



Floristic study of Saint Katherine protectorate, Sinai: with one new record to flora of Egypt.

Sami Rabei^{1*}, Abdel-Hamid Khedr¹ and Ibrahim Elgamal²

¹Botany and Microbiology Department, Faculty of Science, Damietta University, New Damietta, Egypt

²Saint Katherine Protectorate, Egyptian Environmental Affairs Agency (EEAA), Egypt

*Corresponding author: samirabei@du.edu.eg

Abstract

Saint Katherine protectorate is one of the most floristically diverse spots in the Middle East. A field surveys, as well as critical revision of herbarium specimens, were carried out during 2013-2020 revealed that 430 taxa belonging to 283 genera and 62 families. The life-forms are classified into seven life forms with dominance of Therophytes (39%) followed by Chamaephyte (24.7%). Chorological study indicated that 52% of recorded taxa were mono-regional native to Saharo–Arabian (29%), Irano–Turanian (10.39%), Mediterranean (7.4%), Sudanin (4%) while tropical and sub- tropical represented by (0.2%) only. 223 taxa were mono-regional, 127 taxa were bi-regional, while 16 taxa were endemic and Steno-endemic. Investigated taxa distributed in four microhabitats; terraces, slopes, gorges, and wadi bed the last two were the most diversity. The present study investigated that presence of *Papaver somniferum* is a new record to flora of Egypt, eight new records to Sinai and thirty four new records to the study area.

Keywords: Chorology, life forms, new record, Saint Katherine Protectorate

Introduction

Floristic composition is a reflection of plant diversity of a geographic region (Rafay et al. 2013); a floristic inventory is the main source of botanical information and provides an appropriate starting point for supplementary comprehensive studies of a specific geographic area (Keith 1988) . Plant life form as the growth form that represents an adaptation to specific environmental conditions (Galán de Mera et al. 1999) can reflect the climatic adaptability and then the whole vegetation in a particular ecosystem would be an expression of the prevailing climate (Batalha et al., 2002) .

Sinai Peninsula is the meeting place of the old world (Grainger 2003), it occupies 6.1% of the surface of Egypt; it is rich both in the number of species and the high

percentage of endemics as it hosts 1262 taxa (Boulos 2009). According to (Zahran and Willis 2009) Sinai Peninsula stands in four phytogeographical regions: Mediterranean, Irano-Turanian, Sudano-Deccanian and Saharo – Arabian. The majority of Sinai belongs to the Sahara-Arabian phytogeographical region. Its vegetation is characterized by sparseness vegetation; while the high mountains of southern Sinai support mainly Irano-Turanian vegetation. (Danin Avinoan 1986) .

Saint Katherine Protectorate (SKP) (sometimes spelled as Saint Catherine protectorate) spreads over virtually the entire mountain massif of South Sinai, with an area of about 4350 km². and lies between 33° 55' to 34° 30'E and 28° 30' to 28° 35'N

with an elevation up to 2641 m above sea level (asl); it lies in a Saharan-Mediterranean climate with extremely dry, hot summers and cold winters; average rainfall is 60 mm / year, It is the coolest area in Egypt. Mean maximum temperature in August is 36° while winters are relatively cool with mean minimum temperature of - 7.8° in February (Grainger 2003). SKP is one of the most floristically diverse spots in the Middle East (Boulos 2009) with a significant proportion of endemic species as it hosts 17 endemic taxa (Ghaly 2015) out of them 6 are endangered and /or critically endangered; the majority of SKP endemic taxa classified as steno-endemic (Ghaly 2015; Hosni et al. 2013) The diversity of both landforms and geologic structures of SKP leads to the differentiation of a six microhabitats namely; farsh (Basine), caves, terraces, slopes, wadis and gorges the last two microhabitats have dykes that trap water resulting in significant plant cover (Khedr 2007).

According to (Fayed et al. 2004) and (Shaltout et al. 2004) the total number of taxa in Saint Katherine protectorate is 472, belonging to 272 genera and 64 families, (Fayed et al. 2010) carried out Partial Survey in SKP; and listed 134 species belonging to 117 genera and representing 38 families. Since this date there is no partial or whole survey throughout SKP even if there are many climatic changes, human impacts and threats (Omar et al. 2015).

The authors aim to (1) carrying out field survey in an area where few floristic studies had been done before, (2) documented chorological affinities and life spans (3) confirmation the presence of *Papaver somniferum* L. as a new record in flora of Egypt, (4) reporting 8 new taxa to Sinai, and 34 new taxa to SKP.

Material and methods

An inventory of all available specimens was compiled based on field surveys that carried out in Saint Katherine Protectorate, South Sinai, Egypt during 2013-2020 as well as critical revision of herbarium specimens hosted in SKP herbarium, collected taxa were identified according to (Feinbrun-Dothan 1986, 1978; Täckholm 1974; Zohary, 1973, 1966; Boulos, 2005, 2002, 2000, 1999). Taxa names were reconciled against Kew's Plants of the World Online (POWO 2021) which was also used as reference for families and genera classification. For the few species that were not found in POWO the authors followed (GBIF 2021).

Voucher specimens were kept at Saint Katherine Protectorate Herbarium (SKPH) without identification numbers. **Life forms** were followed (Raunkiaer, 1934), when several life forms were given for a taxon, the most representative one was chosen; variation in the life form in the field was not considered, **phytogeographical affinity**, the general approach and terminology of (Zohary 1973) for the Saharo-Arabian and Sudanian regions, each species Phytogeographical affinity was obtained from (Abd El-Ghani 1985, 1981); when these resources for a single taxon gave more than one phytogeographical element, the most appropriate was used, **vegetation type and floristic division** according to (Boulos 2005, 2002, 2000, 1999). The specimens were first checked in (Boulos 2005, 2002, 2000, 1999; Fayed et al. 2004; Moustafa et al. 1998; Shaltout et al. 2004; Täckholm 1974) ,for their presence in Egypt, Sinai and SKP, **rarity and endemism** based on IUCN red list 2018 <https://www.iucnredlist.org>, (Omar et al. 2015; Walter and Harriet 1997).

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Density, frequency, and different diversity indices calculation

Shannon index was calculated using the formula $H' = -\sum P_i \ln P_i$ (Pielou 1975). The relative concentration of dominance within each plot was assessed by the **Simpson diversity index** $D = 1 - \sum (n_i - 1) / (N - 1)$. **Species richness** was calculated as the average number of species/ sampling plot. **Density of species** (i) is calculated as the total number of individuals of species (i) in all sampled plots/ area of sampled plots. **Frequency** is the number of times a plant species occurs in a given number of quadrats. **One-way ANOVA** was performed to calculate the significance of differences in diversity indices, both average density and frequency between different quadrates that

varied in different microhabitats using SPSS software version 22.

Results and discussion

Floristic composition

Despite its small area, SKP region has high floristic richness as it hosts approximately 23% of Egyptian flora (Fayed et al. 2004; Shaltout et al. 2004) and 28% of Egyptian endemic taxa (Ghaly 2015), a total of 430 taxa including 27 infraspecific from the study area were identified; belonging to 283 genera and 62 families (see Appendix 1) of these *Papaver somniferum* is a new record to flora of Egypt, eight taxa are new records to Sinai and thirty four are new records to Saint Katherine Protectorate in addition to sixteen endemic taxa (table 1).

Table (1) Endemic and new records taxa, SKP= Saint Katherine Protectorate

Accepted plant name	Family	Status
<i>Anarrhinum forskahlii</i> subsp. <i>pubescens</i> D.A. Sutton	Plantaginaceae	Endemic
<i>Ballota kaiseri</i> Täckh	Lamiaceae	Endemic
<i>Bufoia multiceps</i> Decne.	Caryophyllaceae	Endemic
<i>Euphorbia obovata</i> Decne.	Euphorbiaceae	Endemic
<i>Hyoscyamus boveanus</i> (Dunal) Asch. & Schweinf.	Solanaceae	Endemic
<i>Micromeria serbaliana</i> Danin & Hedge	Lamiaceae	Endemic
<i>Origanum syriacum</i> subsp. <i>Sinaicum</i> (Boiss.) Greater & Burdet	Lamiaceae	Endemic
<i>Phlomis aurea</i> Decne.	Lamiaceae	Endemic
<i>Polygala Sinaica</i> Botsch.	Polygalaceae	Endemic
<i>Primula involucrata</i> (Raf.) Link & Otto ex Sweet	Primulaceae	Endemic
<i>Pterocephalus arabicus</i> Boiss.	Caprifoliaceae	Endemic
<i>Rosa arabica</i> (Crép. ex Boiss.) Déségl.	Rosaceae	Endemic
<i>Silene leucophylla</i> Boiss.	Caryophyllaceae	Endemic
<i>Silene oreosinaica</i> Chowdhuri	Caryophyllaceae	Endemic
<i>Silene schimperiana</i> Boiss.	Caryophyllaceae	Endemic
<i>Veronica kaiseri</i> Täckh.	Plantaginaceae	Endemic
<i>Achillea tenuifolia</i> Lam.	Asteraceae	New record to SKP
<i>Arabis recta</i> Vill.	Brassicaceae	New record to SKP
<i>Argyrolobium arabicum</i> (Decne.) Jaub. & Spach.	Fabaceae	New record to SKP
<i>Astragalus amalecitanus</i> Boiss.	Fabaceae	New record to SKP
<i>Astragalus echinus</i> DC.	Fabaceae	New record to SKP
<i>Astragalus palaestinus</i> Eig.	Fabaceae	New record to SKP
<i>Capsella bursa-pastoris</i> (L.) Medik	Brassicaceae	New record to Sinai & SKP
<i>Caudanthera Sinaica</i> (Decne.) Plowes	Apocynaceae	New record to SKP
<i>Centaurium pulchellum</i> (Sw.) Druce.	Gentianaceae	New record to SKP
<i>Cistanche salsa</i> (C.A. Mey.) Beck	Orobanchaceae	New record to SKP
<i>Cleome chrysantha</i> Decne.	Cleomiaceae	New record to SKP
<i>Clinopodium barbatum</i> (P.H. Davis) Melnikov	Lamiaceae	New record to Sinai & SKP
<i>Colchicum ritchii</i> R.Br.	Colchicaceae	New record to SKP

Accepted plant name	Family	Status
<i>Datura ferox</i> L.	Solanaceae	New record to Sinai & SKP
<i>Dianthus libanotis</i> Labill.	Caryophyllaceae	New record to SKP
<i>Euphorbia granulata</i> Forssk	Euphorbaiceae	New record to SKP
<i>Euphorbia hirta</i> L.	Euphorbaiceae	New record to SKP
<i>Glebionis coronaria</i> (L.) Tzvelev	Asteracea	New record to SKP
<i>Lamium amplexicaule</i> L.	Lamiaceae	New record to SKP
<i>Limonium lobatum</i> (L. fil.) Chaz.	Plumbaginaceae	New record to SKP
<i>Limonium sinuatum</i> (L.) Mill.	Plumbaginaceae	New record to Sinai & SKP
<i>Lotus hebranicus</i> Hochst. ex Brand	Fabaceae	New record to SKP
<i>Nidorella aegyptiaca</i> (L.) J.C. Manning & Goldblatt	Asteracea	New record to Sinai & SKP
<i>Orobanche palaestina</i> Reuter	Orobanchaceae	New record to Sinai & SKP
<i>Pallenis spinosa</i> (L.) Cass.	Asteracea	New record to SKP
<i>Papaver somniferum</i> L.	Papaveraceae	New record to Egypt, Sinai & SKP
<i>Piptatherum holciforme</i> (M. Bieb.) Roem. & Schult.	Poaceae	New record to SKP
<i>Spergularia marina</i> (L.) Griseb.	Caryophyllaceae	New record to SKP
<i>Stellaria media</i> (L.) Vill.	Caryophyllaceae	New record to SKP
<i>Tribulus pentandrus</i> Forssk.	Zygophyllaceae	New record to SKP
<i>Tricholaena teneriffae</i> (L. f.) Link.	Poaceae	New record to SKP
<i>Vicia articulata</i> Hornem	Fabaceae	New record to Sinai & SKP
<i>Withania somnifera</i> (L.) Dunal	Solanaceae	New record to SKP
<i>Ziziphora tenuior</i> L.	Lamiaceae	New record to SKP

The surveyed flora represented by Angiospermae (Dicotyledoneae 363 taxa, and Monocotyledoneae 61 taxa) while Gymnospermae and Pteridophyta represented by three species for each. More than 60% of the recorded taxa belong to

only 10 species rich families. The largest families were Asteraceae, Poaceae and Fabaceae while nine families were represented by two species, and the remaining twenty-three families were represented by one species only (Fig 1).

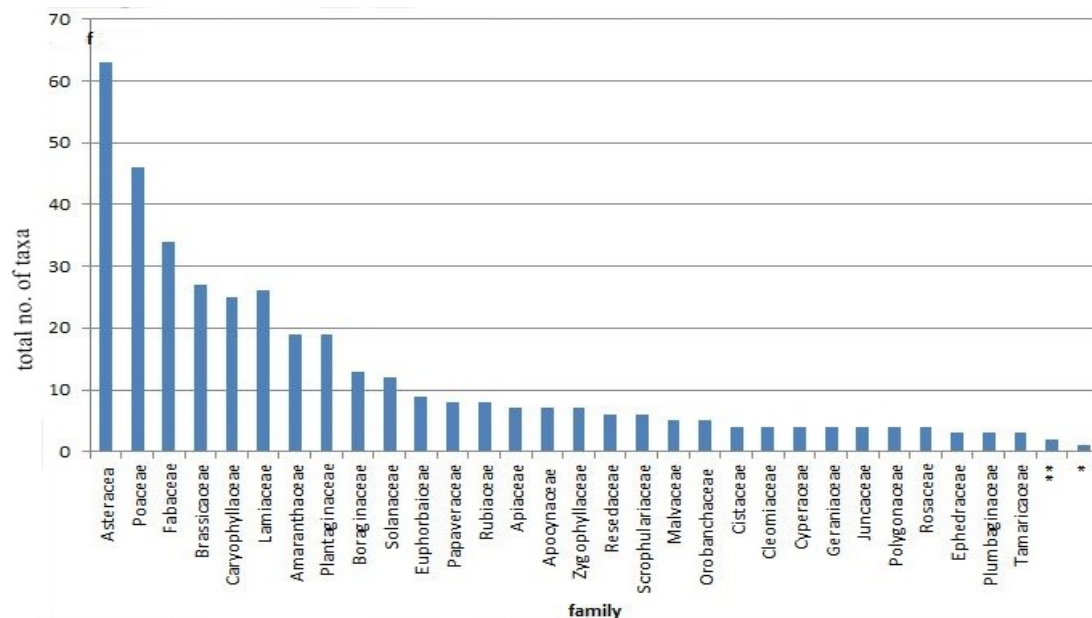


Fig (1) Representative number of taxa of the recorded families; * = 23 families represented by one taxon, and ** = 9 families represented by two taxa.

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Investigated taxa classified into herbaceous plants (301 taxa); shrubs (92 taxa); sub Shrubs (16 taxa), trees (12 taxa), Climber (5 taxa), reeds and Herb/ Subshrub represented by 2 taxa for each (Fig 2), the

dominance of herbaceous taxa over the other growth habits can be recognized to their short life cycle that enables them to resist the instability of the harsh environmental condition (Gomaa 2012).

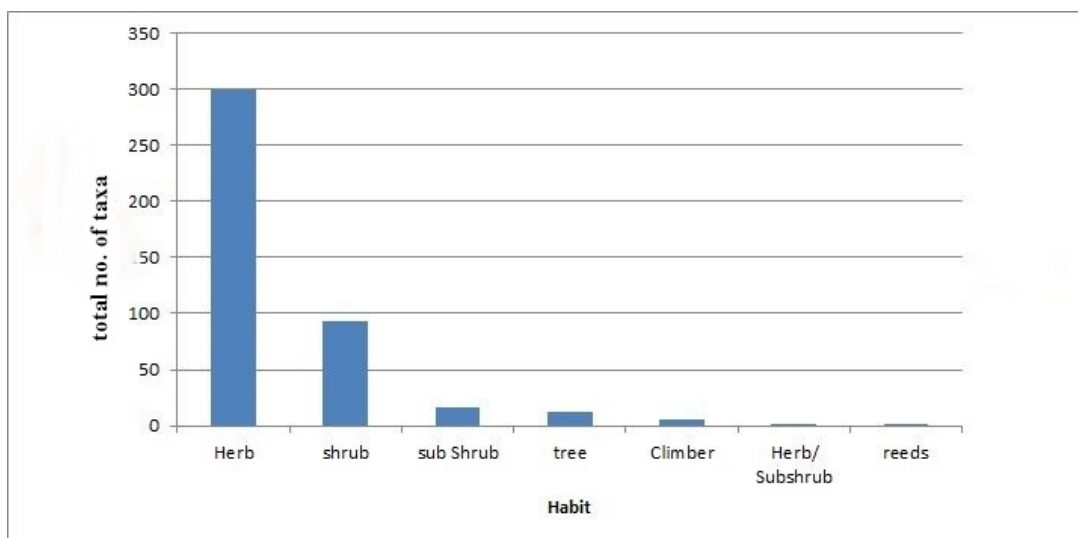


Fig (2) Number of taxa in relation to their habit

Life spans and Life forms

Investigated taxa classified into six groups dominant by Perennial (234 taxa), annual (173 taxa), annual / short perennial (13 taxa), annual/ biennial and biennial

represented by four taxa for each and biennial/ perennial represented only by one taxon (Fig 3).

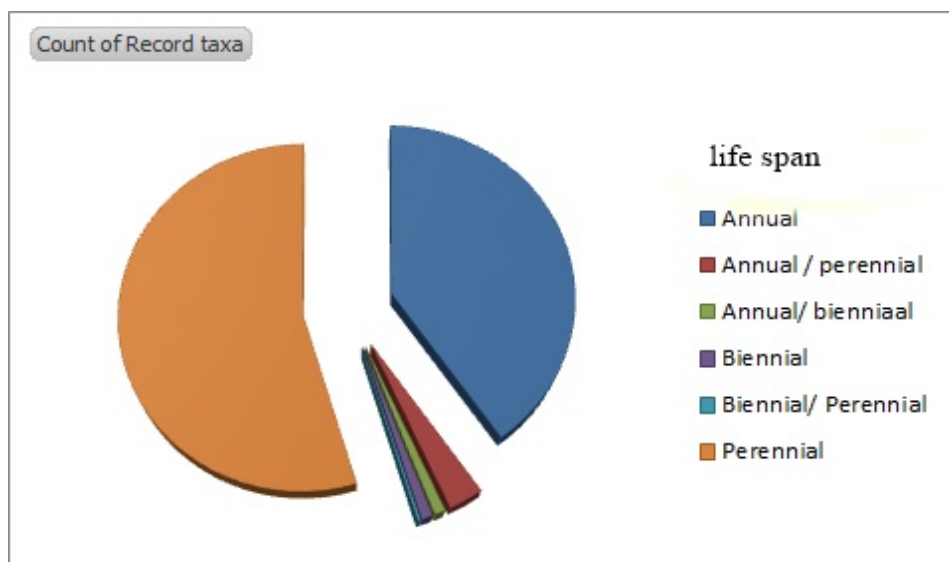


Fig (3) life span of the recorded taxa

Life forms spectrum is characteristic of an arid ecosystem with the dominance of therophytes (171) followed by chamaephyte (106 taxa), hemicryptophyte (102 taxa), phanerophyte (34 taxa), geophyte (11 taxa), parasite (4 taxa) and helophyte represented only by two species (Fig 4), with agreement with previous studies e.g (Elgamal 2020; Moustafa and Zaghoul 1996) Life-form

spectrum in our result is typical of an arid desert region with the dominance of therophytes and this support the concept of (Cain 1950; Deschenes 1969) that arid conditions and overgrazing are so prevalent on grasslands tend to increase therophytes percentage through the introduction and spread of weedy grasses and forbs of this life form.

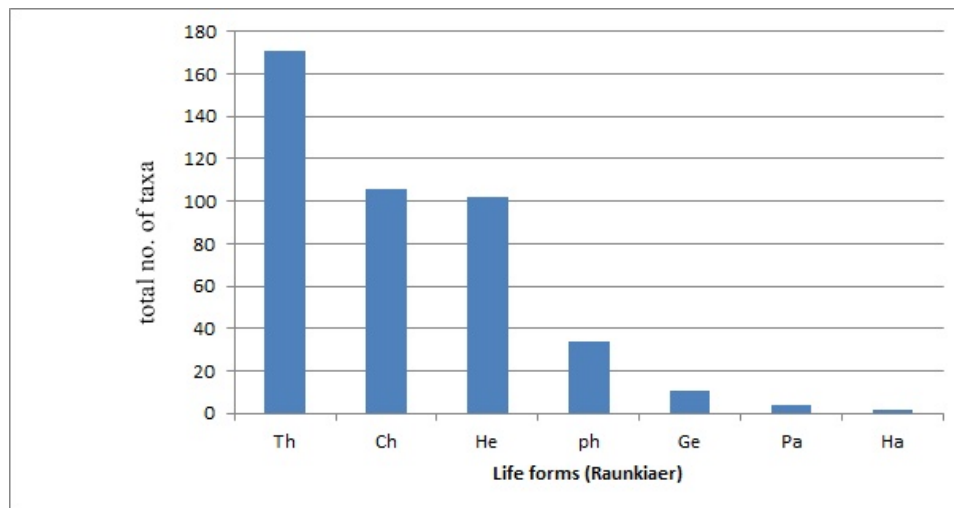


Fig (4) Life forms of the recorded taxa, He = Hemicryptophyte, Ch = chamaephyte, Th = Therophytes, Ph = Phaneroohyte, Ge = Geophyte, Pa = Parasite and Ha = Helophyte.

Phytogeographical affinities

Surveyed taxa related to 6 phytogeographical regions thus the Mediterranean region, Saharo – Arabian, Irano-Turanian, Sudano – Deccanian, Tropical and sub-tropic region. The analysis of surveyed flora chorology revealed that 52% taxa were monoregional native to Saharo – Arabian (29%), Irano- Turanian

(10.39%), Mediterranean (7.39%), Sudanin (4%) while tropical and sub- tropical represented by (0.2%) only. 127 taxa were bi-regional, 63 taxa were recognized in more than two phytogeographical regions and/ or pluri- regional while 16 were endemic and Steno-endemic (Fig 5).

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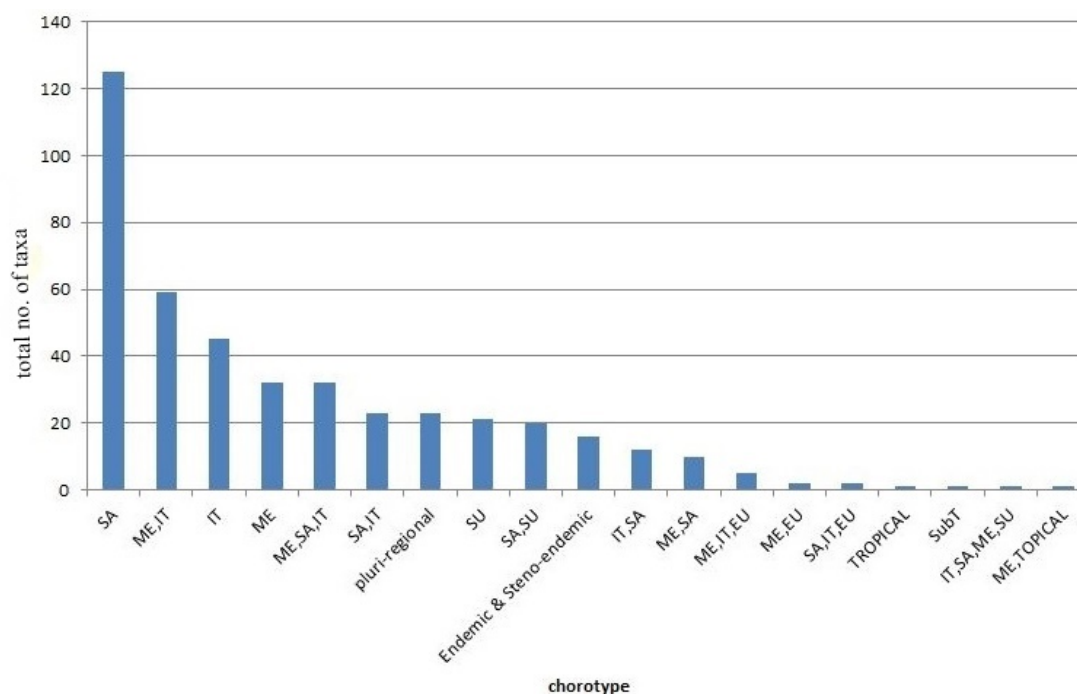


Fig (5) Chorological analysis of the recorded taxa ME = Mediterranean, IT = Irano- turanian, SA = Saharo – Arabian, SU = Sudanin, and Sub T = sub trobic

Concerning the relation between geoelements and life forms (Table 2), chamaephytes followed by therophyte; hemicryptophytes and phanerophytes make an important contribution to the Saharo–Arabian and Irano-Turanian phytogeographical regions, while halophytes and parasites were completely absent. Phanerophyte layer is composed mainly of

both Saharo- Arabian and Sudano-Deccanian geoelement. The Mediterranean geoelement was humbly represented in the tree and shrub layer. That may be recognized to the fact that the Saharo-Arabian and Sudano geoelements are good indicators for harsh ecosystems (Abd El-Ghani and Abdel-Khalik 2006).

Table (2) Distribution of the geoelements among life forms He = Hemicryptophyte, Ch = chamaephyte, Th = Therophytes, Ph = Phaneroohyte, Ge = Geophyte, Pa =Parasite and He = Helophyte. ME = Mediterranean, IT = Irano - Turanian, SA = Saharo – Arabian, SU = Sudanin, and Sub T = sub trobic. Other taxa are distributed in more than two regions

Life form	SA	IT	ME	SU	Sub T	T	Endemic	Bi- regional	Others	total
Th	36	14	14	5	1	1	0	58	42	171
Ch	49	15	6	5	0	0	4	22	5	106
He	27	12	10	3	0	0	11	30	9	102
Ph	9	3	1	8	0	0	1	11	1	34
Ge	3	0	1	0	0	0	0	3	4	11
Pa	0	1	0	0	0	0	0	1	2	4
Ha	0	0	0	0	0	0	0	0	2	2

Microhabitat diversity and abundance

Based on Khedr (2007), six microhabitats can be recognized throughout SKP these are wadi bed, terraces, slopes, gorges, farsh and caves. Investigated taxa are distributed mainly in four out of these six microhabitats viz. wadi, terraces, gorges and slopes with limited availability to farsh and caves microhabitats. The distribution of plant species was higher in gorges; wadi bed as

well as north aspect compared to the other microhabitats and aspect. In general, Shannon index, richness, frequency and density were significantly higher in gorges and wadi bed compared to the other microhabitats. Similarly, the concentration of dominance, as indicated by the Simpson index, with non-significant effect ($P > 0.05$). (Table 3).

Table (3). Results of one-way ANOVA of species density, frequency, and different diversity indices at different microhabitat

	Goreoge	Slope	Terraces	Wadi	F value
Shannon index	2.06	1.5	1.7	1.8	3.8
Simpson diversity index	0.873	0.85	0.87	0.89	648
Richness	10.8	6.2	7.7	10.2	7.5
Frequency	18.22	11.97	10.99	15.02	4.0
density	15.4	9.4	14.08	34.3	7.2

Goreoge, wadi bed and north aspect sites were the most rich microhabitat and aspect while hilltops and south-facing slopes, which will be exposed to more intense insolation, will be the harshest habitats for plant growth, it seems that soil moisture and evaporation rate are among environmental factors determinants influencing species composition and richness in the arid habitat; as Goreoge and wadis have the greater merit of being a drainage system collecting water from great catchment area (El Hadidi 2000; Khedr, 2007) as well as the lowest evaporation rate (Kidron and Zohar 2010), Altitude and aspect on mountains influence the amount of water available to plants (Lomolino 2001); soils at higher altitudes dry out quickly after rain events; this can lead to very dry soils through the rest of the year. (Kidron and Zohar 2010) studied the evaporation rates in different parts of the slope in a drainage basin in the Negev Desert Highlands; they ranked Sites in the following order: north-facing aspect < wadi beds ≤ west-facing aspect ≤ east-facing aspect ≤ south-facing

Aspect < hilltops. As water is the most limiting factor for plant growth and survival in arid regions, the wadi beds and goreoges provides the most favorable conditions for plant growth.

Species that should receive more priority for conservation

According to the species endemism, are these species listed on the Red List of the International Union of Conservation (IUCN), density and frequency of these species, threats to plant species, the present study concluded that twenty five taxa classified as rare (R), with two taxa recently added to Egyptian flora as one population (Table 4); out of them sixteen species are endemic and / or steno-endemic to SKP; according to IUCN red-list six species are endangered or critically endangered. The rarity and endemism of these species indicate that they may be threatened by biotic and abiotic factors and should receive a high priority for conservation.

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Table (4) Species that should receive more priority for conservation, R= rare, VU= vulnerable, EN= endangered, CR= critically endangered

Record taxa	family	Global distribution	Conservation status	IUCN red list category(2018)
<i>Anarrhinum forskahlii</i> subsp. <i>pubescens</i> D.A. Sutton*	Plantaginaceae	Endemic	R	EN
<i>Ballota kaiseri</i> Täckh	Lamiaceae	Endemic	R	Not evaluated
<i>Bufonia multiceps</i> Decne	Caryophyllaceae	Endemic	R	EN
<i>Clinopodium barbatum</i> (P.H.Davis) Melnikov	Lamiaceae	Lebanon-Syria; Palestine; Turkey, recently added to flora of Egypt by Rabei et al (2019) as one population	VU	Not evaluated
<i>Datura ferox</i> L.	Solanaceae	World wide, recently added to flora of Egypt by Rabei et al (2019)as one population	Not evaluated	Not evaluated
<i>Dianthus Sinaicus</i> Boiss.	Caryophyllaceae	Egypt and Palestine (near endemic)	VU	Not evaluated
<i>Euphorbia obovata</i> Decne.	Euphorbaiceae	Endemic	R	EN
<i>Hyoscyamus boveanus</i> (Dunal) Asch. & Schweinf.	Solanaceae	Endemic	R	Not evaluated
<i>Hypericum Sinaicum</i> Hochst. ex Boiss	Hypericaceae	Egypt and Saudi Arabia (near endemic)	R	Not evaluated
<i>Micromeria serbaliana</i> Danin & Hedge	Lamiaceae	Endemic	R	Not evaluated
<i>Micromeria Sinaica</i> Benth.	Lamiaceae	Egypt and Palestine (near endemic)	R	Not evaluated
<i>Nepeta septemcrenata</i> Benth.	Lamiaceae	Egypt and Saudi Arabia (near endemic)	R	Not evaluated
<i>Origanum syriacum</i> subsp. <i>sinaicum</i> (Boiss.) Greater & Burdet.	Lamiaceae	Endemic	R	Not evaluated
<i>Phlomis aurea</i> Decne.	Lamiaceae	Endemic	R	EN
<i>Plantago sinaica</i> (Barneoud) Decne.	Plantagonaceae	Egypt and Palestine (near endemic)	R	Not evaluated
<i>Polygala sinaica</i> Botsch.	Polygalaceae	Endemic	R	Not evaluated
<i>Primula involucrata</i> (Raf.) Link & Otto ex Sweet	Primulaceae	Endemic	R	CR
<i>Pterocephalus arabicus</i> Boiss	Caprifoliaceae	Endemic	VR	Not evaluated
<i>Rosa arabica</i> (Crép. ex Boiss.) Déségl.	Rosaceae	Endemic	R	CR
<i>Silene leucophylla</i> Boiss.	Caryophyllaceae	endemic	R	Not evaluated
<i>Silene odontopetala</i> subsp <i>congesta</i> Boiss.	Caryophyllaceae	Egypt and Iran	R	Not evaluated
<i>Silene oreoSinaica</i> Chowdhuri	Caryophyllaceae	Endemic	R	Not evaluated
<i>Silene schimperiana</i> Boiss.	Caryophyllaceae	Endemic	R	Not evaluated
<i>Thymus decussatus</i> Benth.	Lamiaceae	Egypt ,Palestine; Saudi Arabia(near endemic)	EN	Not evaluated
<i>Veronica kaiseri</i> Täckh.	Scrophulariaceae	Endemic	R	Not evaluated

New record to the flora of Egypt

Papaver L. one of 50 genera related to family *papaveraceae*, characteristic by absence of style and presence of stigmatic tissue arranged radially on a sessile stigmatic disc which crowns the ovary (Kadereit, 1993). *Papaver* has long been at attention for many botanists because of it is content from alkaloids like Papaverin, Codein, Morphin (Sariyar 2002) . *Papaver*

comprises 80 annual, biennial and perennial species in central and south-western Asia, central and southern Europe and northern Africa (Kadereit 1993; Kadereit et al. 1997) In Egypt *Papaver* represented by seven species namely *P. argemone* L., *P. decaisnei* Hochst. & Steud. ex Boiss., *P. dubium* L., *P. humile* Fedde, *P. hybridum* L., *P.*

macrostomum Boiss. & Huet ex Boiss. and *P. rhoeas* L. (Boulos 2009)

Papaver somniferum L., Sp. Pl.: 508 (1753)
TYPE: Lectotypified by Britton and A. Brown, Ill. Fl. N. U.S., ed. 2. 2: 136. 1913.
Syn. *Papaver setigerum* auct. non DC.;
P. somniferum L. var. *hortense* (Huss.) Corb.

Global distribution widely distributed in Europe and Asia.

Annual, 20-120 cm height. Stems erect, simple or branched, glabrous rarely bristled. Internode length 3-3.5 cm, leaves simple, alternate, oblong or ovate, toothed and lobed, rarely pinnately lobed, 4- 15 X1-

5 cm, leaf margin dentate or serrate. Flower solitary, terminal, Sepals glabrous, caduceous, petals 4 entire, obovate-orbicular, toothed, purple, red, violet or white, up to 5.5 -3.5 cm., Stamens long yellowish filaments fruit (capsule) dry and splits open when ripe, glabrous, ovate to oblong, sessile, and crowning the top of the ovary, stigmatic disk shorter than the capsule breadth, with deeply cut marginal lobes, seeds grey to black. Flowering and fruiting between February to June (Fig 6). ***Papaver somniferum*** can distinguished from other Egyptian papaver by its oblong or ovate stem-clasping leaves



Fig (6) *Papaver somniferum*

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Appendix (1) the checklist of recorded taxa, He = Hemicryptophyte, Ch = chamaephyte, Th = Therophytes, Ph = Phaneroohyte, Ge = Geophyte, Pa = Parasite and He = Helophyte. ME = Mediterranean, IT = Irano- turanian, SA = Saharo – Arabian, SU = Sudanin and Sub T = sub trobic. † = recorded as herbarium specimen only

Family	Accepted plant name	life form (Raunkiaer)	life spans	duration	Chorotype	No. of taxa
Acanthaceae	<i>BlePhris attenuata</i> Napper	Ch	Perennial	Herb	IT,SA	1
Aizoaceae	<i>Aizoon canariense</i> L.	Th	Annual	Herb	ME,SA,IT	1
Amaranthaceae	<i>Aerva javanica</i> (Burm. f.) Juss. ex Schult.	Ch	Perennial	shrub	SA	19
	<i>Agathophora alopecuroides</i> (Delile) Fenzl ex Bung	Ch	Perennial	sub Shrub	SA	
	<i>Amaranthus graecizans</i> L.†	Th	Annual	Herb	pluri-regional	
	<i>Amaranthus hybridus</i> L.†	Th	Annual	Herb	pluri-regional	
	<i>Amaranthus blitum</i> subsp. <i>oleraceus</i> (L.) Costea	Th	Annual	Herb	pluri-regional	
	<i>Anabasis articulata</i> (Forssk.) Moq.	Ch	Perennial	shrub	SA	
	<i>Anabasis setifera</i> Moq.	Ch	Perennial	shrub	SA,IT	
	<i>Atriplex halimus</i> L.	Ph	Perennial	shrub	ME,SA	
	<i>Atriplex turcomanica</i> (Moq.) Boiss.	Ch	Perennial	shrub	IT	
	<i>Bassia arabica</i> (Boiss.) Maire & Weiller	Ch	Perennial	sub Shrub	SA	
	<i>Bassia eriophora</i> (Schrad.) Asch.	Ch	Annual	Herb	SA,SU	
	<i>Bassia muricata</i> (L.) Asch.	Th	Annual	Herb	SA,IT	
	<i>Beta vulgaris</i> L.	Th	Annual / perennial	Herb	ME,IT	
	<i>Chenopodium album</i> L.	Th	Annual	Herb	pluri-regional	
	<i>Chenopodiastrum murale</i> (L.) S.Fuentes, Uotila & Borsch	Th	Annual	Herb	pluri-regional	
	<i>Haloxylon salicornicum</i> (Moq.) Bunge ex Boiss.	Ch	Perennial	shrub	SA,IT	
	<i>Caroxylon imbricatum</i> (Forssk.) Moq.	Ch	Perennial	shrub	SA	
	<i>Suaeda aegyptiaca</i> (Hasselq.) Zohary	He	Perennial	Herb	SA	
	<i>Suaeda monoica</i> Forssk. ex J.F. Gmel.	Ph	Perennial	shrub	SA,SU	
Anacardiaceae	<i>Pistacia khinjuk</i> Stocks	Ph	Perennial	tree	IT	1
Apiaceae	<i>Deverra tortuosa</i> (Desf.)DC.	Ch	Perennial	shrub	SA	
	<i>Deverra triradiata</i> Hochst. ex Boiss.	Ch	Perennial	shrub	SA	7
	<i>Ferula Sinaica</i> Boiss.	He	Perennial	Herb	IT	
	<i>Foeniculum vulgare</i> Mill.	He	Perennial	Herb	ME,IT	
	<i>Pycnocycla tomentosa</i> Decne.	He	Perennial	Herb	SA	
	<i>Scandix stellata</i> Banks & Sol.	Th	Annual	Herb	IT	
	<i>Zosima absinthifolia</i> (Vent.) Link.	He	Perennial	Herb	IT	
Apocynaceae	<i>Calotropis procera</i> (Aiton) W.T. Aiton.	Ph	Perennial	shrub	SA	7
	<i>Caudanthera Sinaica</i> (Decne.) Plowes	He	Perennial	Herb	SA	
	<i>Cynanchum acutum</i> L.	Ch	Perennial	Herb	SA	
	<i>Gomphocarpus Sinaicus</i> Boiss.	Ch	Perennial	shrub	SA	
	<i>Leptadenia pyrotechnica</i> (Forssk.) Decne.	Ph	Perennial	shrub	SA	
	<i>Pergularia tomentosa</i> L.	Ch	Perennial	shrub	SA	
	<i>Periploca aphylla</i> subsp. <i>Aphylla</i>	Ph	Perennial	shrub	SU	
	<i>Solenostemma oleifolium</i> (Nectoux) Bullock & E.A. Bruce ex Maire	Ph	Perennial	shrub	SA	

Family	Accepted plant name	life form (Raunkiaer)	life spans	duration	Chorotype	No. of taxa
Arecaceae	<i>Phoenix dactylifera</i> L.	Ch	Perennial	tree	SA	1
Asparagaceae	<i>Asparagus horridus</i> L.	Ge	Perennial	shrub	ME,SA	1
Asphodelaceae	<i>Asphodelus tenuifolius</i> Cav.	Th	Annual	Herb	ME,SA,IT	1
Asteraceae	<i>Achillea fragrantissima</i> (Forssk.) Sch. Bip.	He	Perennial	shrub	IT,SA	63
	<i>Achillea tenuifolia</i> Lam.	He	Perennial	Herb	IT	
	<i>AntHeis melampodina</i> Delile †	Th	Annual	Herb	SA,IT	
	<i>Artemisia herba-alba</i> Asso	Ch	Perennial	shrub	IT	
	<i>Artemisia judaica</i> L.	Ch	Perennial	shrub	SA	
	<i>Asteriscus graveolens</i> (Forssk.) Less.	He	Perennial	shrub	SA	
	<i>Atractylis carduus</i> (Forssk.) C. Chr.	Ch	Perennial	sub Shrub	SA	
	<i>Atractylis mernepthae</i> Asch. & Schweinf. & Letourn.	Th	Annual	Herb	SA	
	<i>Bidens pilosa</i> L.	Th	Annual	Herb	ME,IT,EU	
	<i>Blumea bovei</i> (DC.) Vatke	He	Perennial	Herb	SA	
	<i>Brochia cinerea</i> (Delile) Vis.	Th	Annual	Herb	SA	
	<i>Calendula arvensis</i> L.	Th	Annual	Herb	ME,IT	
	<i>Carduus getulus</i> Pomel.	Th	Annual	Herb	SA	
	<i>Carthamus nitidus</i> Boiss.	Th	Annual	Herb	SA	
	<i>Centaurea eryngioides</i> Lam.	He	Perennial	Herb	SA,IT	
	<i>Centaurea scoparia</i> Sieber ex Spreng.	Ch	Perennial	sub Shrub	SA	
	<i>Centaurea Sinaica</i> DC.	Th	Annual	Herb	SA	
	<i>Chiliadenus montanus</i> (Vahl) Brullo.	He	Perennial	shrub	SA	
	<i>Cichorium pumilum</i> Jacq.	Th	Annual	Herb	ME,IT	
	<i>Crepis sancta</i> (L.) Bornm.	Th	Annual	Herb	ME,SA,IT	
	<i>Echinops glaberrimus</i> DC.	He	Perennial	Herb	SA	
	<i>Erigeron bonariensis</i> L.	Th	Annual	Herb	SU	
	<i>Eschenbachia stricta</i> (Willd.) Raizada	Ch	Perennial	Herb	SA	
	<i>Filago desertorum</i> Pomel	Th	Annual	Herb	SA,IT	
	<i>Glebionis coronaria</i> (L.) Cass. ex Spach	Th	Annual	Herb	ME	
	<i>Gymnarrhena micrantha</i> Desf. †	Th	Annual	Herb	SA,IT	
	<i>Ifloga spicata</i> subsp. <i>albescens</i> Chrtk	Th	Annual	Herb	ME,SA,IT	
	<i>Ifloga spicata</i> subsp. <i>spicata</i>	Th	Annual	Herb	ME,SA,IT	
	<i>Iphiona mucronata</i> (Forssk.) Asch. & Schweinf.	Ch	Perennial	shrub	SA	
	<i>Iphiona scabra</i> DC. ex Decne.	Ch	Perennial	shrub	SA	
	<i>Koelpinia linearis</i> Pall.	Th	Annual	Herb	ME,SA,IT	
	<i>Lactuca orientalis</i> (Boiss.) Boiss.	Ch	Perennial	shrub	IT	
	<i>Lactuca saligna</i> L.	Th	Annual/ bienniaal	Herb	ME,SA,IT	
	<i>Lactuca serriola</i> L.	Ge	Annual/ bienniaal	Herb	ME,IT	
	<i>Lactuca undulata</i> Ledeb.	Th	Annual	Herb	IT	
	<i>Lasiopogon muscoides</i> (Desf.) DC.	Th	Annual	Herb	SA	
	<i>Launaea capitata</i> (Spreng.) Dandy	Th	Annual	Herb	SA	

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Family	Accepted plant name	life form (Raunkiaer)	life spans	duration	Chorotype	No. of taxa
	<i>Launaea mucronata</i> (Forssk.) Muschl.	He	Perennial	Herb	SA	
	<i>Launaea nudicaulis</i> (L.) Hook. f.	He	Perennial	Herb	SA,IT	
	<i>Launaea spinosa</i> (Forssk.) Sch. Bip. Ex Kuntze	Ch	Perennial	shrub	SA	
	<i>Leysera leyserooides</i> (Desf.) Maire	Th	Annual	Herb	SA,SU	
	<i>Nidorella aegyptiaca</i> (L.) J.C.Manning & Goldblatt	Th	Annual	Herb	SU	
	<i>Onopordum ambiguum</i> Fresen.	He	Biennial	Herb	IT,SA	
	<i>Osteospermum vaillantii</i> (Decne.) Norl	Ch	Perennial	Herb	SA,SU	
	<i>Pallenis hierochuntica</i> (Michon) Greuter	Th	Annual	Herb	SA	
	<i>Pallenis spinosa</i> (L.) Cass.	He	Annual / perennial	Herb	ME	
	<i>Phgnalon barbeyanum</i> Asch. & Schweinf	Ch	Perennial	shrub	SA	
	<i>Phgnalon nitidum</i> Fresen.	Ch	Perennial	Herb	IT	
	<i>Phgnalon Sinaicum</i> Bormm. & Kneuck.	Ch	Perennial	shrub	IT	
	<i>Picris cyanocarpa</i> Boiss.	Th	Annual	Herb	SA	
	<i>Pulicaria incisa</i> (Lam.) DC.	Ch	Perennial	Herb	SA,SU	
	<i>Pulicaria inuloides</i> DC.	He	Perennial	Herb	SA	
	<i>Pulicaria undulata</i> (L.) C. A. Mey.	Ch	Perennial	shrub	SA,SU	
	<i>ReiChrdia tingitana</i> (L.) Roth.	Th	Annual	Herb	ME,SA,IT	
	<i>Scorzonera schweinforthii</i> Boiss.	He	Perennial	Herb	SA	
	<i>Senecio flavus</i> (Decne.) Sch. Bip.	Th	Annual	Herb	SA	
	<i>Senecio glaucus</i> L.	Th	Annual	Herb	ME,SA,IT	
	<i>Sonchus asper</i> (L.) Hill	Th	Annual	Herb	ME	
	<i>Sonchus oleraceus</i> L.	Th	Annual	Herb	ME	
	<i>Tanacetum sinaicum</i> (Fresen.) Delile ex K.Bremer & Humphries	Ch	Perennial	shrub	IT	
	<i>Tragopogon porrifolius</i> subsp. porrifolius	Ch	Biennial/ Perennial	Herb	ME	
	<i>Urospermum picroides</i> (L.) F.W. Schmidt.	Th	Annual	Herb	ME,SA,IT	
	<i>Zoegia purpurea</i> Fresen.	Th	Annual	Herb	SA,IT	
Boraginaceae	<i>Alkanna orientalis</i> (L.) Boiss.	Ch	Perennial	Herb	ME,IT	14
	<i>Gastrocotyle hispida</i> (Forssk.) Bunge	Th	Annual	Herb	SA,IT	
	<i>Anchusa milleri</i> Lam. ex Spreng.	Th	Annual	Herb	IT,SA	
	<i>Arnebia decumbens</i> (Vent.) Coss. & Kralik †	Th	Annual	Herb	SA,IT	
	<i>Echium horridum</i> Batt.	Th	Annual / perennial	Herb	ME,SA	
	<i>Heliotropium arbainense</i> Fresen.	Ch	Perennial	sub Shrub	SA	
	<i>Heliotropium bacciferum</i> Forssk.	Ch	Perennial	Herb	SA	
	<i>Heliotropium digynum</i> (Forssk.) Asch. ex C.Chr.	Ch	Perennial	Herb	SA	
	<i>Pseudolappula Sinaica</i> (A.DC.) Khoshokhan, Sherafati & Kaz.Osaloo	Th	Annual	Herb	SA	
	<i>Lappula spinocarpos</i> (Forssk.) Asch. ex Kunze.	Th	Annual	Herb	SA,IT	
	<i>Microparacaryum intermedium</i> (Fresen.) Hilger & Podlech	Th	Annual	Herb	SA,IT	
	<i>Paracaryum rugulosum</i> (DC.) Bosis.	He	Biennial	Herb	IT,SA	

Family	Accepted plant name	life form (Raunkiaer)	life spans	duration	Chorotype	No. of taxa
	<i>Trichodesma africanum</i> (L.) Sm.	Th	Annual	Herb	SA	
	<i>Trichodesma ehrenbergii</i> Schweinf.	He	Annual/ biennial	Herb	SU	
Brassicaceae	<i>Arabis recta</i> Vill.	Th	Annual	Herb	IT	27
	<i>Capsella bursa-pastoris</i> (L.) Medik	Th	Annual	Herb	pluri-regional	
	<i>Carrichtera annua</i> (L.) DC.	Th	Annual	Herb	SA	
	<i>Clypeola jonthlaspi</i> L.	Th	Annual	Herb	ME,IT	
	<i>Cuprella homalocarpa</i> (Fisch. & C.A.Mey.) Salmerón-Sánchez, Mota & Fuertes	Th	Annual	Herb	IT	
	<i>Diplotaxis acris</i> (Forssk.) Boiss.	Th	Annual	Herb	SA	
	<i>Diplotaxis harra</i> (Forssk.) Boiss.	Ch	Perennial	Herb	SA	
	<i>Eruca vesicaria</i> (L.) Cav.	Th	Annual	Herb	ME	
	<i>Farsetia aegyptia</i> Turra	Ch	Perennial	shrub	SU	
	<i>Farsetia longisiliqua</i> Decne.	Ch	Perennial	Herb	SU	
	<i>Hornungia procumbens</i> (L.) Hayek	Th	Annual	Herb	ME,SA,IT	
	<i>Isatis microcarpa</i> J.Gay ex Boiss.	Th	Annual	Herb	SA	
	<i>Lobularia canariensis</i> subsp. <i>marginata</i> (Webb ex Coss.) L.Borgen †	Th	Annual	Herb	IT	
	<i>lepidium draba</i> L.	Th	Annual	Herb	ME,IT	
	<i>Malcolmia africana</i> (L.) R. Br. in W. T. Aiton †	Th	Annual	Herb	SA,IT	
	<i>Matthiola arabica</i> Boiss.	He	Perennial	Herb	SA	
	<i>Matthiola longipetala</i> (Vent.) DC.	Th	Annual	Herb	ME,IT	
	<i>Morettia canescens</i> Boiss.	Ch	Perennial	Herb	ME	
	<i>Moricandia Sinaica</i> (Boiss.) Boiss.	Ch	Perennial	Herb	SA	
	<i>RaPhnus raPhnistrum</i> L.	Th	Annual	Herb	ME,EU	
	<i>Savignya parviflora</i> (Delile) Webb	Th	Annual	Herb	SA	
	<i>Schimpera arabica</i> Hochst. & Steud.	Th	Annual	Herb	SA	
	<i>Schowwia purpurea</i> (Forssk.) Schweinf.	Th	Annual	Herb	SA	
	<i>Sisymbrium erysimoides</i> Desf.	Th	Annual	Herb	ME,IT	
	<i>Sisymbrium irio</i> L.	Th	Annual	Herb	ME,IT	
	<i>Sisymbrium septulatum</i> DC.	Th	Annual	Herb	IT	
	<i>Zilla spinosa</i> (L.) Prrantl	Ch	Perennial	shrub	SA	
Capparaceae	<i>Capparis cartilaginea</i> Decne	Ph	Perennial	shrub	SA	2
	<i>Capparis spinosa</i> L.	Ch	Perennial	shrub	ME,SA,IT	
Caprifoliaceae	<i>PterocPhlus arabicus</i> Boiss.	Ch	Perennial	shrub	Endemic & Steno-endemic	2
	<i>PterocPhlus sanctus</i> Decne.	Ch	Perennial	shrub	IT	
Caryophyllaceae	<i>Arenaria deflexa</i> Decne.	Ch	Perennial	Herb	ME	25
	<i>Bolanthus hirsutus</i> (Labill.) Barkoudah	He	Perennial	Herb	ME	
	<i>Bufonia multiceps</i> Decne.	He	Perennial	Herb	Endemic & Steno-endemic	
	<i>Cerastium dichotomum</i> L. †	Th	Annual	Herb	ME,IT	
	<i>Dianthus libanotis</i> Labill.	Ch	Perennial	Herb	ME,IT	
	<i>Dianthus Sinaicus</i> Boiss.	Ch	Perennial	Herb	IT	

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Family	Accepted plant name	life form (Raunkiaer)	life spans	duration	Chorotype	No. of taxa
	<i>Gymnocarpus decander</i> Forssk.	Ch	Perennial	shrub	SA	
	<i>Gypsophila capillaris</i> (Forssk.) C. Chr.	Ch	Perennial	Herb	IT	
	<i>Gypsophila viscosa</i> Murray	Th	Annual	Herb	IT	
	<i>Eremogone picta</i> (Sm.) Dillenb. & Kadereit	Th	Annual	Herb	IT	
	<i>Paronychia Sinaica</i> Fresen.	He	Perennial	Herb	IT	
	<i>Polycarpaea repens</i> (Forssk.) Asch. & Schweinf.	Th	Annual	Herb	SA,SU	
	<i>Polycarpaea robbairea</i> (Kuntze) Greuter & Burdet	Th	Annual	Herb	SA	
	<i>Pteranthus dichotomus</i> Forssk.	Th	Annual	Herb	SA	
	<i>Gymnocarpus sclerocephalus</i> (Decne.) Dahlgren & Thulin	Th	Annual	Herb	SA	
	<i>Silene arabica</i> Boiss.	Th	Annual	Herb	ME,IT	
	<i>Silene leucophylla</i> Boiss.	He	Perennial	Herb	Endemic & Steno-endemic	
	<i>Silene linearis</i> Decne.	Th	Annual	Herb	SU	
	<i>Silene odontopetala</i> subsp. <i>congesta</i> (Boiss.) Melzh.	He	Perennial	Herb	ME	
	<i>Silene oreoSinaica</i> Chowdhuri	He	Perennial	Herb	Endemic & Steno-endemic	
	<i>Silene schimperiana</i> Boiss.	He	Perennial	Herb	Endemic & Steno-endemic	
	<i>Silene villosa</i> Forssk.	Th	Annual	Herb	SA	
	<i>Spergularia flaccida</i> (Madden) I.M.Turner	Th	Annual	Herb	ME,SA,IT	
	<i>Spergularia diandra</i> (Guss.) Heldr.	Th	Annual	Herb	SA	
	<i>Spergularia marina</i> (L.) Besser	He	Annual / perennial	Herb	ME,IT	
	<i>Stellaria media</i> (L.) Vill.	Th	Annual	Herb	pluri-regional	
Cistaceae	<i>Helianthemum aegyptiacum</i> (L.) Mill.	Th	Annual	Herb	ME,IT	4
	<i>Helianthemum kahircicum</i> Delile	Ch	Perennial	shrub	SA	
	<i>Helianthemum lippii</i> (L.) Dum. Cours.	Ch	Perennial	shrub	SA	
	<i>Helianthemum sancti-antonii</i> Schweinf. ex Boiss.	Ch	Perennial	shrub	SA	
Cleomaceae	<i>Cleome amblyocarpa</i> Barratte & Murb.	Th	Annual	Herb	SA,SU	4
	<i>Cleome arabica</i> L.	Ch	Perennial	shrub	SU	
	<i>Cleome chrysantha</i> Decne.	Ch	Perennial	Herb	SA,SU	
	<i>Cleome droserifolia</i> (Forssk.) Delile	Ch	Perennial	shrub	SU	
Colchicaceae	<i>Colchicum schimperii</i> Janka ex Stef.	Ge	Perennial	Herb	SA	2
	<i>Colchicum ritchii</i> R.Br.	Ge	Perennial	Herb	SA	
Convolvulaceae	<i>Convolvulus arvensis</i> L.	Ge	Annual	Climber	pluri-regional	2
	<i>Cuscuta planiflora</i> Ten.	Pa	Annual	Climber	ME,SA	
Crassulaceae	<i>Umbilicus horizontalis</i> (Guss.) DC.	Ge	Perennial	Herb	ME	1
Cucurbitaceae	<i>Citrullus colocynthis</i> (L.) Schrad.	He	Perennial	Climber	ME,SA,IT	2
	<i>Cucumis prophetarum</i> L.	He	Annual	Climber	SA	
Cyperaceae	<i>Cyperus laevigatus</i> L.	He	Perennial	Herb	ME,IT	4
	<i>Cyperus rotundus</i> L.	Ge	Perennial	Herb	pluri-regional	
	<i>Schoenus nigricans</i> L.	Ha	Perennial	Herb	ME,IT,EU	
	<i>Scirpoides holoschoenus</i> (L.) Soják	He	Perennial	Herb	ME,SA,IT	

Family	Accepted plant name	life form (Raunkiaer)	life spans	duration	Chorotype	No. of taxa
Ephedraceae	<i>Ephedra alata</i> Decne.	Ch	Perennial	shrub	ME,SA	3
	<i>Ephedra foliata</i> Boiss. ex C.A. Mey.	Ph	Perennial	shrub	SU	
	<i>Ephedra pachyclada</i> subsp. <i>sinaica</i> (Riedl) Freitag & Maier-St.	Ph	Perennial	shrub	IT	
Equisetaceae	<i>Equisetum ramosissimum</i> Desf.	He	Perennial	Herb	pluri-regional	1
Euphorbiaceae	<i>Chrozophora oblongifolia</i> (Delile) A.Juss. ex Spreng.	Ch	Perennial	Herb	SU	9
	<i>Euphorbia Chmaepeplus</i> Boiss. & Gaill.	Th	Annual	Herb	SA,IT	
	<i>Euphorbia granulata</i> Forssk.	Th	Annual	Herb	SA	
	<i>Euphorbia helioscopia</i> L.	Th	Annual	Herb	ME	
	<i>Euphorbia hirta</i> L.	Th	Annual	Herb	pluri-regional	
	<i>Euphorbia obovata</i> Decne.	He	Perennial	sub Shrub	Endemic & Steno-endemic	
	<i>Euphorbia peplus</i> L.	Th	Annual	Herb	ME,IT,EU	
	<i>Euphorbia prostrata</i> Aiton.	Th	Annual	Herb	pluri-regional	
	<i>Euphorbia retusa</i> Forssk.	He	Perennial	Herb	SA	
	<i>Euphorbia</i> sp.	Th	Annual	Herb	pluri-regional	
Fabaceae	<i>Alhagi graecorum</i> Boiss.	He	Perennial	shrub	ME,IT	34
	<i>Argyrolobium arabicum</i> (Decne.) Jaub. & Spach	Th	Annual / perennial	Herb	SA	
	<i>Astragalus amalecitanus</i> Boiss.	Ch	Perennial	Herb	IT	
	<i>Astragalus asterias</i> Steven	Th	Annual	Herb	ME,SA	
	<i>Astragalus bombycinus</i> Boiss.	Th	Annual	Herb	SA	
	<i>Astragalus caprinus</i> L.	He	Perennial	Herb	SA	
	<i>Astragalus crenatus</i> Schult.	Th	Annual	Herb	SA,IT	
	<i>Astragalus cretaceus</i> Boiss. & Kotschy	He	Perennial	Herb	IT	
	<i>Astragalus dactylocarpus</i> subsp. <i>acinacifer</i> (Boiss.) E.Ott	He	Perennial	sub Shrub	SA	
	<i>Astragalus echinus</i> DC.	Ch	Perennial	shrub	ME,IT	
	<i>Astragalus eremophilus</i> Boiss.	Th	Annual	Herb	SA	
	<i>Astragalus fruticosus</i> Forssk. †	He	Perennial	Herb/ Subshrub	SA	
	<i>Astragalus palaestinus</i> Eig.	He	Annual / perennial	Herb	ME,IT	
	<i>Astragalus sieberi</i> DC.	Ch	Perennial	sub Shrub	SA	
	<i>Astragalus spinosus</i> (Forssk.) Muschl.	Ch	Perennial	shrub	IT	
	<i>Astragalus tribuloides</i> Delile	Th	Annual	Herb	IT,SA	
	<i>Bituminaria flaccida</i> (Nábelek) Greuter	He	Perennial	Herb	ME	
	<i>Colutea istria</i> Mill.	Ph	Perennial	shrub	IT	
	<i>Crotalaria aegyptiaca</i> Benth.	He	Perennial	shrub	SA	
	<i>Leobordea platycarpa</i> (Viv.) B.-E.van Wyk & Boatwr.	Ge	Annual / perennial	Herb	SA,SU	
	<i>Lotus hebranicus</i> Hochst. ex Brand	He	Perennial	sub Shrub	SA	
	<i>Medicago laciniata</i> (L.) Mill.	Th	Annual	Herb	SA	
	<i>Medicago sativa</i> L.	He	Perennial	Herb	ME,IT	
	<i>Melilotus indicus</i> (L.) All.	Th	Annual	Herb	ME	
	<i>Onobrychis ptolemaica</i> (Delile) DC.	He	Perennial	Herb	SA	
	<i>Ononis sicula</i> Guss.	Th	Annual	Herb	ME,SA,IT	

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	<i>Retama raetam</i> (Forssk.) Webb. & Berthel.	Ph	Perennial	shrub	SA	
	<i>Senna alexandrina</i> Mill.	He	Perennial	shrub	SU	
	<i>Senna italica</i> Mill.	He	Perennial	sub Shrub	SU	
	<i>Tephrosia purpurea</i> subsp. <i>leptostachya</i> (DC.) Brummitt	Ch	Perennial	Herb	SA	
	<i>Vachellia tortilis</i> subsp. <i>raddiana</i> (Savi) Kyal. & Boatwr.	Ph	Perennial	tree	SA,SU	
	<i>Vachellia tortilis</i> subsp. <i>tortilis</i>	Ph	Perennial	tree	SA,SU	
	<i>Vicia articulata</i> Hornem	Th	Annual	Herb	ME	
	<i>Vicia monantha</i> Retz.	Th	Annual	Herb	SA	
Gentianaceae	<i>Centaurium pulchellum</i> (Sw.) Hayek ex Hand-Mazz., Stadlm., Janch. & Faltis	Th	Annual	Herb	ME,IT	1
Geraniaceae	<i>Erodium cicutarium</i> (L.) L'Her.	Th	Annual	Herb	ME,IT	4
	<i>Erodium crassifolium</i> L'Her.	He	Perennial	Herb	SA	
	<i>Erodium laciniatum</i> (Cav.) Willd.	Th	Annual	Herb	ME	
	<i>Geranium molle</i> L.	Th	Annual	Herb	ME	
Hypericaceae	<i>Hypericum Sinaicum</i> Hochst. ex Boiss	Ch	Perennial	Herb	IT	1
Juncaceae	<i>Juncus acutus</i> L.	He	Perennial	Herb	ME,IT	4
	<i>Juncus bufonius</i> L.	Th	Annual	Herb	ME,IT	
	<i>Juncus punctorius</i> L.f.	He	Perennial	Herb	SA	
	<i>Juncus rigidus</i> Desf.	He	Perennial	Herb	IT,SA	
Lamiaceae	<i>Ajuga Chmaepitys</i> subsp. <i>tridactylites</i> (Ging. ex Benth.) P.H.Davis	He	Perennial	Herb	IT	26
	<i>Ballota kaiseri</i> Täckh	He	Perennial	shrub	Endemic & Steno-endemic	
	<i>Ballota saxatilis</i> Sieber ex C.Presl	He	Perennial	shrub	ME,IT	
	<i>Clinopodium barbatum</i> (P.H.Davis) Melnikov	Ch	Perennial	shrub	ME	
	<i>Lamium amplexicaule</i> L.	Th	Annual	Herb	ME,IT	
	<i>Lavandula coronopifolia</i> Poir.	Ch	Perennial	shrub	SA,SU	
	<i>Lavandula pubescens</i> Decne.	He	Perennial	shrub	ME,SA	
	<i>Mentha longifolia</i> var. <i>schimperii</i> (Briq.) Briq.	He	Perennial	Herb	ME,IT	
	<i>Micromeria serbaliana</i> Danin & Hedge	He	Perennial	Herb	Endemic & Steno-endemic	
	<i>Micromeria Sinaica</i> Benth.	Ch	Perennial	shrub	SA	
	<i>Nepeta septemcrenata</i> Ehrenb. ex Benth.	Ch	Perennial	shrub	ME,SA	
	<i>Origanum syriacum</i> subsp. <i>sinaicum</i> (Boiss.) Greater & Burdet	Ch	Perennial	shrub	Endemic & Steno-endemic	
	<i>Ostostegia fruticosa</i> subsp. <i>schimperii</i> (Benth.) Sebald	Ch	Perennial	shrub	SA	
	<i>Phlomis aurea</i> Decne.	Ch	Perennial	shrub	Endemic & Steno-endemic	
	<i>Pseudodictamnus undulatus</i> (Benth.) Salmaki & Siadati	Ch	Perennial	shrub	ME	
	<i>Salvia aegyptiaca</i> L.	Ch	Perennial	sub Shrub	SA,IT	
	<i>Salvia deserti</i> Decne.	He	Perennial	sub Shrub	SA	
	<i>Salvia lanigra</i> Poir.	Ch	Perennial	Herb	ME,SA	
	<i>Salvia multicaulis</i> Vahl	Ch	Perennial	shrub	IT	
	<i>Salvia sclarea</i> L.	He	Perennial	Herb	ME,IT	

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	<i>Salvia spinosa</i> L.	He	Perennial	Herb	IT	
	<i>Stachys aegyptiaca</i> Pers.	Ch	Perennial	shrub	ME,SA,IT	
	<i>Teucrium leucocladum</i> Boiss.	Ch	Perennial	shrub	SA	
	<i>Teucrium polium</i> L.	Ch	Perennial	shrub	ME,IT	
	<i>Thymus decussatus</i> Benth.	Ch	Perennial	shrub	SA	
	<i>Ziziphora tenuior</i> L.	Th	Annual	Herb	SA	
Malvaceae	<i>Abutilon fruticosum</i> Guill. & Perr.	Ch	Perennial	shrub	SA	5
	<i>Alcea acaulis</i> (Cav.) Alef.	Ch	Perennial	Herb	ME	
	<i>Alcea striata</i> (DC.) Alef.	He	Perennial	Herb	IT	
	<i>Malva neglecta</i> Wallr.	Th	Annual	Herb	ME,IT	
	<i>Malva parviflora</i> L.	Th	Annual	Herb	ME,IT	
Menispermaceae	<i>Cocculus pendulus</i> (J.R.Forst. & G.Forst.) Diels	Ph	Perennial	Climber	SA	1
Moraceae	<i>Ficus carica</i> L.	Ph	Perennial	tree	ME,IT	
	<i>Ficus palmata</i> Forssk.	Ph	Perennial	shrub	SU	2
Moringaceae	<i>Moringa peregrina</i> (Forssk.) Fiori	Ph	Perennial	tree	SU	1
Neuradaceae	<i>Neurada procumbens</i> L.	Th	Annual	Herb	SA	1
Nitrariaceae	<i>Peganum harmala</i> L.	He	Perennial	shrub	IT,SA	1
Oleaceae	<i>Olea europaea</i> L.	Ph	Perennial	tree	ME	1
Orobanchaceae	<i>Cistanche salsa</i> (C.A.Mey.) Beck	Pa	Perennial	Herb	IT	5
	<i>Cistanche phelypaea</i> (L.) Cout.	Pa	Perennial	Herb	ME,SA,IT	
	<i>Orobanche cernua</i> Loefl.	Pa	Annual	Herb	ME,SA,IT	
	<i>Orobanche palaestina</i> Reuter	pa	Annual	Herb	ME	
	<i>Lindenbergia indica</i> (L.) Vatke.	Ch	Perennial	shrub	SA	
Oxalidaceae	<i>Oxalis corniculata</i> L.	Th	Annual	Herb	pluri-regional	1
Papaveraceae	<i>Fumaria parviflora</i> Lam.	Th	Annual	Herb	ME,IT	8
	<i>Glaucium arabicum</i> Fresen.	He	Annual	Herb	IT	
	<i>Glaucium flavum</i> Crantz.	He	Perennial	shrub	ME	
	<i>Hypecoum pendulum</i> L.	Th	Annual	Herb	ME,IT	
	<i>Papaver decaisnei</i> Hochst. & Steud. ex Elkan	Th	Annual	Herb	IT	
	<i>Papaver dodecandrum</i> (Forssk.) Medik.	Th	Annual	Herb	ME,IT	
	<i>Papaver somniferum</i> L.	He	Annual	Herb	pluri-regional	
	<i>Roemeria hybrida</i> subsp. <i>dodecandra</i> (Forssk.)Maire	Th	Annual	Herb	ME,IT	
Phyllanthaceae	<i>Andrachne aspera</i> Spreng.	Ch	Perennial	Herb/ Subshrub	SA	1
Plantaginaceae	<i>Anarrhinum forskaohlii</i> subsp. <i>pubescens</i> D.A.Sutton	He	Perennial	shrub	Endemic & Steno-endemic	19
	<i>Globularia arabica</i> Jaub. & Spach	Ch	Perennial	shrub	SA	
	<i>Nanorrhinum acerbianum</i> (Boiss.) Betsche	He	Annual / perennial	Herb	SA	
	<i>Nanorrhinum scoparium</i> (Brouss. ex Spreng.) Yousefi & Zarre	Ch	Perennial	Herb	SA,SU	
	<i>Plantago afra</i> L.	Th	Annual	Herb	ME,SA,IT	
	<i>Plantago amplexicaulis</i> Cav.	Th	Annual	Herb	ME,SA,IT	

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	<i>Plantago ciliata</i> Desf.	Th	Annual	Herb	SA,IT	
	<i>Plantago cylindrica</i> Forssk.	Th	Annual / perennial	Herb	SA	
	<i>Plantago major</i> L.	Th	Annual	Herb	SA,IT,EU	
	<i>Plantago ovata</i> Forssk.	Th	Annual	Herb	ME,SA,IT	
	<i>Plantago sinaica</i> (Barnéoud) Decne.	Ch	Perennial	shrub	IT	
	<i>Plantago squarrosa</i> Murray.	Th	Annual	Herb	ME	
	<i>Veronica anagallis-aquatica</i> L.	He	Perennial	Herb	pluri-regional	
	<i>Veronica catenata</i> subsp. <i>pseudocatenata</i> Chrtek & Osb.-Kos.	He	Perennial	Herb	ME,EU	
	<i>Veronica kaiseri</i> Täckh.	He	Perennial	Herb	Endemic & Steno-endemic	
	<i>Veronica rubrifolia</i> subsp. <i>respectatissima</i> M.A. Fisch	Th	Annual	Herb	SA	
Plumbaginaceae	<i>Limonium lobatum</i> (L.f.) Chz.	Th	Annual	Herb	SA	3
	<i>Limonium pruinosum</i> (L.) Chz.	Ch	Perennial	Herb	SA	
	<i>Limonium sinuatum</i> (L.) Mill.	He	Perennial	Herb	ME	
Poaceae	<i>Aegilops crassa</i> Boiss.	Th	Annual	Herb	IT	46
	<i>Achnatherum parviflorum</i> (Desf.) M.Nobis	He	Perennial	Herb	IT	
	<i>Aristida adscensionis</i> L.	Th	Annual / perennial	Herb	SA,SU	
	<i>Arundo donax</i> L.	Ph	Perennial	reeds	ME,IT	
	<i>Avena barbata</i> Pott ex Link	Th	Annual	Herb	ME	
	<i>Avena fatua</i> L.	Th	Annual	Herb	ME	
	<i>Bromus pumilio</i> (Trin.) P.M.Sm.	Th	Annual	Herb	ME,IT,EU	
	<i>Brachypodium distachyon</i> (L.) P.Beauv.	Th	Annual	Herb	ME,IT	
	<i>Bromus tectorum</i> L.	Th	Annual	Herb	ME,IT,EU	
	<i>Bromus catharticus</i> Vahl	Th	Annual / perennial	Herb	ME,IT	
	<i>Bromus pectinatus</i> Thunb.	Th	Annual	Herb	ME,IT	
	<i>Cutandia dichotoma</i> (Forssk.) Trab. †	Th	Annual	Herb	SA,IT	
	<i>Cynodon dactylon</i> (L.) Pers.	He	Perennial	Herb	pluri-regional	
	<i>Dactyloctenium aegyptium</i> (L.) Willd.	Th	Annual	Herb	pluri-regional	
	<i>Digitaria ciliaris</i> (Retz.)Koeler	Th	Annual	Herb	TROPICAL	
	<i>Digitaria sanguinalis</i> (L.) Scop.	Th	Annual	Herb	pluri-regional	
	<i>Echinochloa colonum</i> (L.) Link	Th	Annual	Herb	SA	
	<i>Eragrostis barrelieri</i> Daveau	Th	Annual	Herb	ME,SA	
	<i>Hordeum marinum</i> Huds.	Th	Annual	Herb	ME,IT	
	<i>Hyparrhenia hirta</i> (L.) Stapf	Ch	Perennial	Herb	ME,SA,IT	
	<i>Imperata cylindrica</i> (L.) P.Beauv.	He	Perennial	Herb	ME,SA,IT	
	<i>Lasiurus scindicus</i> Henrard	He	Perennial	Herb	SA	
	<i>Lolium rigidum</i> Gaudin	Th	Annual	Herb	ME,IT	
	<i>Lygeum spartum</i> Loefl. ex L.	He	Perennial	Herb	ME	
	<i>Melanocenchris abyssinica</i> (R. Br. ex Fresen.) Hochst. †	Th	Annual	Herb	SA	
	<i>Melica persica</i> Kunth.	He	Perennial	Herb	ME,IT	
	<i>Oloptum miliaceum</i> (L.) Röser & Hamasha	He	Perennial	Herb	ME,IT	

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	<i>Panicum turgidum</i> Forssk.	Ge	Perennial	Herb	ME,SA,IT	
	<i>Phlaris minor</i> Retz.	Th	Annual	Herb	ME,IT	
	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	He	Perennial	reeds	pluri-regional	
	<i>Piptatherum holciforme</i> (M.Bieb.) Roem. & Schult.	He	Perennial	Herb	ME,IT	
	<i>Poa sinaica</i> Steud.	He	Perennial	Herb	IT	
	<i>Polypogon monspeliensis</i> (L.) Desf.	Th	Annual	Herb	ME,SA,IT	
	<i>Schismus barbatus</i> (L.) Thell.	Th	Annual	Herb	SA,IT,EU	
	<i>Setaria verticillata</i> (L.) P. Beauv.	Th	Annual	Herb	pluri-regional	
	<i>Setaria viridis</i> (L.) P. Beauv.	Th	Annual	Herb	ME,IT	
	<i>Sorghum virgatum</i> (Hack.) Stapf	Ch	Annual	Herb	IT,SA,ME,SU	
	<i>Stipa arabica</i> Trin. & Rupr.	He	Perennial	Herb	IT	
	<i>Stipellula capensis</i> (Thunb.) Röser & Hamasha	Th	Annual	Herb	IT,SA	
	<i>Stipagrostis ciliata</i> (Desf.) De Winter	He	Perennial	Herb	SA	
	<i>Stipagrostis plumosa</i> (L.) Munro ex T.Anderson	He	Perennial	Herb	IT,SA	
	<i>Stipagrostis raddiana</i> (Savi) De Winter	He	Perennial	Herb	SA	
	<i>Taeniatherum caput-medusae</i> (L.) Nevski.	Th	Annual	Herb	IT	
	<i>Tetrapogon villosus</i> Desf.	Ge	Perennial	Herb	SA	
	<i>Tricholaena teneriffae</i> (L. f.) Link	Ge	Perennial	Herb	ME,SA,IT	
Polygalaceae	<i>Polygala Sinaica</i> Botsch.	Ch	Perennial	shrub	Endemic & Steno-endemic	1
Polygonaceae	<i>AtraPhxis spinosa</i> L.	Ch	Perennial	shrub	IT	3
	<i>Calligonum comosum</i> L'Hér.	Ph	Perennial	shrub	SA,IT	
	<i>Rumex vesicarius</i> L.	Th	Annual	Herb	ME,SA,IT	
Portulacaceae	<i>Portulaca oleracea</i> L.	Th	Annual	Herb	pluri-regional	1
Primulaceae	<i>Lysimachia arvensis</i> (L.) U.Manns & Anderb.	Th	Annual	Herb	ME,IT	
	<i>Primula involucrata</i> (Raf.) Link & Otto ex Sweet	He	Perennial	Herb	Endemic & Steno-endemic	2
Pteridaceae	<i>Adiantum capillus-veneris</i> L.	He	Perennial	Herb	ME,IT	
	<i>Heionitis pteridioides</i> (ReiChrd) Christenh. †	He	Perennial	Herb	ME	2
Resedaceae	<i>Caylusea hexagyna</i> (Forssk.) M. L. Green.	Th	Annual / perennial	Herb	SU	6
	<i>Ochradenus baccatus</i> Delile	Ph	Perennial	shrub	SU	
	<i>Oligomeris linifolia</i> (Vahl ex Hornem.) J.F.Macbr.	Th	Annual	Herb	SU	
	<i>Reseda muricata</i> C. Presl	Ch	Perennial	Herb	SA	
	<i>Reseda pruïnosa</i> Delile	He	Annual	Herb	IT,SA	
	<i>Reseda stenostachya</i> Boiss.	Ch	Annual	Herb	SA	
Rhamnaceae	<i>Rhamnus disperma</i> Ehrenb. ex Boiss.	Ph	Perennial	shrub	SA	2
	<i>Ziziphus spina-christi</i> (L.) Desf.	Ph	Perennial	tree	SU	
Rosaceae	<i>Cotoneaster orbicularis</i> Schltdl.	Ph	Perennial	shrub	SA	4
	<i>Crataegus x sinaica</i> Boiss.	Ph	Perennial	tree	ME,IT	
	<i>Rosa arabica</i> (Crép. ex Boiss.) Déségl.	Ph	Perennial	shrub	Endemic & Steno-endemic	

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Rubiaceae	<i>Rubus creticus</i> Tourn. ex L.	Ph	Perennial	shrub	ME,IT	8
	<i>Callipeltis cucullaris</i> (L.) DC. †	Th	Annual	Herb	ME,SA,IT	
	<i>Crucianella ciliata</i> Lam.	Th	Annual	Herb	IT	
	<i>Galium aparine</i> L.	Th	Annual	Herb	ME,IT	
	<i>Galium ceratopodum</i> Boiss.	Th	Annual	Herb	ME	
	<i>Galium setaceum</i> Lam.	Th	Annual	Herb	IT	
	<i>Galium sinaicum</i> (Delile ex Decne.) Boiss.	Ch	Perennial	Herb	ME,SA,IT	
Rutaceae	<i>Kohautia caespitosa</i> subsp. caespitosa	Th	Annual / perennial	Herb	SA,SU	1
	<i>Plocama calycoptera</i> (Decne.) M.Backlund & Thulin	Ch	Perennial	shrub	SA	
	<i>Haplophyllum tuberculatum</i> (Forssk.) A.Juss.	Ch	Perennial	Herb	SA	
Salicaceae	<i>Salix mucronata</i> Thunb.	Ph	Perennial	tree	ME,IT	1
Scrophulariaceae	<i>Scrophularia deserti</i> Delile.	He	Perennial	Herb	SA	6
	<i>Scrophularia libanotica</i> Boiss.	He	Perennial	Herb	ME	
	<i>Scrophularia xanthogolssa</i> Boiss.	Ch	Perennial	Herb	ME,IT	
	<i>Verbascum decaisneanum</i> Kuntze	Ch	Perennial	Herb	SA	
	<i>Verbascum sinaiticum</i> Benth.	He	Biennial	Herb	ME,SA,IT	
	<i>Verbascum sinuatum</i> L.	He	Biennial	Herb	ME,IT	
Solanaceae	<i>Datura ferox</i> L.	Th	Annual	Herb	SubT	12
	<i>Datura innoxia</i> Mill.	Th	Annual	Herb	pluri-regional	
	<i>Hyoscyamus boveanus</i> (Dunal) Asch. & Schweinf.	He	Perennial	Herb	Endemic & Steno-endemic	
	<i>Hyoscyamus desertorum</i> (Asch. Ex Boiss.) Täckh.	He	Annual	Herb	ME	
	<i>Hyoscyamus muticus</i> L. †	He	Perennial	shrub	SA,IT	
	<i>Hyoscyamus pusillus</i> L.	Th	Annual	Herb	IT	
	<i>Lycium shawii</i> Roem. & Schult.	Ph	Perennial	shrub	SA,SU	
	<i>Nicotiana glauca</i> Graham	Ph	Perennial	shrub	pluri-regional	
	<i>Solanum nigrum</i> L.	He	Annual	Herb	ME,IT	
	<i>Solanum villosum</i> Mill.	Ch	Perennial	Herb	SA	
Tamaricaceae	<i>Withania somnifera</i> (L.) Dunal	Ch	Perennial	shrub	ME,IT	3
	<i>Reaumuria alternifolia</i> (Labill.)Britten	Ch	Perennial	shrub	IT,SA	
	<i>Tamarix aphylla</i> (L.) H. Karst.	Ph	Perennial	tree	SU	
TyPhceae	<i>Tamarix nilotica</i> (Ehrenb.) Bunge	Ph	Perennial	tree	SA	1
	<i>TyPh domingensis</i> Pers.	Ha	Perennial	Herb	ME,SA,IT	
Urticaceae	<i>Forsskaolea tenacissima</i> L.	Ch	Perennial	shrub	SA,SU	2
	<i>Parietaria alsinifolia</i> Delile	Th	Annual	Herb	SA,IT	
Verbenaceae	<i>Phyla nodiflora</i> (L.) Greene.	He	Perennial	Herb	ME,TOPICAL	1
Zygophyllaceae	<i>Tribulus pentandrus</i> Forssk.	Th	Annual	Herb	SA,SU	7
	<i>Tribulus terrestris</i> L.	Th	Annual	Herb	ME,IT	
	<i>Zygophyllum arabicum</i> (L.) Christenh. & Byng	Ch	Perennial	sub Shrub	SA	
	<i>Zygophyllum bruguieri</i> (DC.) Christenh. & Byng	He	Perennial	sub Shrub	SA,IT	

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Family	Accepted plant name	life form (Raunkiaer)	life spans	duration	Chorotype	No. of taxa
	<i>Zygophyllum coccineum</i> L.	Ch	Perennial	shrub	SA	
	<i>Zygophyllum molle</i> (Delile) Christenh. & Byng	Ch	Perennial	sub Shrub	SA	
	<i>Zygophyllum simplex</i> L.	Th	Annual / biennial	Herb	SA,SU	