C.A. Mey.) Boiss. Subsp. *microcarpa*.

**Cerasus**

- 9 *C. microcarpa* (C.A. Mey.) Boiss. Subsp. *tortuosa* (Boiss. & Hausskn.) Browiez.
- 10 *C. microcarpa* (C.A. Mey.) Boiss. Subsp. *diffusa* (Boiss. & Hausskn.) Browiez.
- 11 *C. avium* (L.) Moench.
- 12 *C. vulgaris* Miller.
- 13 *C. mahaleb* (L.) Miller.

Olea

- 1 *O. europaea* L.

Punica

- 1 *P. granatum* L.

Vitis

- 1 *V. vinifera* Cult.
- 2 *V. sylvestris* C.C.Gmelin.
- 3 *V. sylvestris* C.C.Gmelin Subsp. *anebophylla* Kolen.
- 4 *V. sylvestris* C.C.Gmelin Subsp. *trichophylla* Kolen.

Morus

- 1 *M. nigra* L.
- 2 *M. alba* L.

Ficus

- 1 *F. carica* L. Subsp. *carica*.
- 2 *F. carica* L. Subsp. *rupestris* (Hausskn. ex Boiss.) Browiez.
- 3 *F. johannis* Boiss. Subsp. *johannis*.
- 4 *F. johannis* Boiss. Subsp. *afghanistanica* (Warb.) Browiez.
- 5 *F. palmata* Forssk. Subsp. *virgata* (Roxb.) Browiez.
- 6 *F. religiosa* L.
- 7 *F. benghalensis* L.

Phoenix

- 1 *P. dactylifera* L.

Lepidium

- 1 *L. aucheri* Boiss.
- 2 *L. sativum* L.
- 3 *L. ruderale* L.
- 4 *L. perfoliatum* L.
- 5 *L. vesicarium* L.
- 6 *L. cartilagineum* (J.mayer) Thell. Subsp. *cartilagineum*.
- 7 *L. cartilagineum* (J.mayer) Thell. Subsp. *pumilum* (Boiss. & Bal.) Hedge.
- 8 *L. latifolium* L.
- 9 *L. persicum* Boiss. Subsp. *persicum*.

**Rorippa**

- 1 *R. amphibia* (L.) Besser.
- 2 *R. cowardice* (Boiss. & Hausskn.) Hedge.
- 3 *R. sylvestris* (L.) Besser.

Cucumis

- 1 *C. prophetarum* L.
- 2 *C. melo* L.

Citrullus

- 1 *C. colocynthis*.
- 2 *C. lanatus*.

Diospyras

- 1 *D. lotus* L.

Corylus

- 1 *C. avellana* L.
- 2 *C. columa* L.

Juglans

- 1 *J. regia* L.

Melia

- 1 *M. azedarach* L.

Mentha

- 1 *M. aquatica* L.
- 2 *M. longifolia* (L.) Hudson.
- 3 *M. longifolia* (L.) Hudson var. *asiatica* (Boiss.) Rech.f.
- 4 *M. longifolia* (L.) Hudson var. *amphilema* Briquet ex Rech.f.
- 5 *M. longifolia* (L.) Hudson var. *chlorodictya* Rech.f.
- 6 *M. longifolia* (L.) Hudson var. *kermanensis* Rech.f.
- 7 *M. longifolia* (L.) Hudson var. *calliantha* (Stapf) Briquet.
- 8 *M. longifolia* (L.) Hudson var. *kotschyana* (Boiss.) Briquet.
- 9 *M. longifolia* (L.) Hudson va. *petiolata* Boiss.
- 10 *M. spicata* L.
- 11 *M. pulegium* L.

Ocimum

- 1 *O. basilicum* L.

**Satureja**

- 1 *S. intermedia* C. A. Mey.
- 2 *S. isophylla* Rech.f.
- 3 *S. matico* Fisch. & C. A. Mey.
- 4 *S. spicigera* (C.Koch) Boiss.
- 5 *S. macrantha* C.A. Mey.
- 6 *S. edmondi* Briquet.
- 7 *S. atropatana* Bunge.
- 8 *S. sahendica* Bornm.
- 9 *S. bachtiarica* Bunge.
- 10 *S. laxiflora* C.Koch.
- 11 *S. boissieri* Hauskn. ex Boiss.

Artemisia

- 1 *A. vulgaris* L.
- 2 *A. chamaemelifolia* Vill.
- 3 *A. biennis* Willd.
- 4 *A. annua* L.
- 5 *A. splendens* Willd.
- 6 *A. melanolepis* Boiss.
- 7 *A. austriaca* Jacq.
- 8 *A. haussknechtii* Boiss.
- 9 *A. persica* Boiss.
- 10 *A. absinthium* L.
- 11 *A. kulbadica* Boiss. & Buhse.
- 12 *A. incana* (L.) Druce.
- 13 *A. tschernieviana* Besser.
- 14 *A. scoparia* Waldst. & Kit.
- 15 *A. deserti* Krasch.
- 16 *A. santolina* Schrenk.
- 17 *A. lehmanniana* Bunge.
- 18 *A. turanica* Krasch.
- 19 *A. diffusa* Krasch. ex Poljak.
- 20 *A. kopetdaghensis* Krasch.
- 21 *A. turkomanica* Gand.
- 22 *A. sieberi* Besser Subsp. *Sieberi*.
- 23 *A. kerinanensis* Podl.
- 24 *A. oliveriana* J.Gay ex DC.
- 25 *A. gypsacea* Krasch.
- 26 *A. khorassanica* Podl.
- 27 *A. quettensis* Podl.
- 28 *A. aucheri* Boiss.
- 29 *A. ciniformis* Krasch. & M.Pop. ex Poljak.
- 30 *A. fragrans* Willd.
- 31 *A. spicigera* C.Koch.

**Cynara**

- 1 *C. syriaca* Boiss.

Lactuca

- 1 *L. udulata* Ledeb.
- 2 *L. glauciifolia* Boiss.
- 3 *L. rosularis* Boiss.
- 4 *L. polyclada* Boiss.
- 5 *L. wilhelmsiana* Fisch. & C.A.Mey.
- 6 *L. azerbaijanica* Rech.f.
- 7 *L. aculeata* Boiss. & KY. ex Boiss.
- 8 *L. serriala* L.
- 9 *L. scarioloides* Boiss.

Sesamum

- 1 *S. indicum* L.

Rheum

- 1 *R. turkestanicum* Janisch.
- 2 *R. ribes* L.
- 3 *R. persicum* Los.

Eruca

- 1 *E. sativa* Miller.

Berberis

- 1 *B. khorasanica* Browicz & J.Zielinski.
- 2 *B. integerrima* Bunge.
- 3 *B. crataegina* DC.
- 4 *B. orthobotrys* Bienert ex C. K. Schneider P.P.
- 5 *B. vulgaris* L.
- 6 *B. integerrima* x *vulgaris*.
- 7 *B. integerrima* x *crataegina*.
- 8 *B. integerrima* x *orthobotrys*.
- 9 *B. crataegina* x *vulgaris*.



Acknowledgment

The present report was compiled based on information and assistance provided by the following people:

N. Khaghani

The national plant gene bank of Iran

M. Nikpour

The national plant gene bank of Iran

F. Hemmati

The national plant gene bank of Iran

M. Abas Ali

The national plant gene bank of Iran

M. Tavakoli

The national plant gene bank of Iran

R. Ataii

The national plant gene bank of Iran

H.G. Seradj

The national plant gene bank of Iran

M. Esmaily

The national plant gene bank of Iran

N.A. Sepahvand

The national plant gene bank of Iran

M. Kouhpayeghani

The national plant gene bank of Iran

B.S. Shafeadine

The national plant gene bank of Iran

N. Takapouy

The national plant gene bank of Iran

**F. Javadi**

The national plant gene bank of Iran

N. Baghaie

The national plant gene bank of Iran

M. Rahimi

The national plant gene bank of Iran

S. Jamshidi

The national plant gene bank of Iran

E. Bigdeli

The Seed and Plant Improvement Institute

L. Khoshnevisan

The Seed and Plant Improvement Institute

E. Moghadam

The Seed and Plant Improvement Institute

P. Karbasi

The Agricultural Research, Extension and Education Organization

K. Abaskhani Davanlou

The Agricultural Research, Extension and Education Organization