
Floristic study of Dalab woodlands, north-east of Ilam province, west Iran

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Abstract

The present survey deals with the floristic study of Dalab Woodlands, located in Manesht and Ghelarang protected area, western Iran. It covers an area of 4335 ha. In total, 224 vascular plant species belonging to 46 families and 156 genera were identified. The largest families are Asteraceae (29 species), Fabaceae (23 species), Poaceae (22 species), and Apiaceae (18 species). *Astragalus* (13 species), *Centaurea* (9 species), *Onosma* (6 species), *Bromus* (5 species) and *Amygdalus* (3 species) are the most diverse genera of the region. The life form spectrum includes: hemichryptophytes (36.6 %), therophytes (33 %), cryptophytes (13.8 %), chamaephytes (8.9 %) and phanerophytes (7.6 %). From the chorological point of view, the largest proportion of the flora belongs to the Irano-Turanian (68.7 %) elements. About 22.32 % of the Dalab Woodlands species are endemic to Iran and six rare species including *Alrawia bellii*, *Arum giganteum*, *Cousinia cylindracea*, *Echinops kotschyi*, *Thymbra spicata* and *Zeugandra iranica* are also identified in this region.

Keywords: Flora; plant species; life form; Dalab woodlands; Ilam

1. Introduction

Zagros forests cover a vast area of the Zagros Mountain ranges (ca. 5 million hectares), about 40 % of Iran's forests [1-3]. Geographically this important natural ecosystem has been divided into three parts: northern, central and southern Zagros [4]. The central Zagros (including Ilam, Lorestan, and Kermanshah and Hamadan provinces) is globally significant for protection of ecosystems, species and genetic biodiversity. Extreme relief and climatic conditions have led to a great diversity of ecosystems and habitats over small geographical areas. In turn, this has created a home for a vast range of plant and animal species, especially several endemic and endangered species [5]. Unfortunately the entire Zagros forest and its vulnerable ecosystem is degraded by various factors, especially overexploitation caused by poverty, shortage of regional development opportunities, low literacy rate and high dependence of residents on forest resources for daily life.

Floristic survey of an area is an essential tool for identifying the floristic composition, particularly endemic, resistant and endangered species [6]. Gathering the knowledge is the first step toward

determining the potential and production potential of a region, increasing the density of vegetation [7], managing ecosystems for long term viability and sustainability, and preventing the destruction of habitats [8-15]. The present study aimed to identify the floristic composition, life forms, and chorology of Dalab Woodlands flora (North East of Ilam Province, Iran). The result provides an overview of biodiversity among vascular plants of western Iran with special emphasis to flora, life-forms and chorology.

2. Material and methods

Dalab forested region, with a 4335 ha area is located in Manesht and Ghelarang protected area, northeast of Ilam province, in the west of Iran. This region is situated between 46° 20' 56" and 46° 27' 37" East longitude and 33° 40' 20" to 33° 45' 20" North latitude. This region is limited with the Dalab River from the south, Manesht Mountains from the east, Bankul Mountains from the north and Sharah Zool Mountains from the west (Fig. 1). The altitude in this region varies from 320 m in the north to 2650 m in the west. According to available data from the nearest climatic station to the Dalab woodlands [16], the mean annual precipitation is 560.75 mm, the mean maximum annual

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temperature of the warmest month is 22° C (in July), the mean minimum annual temperature of the coldest month is 6.3 ° C (in January) and the average relative humidity of the region is 47%. The greatest number of frost days (14 days) is measured in January. The plant samples were collected by walking in June 2012. They were identified using available literature [17-22] and deposited into the herbarium of the University of Ilam (Faculty of Agriculture). The vascular flora of the region was recorded in 696 relives based on the Braun-Blanquet approach [23]. The life forms were recognized on the basis of the Raunkiaer's classification. The endemic species were determined according to Red data book of Iran [24, 25]. The phytocorya distribution of plants followed Zohary, Takhtajan and Leonard [26, 27]. The floristic list of the region is presented in Table 1. The abbreviations used in the text and the floristic list are as follows: Th: therophyte, Ch: chamaephyte, Ph: phanerophyte, Cr: cryptophyte, IT: Irano-Turanian, ES: Euro-Siberian, SS: Saharo-Sindian, Med: Mediterranean, Cosm: cosmopolitan, Endm: endemic.

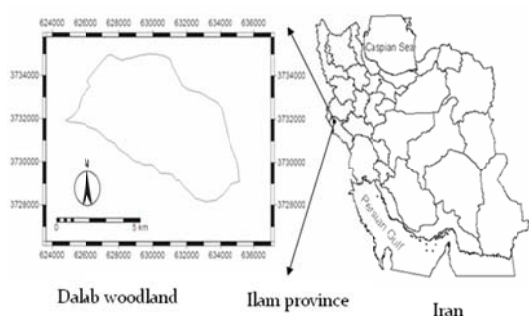


Fig. 1. Map of the Dalab Woodlands and the location in Iran

3. Results and discussion

3.1. Flora

In the present survey a total of 224 species belonging to 46 families and 156 genera have been identified. Asteraceae (17 genera/29 species) is the most common angiosperm family in the region, followed by Fabaceae (8 genera/23 species), Poaceae (8 genera/22 species), Apiaceae (genera10/18 species), Boraginaceae (6 genera/15 species), Laminaceae (8 genera /12 species), Rosaceae (4 genera/7 species), Brassicaceae (genera 6/6 species) and Liliaceae (5 genera/6 species) (Fig. 2). This shows that the representatives of Astraceae are adapted to the semiarid conditions and based on the previous studies great diversity among species of some families such as Astraceae is accompanied by

destruction of the area [28, 29]. There are 120 genera with 1 species, 23 genera with 2 species, 7 genera with 3 species and some individual genera with 4, 5, 6, 9 and 13 species. *Astragalus* (with 13 species) is the largest genus in the Dalab Woodlands then *Centaurea* (9), *Onosma* (6), *Bromus* (5) and *Amygdalus* (3) are in the next order.

3.2. Life forms

Life-form categories were determined on the basis of the Raunkiaer's classification [30]. The life form spectrum of plant species is as follows: hemichryptophytes 36.6 %, therophytes 33 %, cryptophytes 13.8 %, chamaephytes 8.9 % and phanerophytes 7.6 % (Fig. 3).

Hemichryptophytes were the dominant life form in this area (36.6 %) followed by therophytes (33 %). The most dominant hemichryptophytes belong to the families Astraceae (14 species), Fabaceae (7 species), Boraginaceae (6 species), Laminaceae (6 species) and Poaceae (5 species). Therophytes are the second dominant life forms. The helophyte species mainly belong to family Astraceae (10 species), Poaceae (7 species) and Fabaceae (5 species).

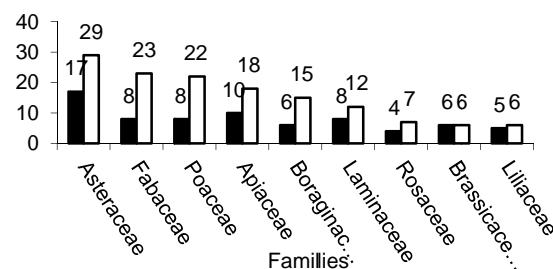


Fig. 2. The number of genera (■) and species (□) in each family

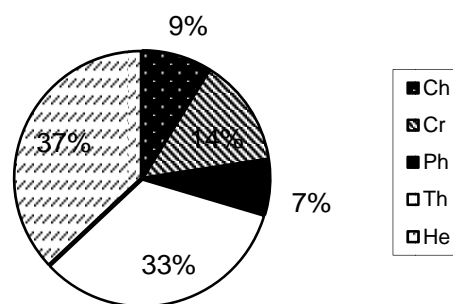


Fig. 3. The proportion of the life forms of species in Dalab Woodlands

Since the life form classification is essentially based on plant reaction to extremes of climate, it clearly reflects the adaptation of plant to environmental factors, especially climatic condition [30]. According to Mobayen, [31] the frequency of two life forms (hemichryptophytes and therophytes)

indicates the effect of the two types of Mediterranean and cold temperate climates. Hemicryptophytic species are adapted to the conditions of a particular area and develop different ways to survive, especially for reserving water, using ground water, reducing their water need by losing their leaves, reduction of vegetative growth [32] and producing their vegetative parts underground during difficult conditions. Therophytes are resistant to low rainfall and continuous drought. They finish their life cycle in a short time [33] and spend vegetative period in the form of seed [34]. According to Naqinezhad et al. (2010) [35] the presence of therophytes as second dominant life forms of the region can be partly explained by the seasonal character of water supply that supports the annual plants.

Most of the cryptophytes of the region belong to Liliaceae (7 species), Apiaceae (4), Poaceae and Geraniaceae (3 species) and Araceae (2 species) families. The chamaephytes in the region mostly belong to Fabaceae (7 species) and Plumbaginaceae (2 species) families, while most of the phanerophyte species of the region belong to Rosaceae (7 species). The low percentage of cryptophytes (being less tolerant with heat stress and drought), chamaephytes and phanerophytes indicate that these plants are not adapted to the existing climate and edaphic conditions. According to Asri, each plant species has its specific ecological area with a known tolerance to life conditions of area, and the geographical distribution of plant species depends on the life conditions of the particular area and adaptation of the plants to the site conditions [34].

3. 3. Phytogeography

The phytogeographical elements include Irano-Turanian (68.7 %), Irano-Turanian/Euro-Siberian (12.9 %), Irano-Turanian/Mediterranean (6.5 %), Irano-Turanian/Euro-Siberian/Saharo-Sindian (2.2 %), Irano-Turanian/Saharo-Sindian (2.2 %), Irano-Turanian/Euro-Siberian/Mediterranean) 2.2 %, Euro-Siberian/Mediterranean, Irano-Turanian/Saharo-Sindian/Mediterranean (1.3 %) and cosmopolitan (2.7 %) (Fig. 4). The phytocorya distribution of plants reflects the climate conditions. Dalab Woodlands with 68.7 % Irano-Touranian species belong to the Irano-Touranian region, characterized by low rainfall and a long dry season. This result is identical to that of Khan-Gormaz protected area in Hamedan province [32]. Irano-Turanian species of this region mostly belong to Fabaceae (18 species), Astraceae (15 species) and Poaceae (10 species) families. Examples of Irano-Turanian species are *Astragalus abnormalis*, *Centaurea irritans* and *Bromus erectus*. Most Irano-Turanian/Euro-Siberian species belong to Asteraceae (3 species), Laminaceae (3 species), Boraginaceae, Poaceae, Caryophyllaceae, and Rosaceae (each with 2 species) families. Some examples of Irano-Turanian/Euro-Siberian species are *Helianthemum salicifolium*, *Mentha longifolia*, *Heliotropium europaeum*, *Bromus tectorum*, *Minuartia meyeri* and *Cerasus microcarpa*.

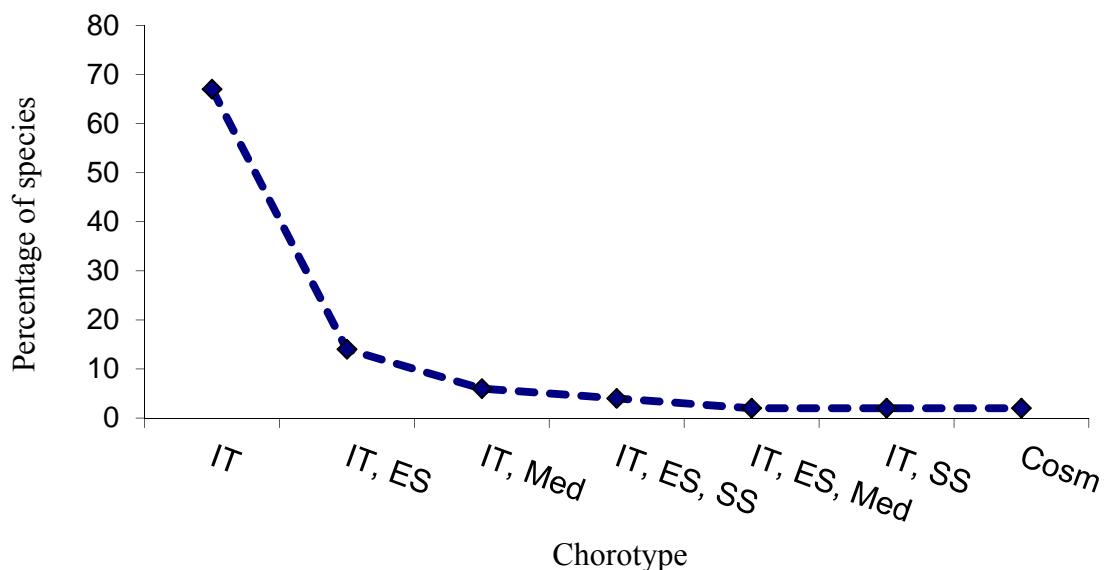


Fig 4. The percentage of phytocorya of species in Dalab Woodlands

3. 4. Iranian endemics of the regions

The Zagros Mountains are one of the four main centers of endemism [24] which are characterized by a very autochthonous rich flora with high number of endemic species [36]. In total, 50 endemic species (Table 1) were identified in Dalab Woodlands region, which constitute the most valuable floristic elements of this region. Most of the endemic species of the region belong to Fabaceae (8 species) family followed by Astraceae (4), Boraginaceae, Lamiaceae, Apiaceae (3 species in each), Rosaceae and Scrophulariaceae (2 species in each) are the next. Some of the identified genera contain a relatively high proportion of endemic species. The highest proportion of

endemic species belong to *Astragalus* (with 6 species) followed by *Amygdalus* (2), *Centaurea* (2), *Cousinia* (2), *Onosoma* (2) genera. Among the endemic species, six rare species, including: *Alrawia bellii*, *Arum giganteum*, *Cousinia cylindracea*, *Echinops kotschy*, *Thymra spicata* and *Zeugandra iranica* were also identified (Table 1). The result of the present floristic study revealed that the vascular plant flora in the Dalab Woodlands is rich in species and contains numerous endemic and rare species. However, most of the endemic and rare species are severely threatened by human disturbances. Therefore, conservation and protection management policies have to be applied to the Dalab Woodlands vegetation.

Table 1. The floristics of the list of Dalab woodlands in Ilam Province

No.	Species	Life form	Chorotype	Endm	Family
1	<i>Acantholimon blakelockii</i> Mobayen	Ch	IT	*	Plumbaginaceae
2	<i>Acantholimon bromifolium</i> Boiss var. <i>bromifolium</i>	Ch	IT	*	Plumbaginaceae
3	<i>Acanthophyllum crassifolium</i> Boiss.	Ch	IT	*	Caryophyllaceae
4	<i>Acer monspessulanum</i> L. subsp. <i>cinerascens</i> (Boiss.) Yaltirik.	Ph	IT		Aceraceae
5	<i>Achillea wilhelmsii</i> C. Koch.	He	IT/ES/SS		Astraceae
6	<i>Aegilops triuncialis</i> L.	Th	IT		Poaceae
7	<i>Aethionema elongatum</i> Boiss.	He	IT		Brassicaceae
8	<i>Agropyrum trichophorum</i> (Link) Richter	Cr	ES/Med		Poaceae
9	<i>Allium stamineum</i> Boiss.	Cr	IT		Liliaceae
●10	<i>Alrawia bellii</i> (Baker) K. persson & Wendelbo	Cr	IT	*	Liliaceae
11	<i>Alyssum marginatum</i> Steud. ex Boiss.	Th	IT		Brassicaceae
12	<i>Amygdalus lycioides</i> Spach.	Ph	IT	*	Rosaceae
13	<i>Amygdalus orientalis</i> Duh.	Ph	IT		Rosaceae
14	<i>Amygdalus scoparia</i> Spach.	Ph	IT	*	Rosaceae
15	<i>Anagallis arvensis</i> L.	Th	Cosm		Primulaceae
16	<i>Anthemis haussknechtii</i> Boiss & Reut. var. <i>Haussknechtii</i>	Th	IT		Astraceae
17	<i>Aristolochia bottae</i> Jaub. & Spach	He	IT		Aristolochiaceae
18	<i>Aristolochia olivieri</i> Collegno	He	IT	*	Aristolochiaceae
19	<i>Artemisia haussknechtii</i> Boiss.	Ch	IT		Astraceae
20	<i>Arum conophalloides</i> Ky. ex Schott.	Cr	IT		Araceae
●21	<i>Arum giganteum</i> A. Ghahreman.	Cr	IT	*	Araceae
22	<i>Astragalus abnormalis</i> (Rech. F.)	He	IT	*	Papilionaceae
23	<i>Astragalus adscendens</i> Boiss. & Hausskn.	Ch	IT	*	Papilionaceae
24	<i>Astragalus curvirosteris</i> Boiss.	He	IT		Papilionaceae
25	<i>Astragalus ecbatanus</i> Bunge.	Ch	IT	*	Papilionaceae
26	<i>Astragalus fasciculifolius</i> Boiss.	Ch	IT	*	Papilionaceae
27	<i>Astragalus ferruminatus</i> Massoumi	Ch	IT	*	Papilionaceae
28	<i>Astragalus gossypinus</i> Fisch.	Ch	IT		Papilionaceae
29	<i>Astragalus iranicus</i> Bunge.	He	IT		Papilionaceae
30	<i>Astragalus kirrindicus</i> Boiss. & Noe	He	IT		Papilionaceae
31	<i>Astragalus neo-mozaffariani</i> Massomi	Ch	IT		Papilionaceae
32	<i>Astragalus ovinus</i> Boiss.	He	IT	*	Papilionaceae
33	<i>Astragalus siliquosus</i> Boiss.	He	IT		Papilionaceae
34	<i>Astragalus verus</i> Olivier	Ch	IT	*	Papilionaceae
35	<i>Atriplex tatarica</i> Boiss.	Th	IT		Chenopodiaceae
36	<i>Avena Wiestii</i> Steud.	Th	IT/Med		Poaceae
37	<i>Bellevalia glauca</i> (Lindl.) Kunth	Cr	IT		Liliaceae
38	<i>Biebersteinia multifida</i> DC.	Cr	IT		Geraniaceae
39	<i>Boissiera squarrosa</i> (Banks & Soland.) Nevski	Th	IT		Poaceae
40	<i>Bongardia chrysozonum</i> (L.) Boiss.	Cr	IT		Podophyllaceae
41	<i>Bromus danthoniae</i> Trin.	Th	IT		Poaceae
42	<i>Bromus erectus</i> Hudson	He	IT		Poaceae
43	<i>Bromus sterilis</i> L.	Th	IT/ES		Poaceae

44	<i>Bromus tectorum</i> L.	Th	ES/M		Poaceae
45	<i>Bromus tomentellus</i> Boiss.	He	IT		Poaceae
46	<i>Bunium luristanicum</i> Rech. F.	Cr	IT	*	Apiaceae
47	<i>Bunium paucifolium</i> DC.	Cr	IT		Apiaceae
48	<i>Bunium rectangulum</i> Boiss & Hausskn	Cr	IT		Apiaceae
49	<i>Bupleurum Gerardii</i> All.	Th	IT		Apiaceae
50	<i>Callipeltis cucullaria</i> (L.) Stev.	Th	IT		Rubiaceae
51	<i>Campanula humillima</i> DC.	He	IT	*	Campanulaceae
52	<i>Capparis parviflora</i>	Ch	IT		Capparidaceae
53	<i>Cardaria draba</i> (L.) Desv.	He	Cosm		Brassicaceae
54	<i>Carthamus oxyacantha</i> M. B.	Th	IT/SS/Med		Astraceae
55	<i>Celtis caucasica</i> Willd.	Ph	IT		Ulmaceae
56	<i>Centaurea iberica</i> Trev. ex Spreng.	He	IT/Med		Astraceae
57	<i>Centaurea behen</i> L.	He	IT		Astraceae
58	<i>Centaurea bruguierana</i> (DC.) Hand-Mzt. Subsp. <i>Belangerana</i> (DC.) Bornm.	He	IT		Astraceae
59	<i>Centaurea depressa</i> M. B.	Th	IT/ES		Astraceae
60	<i>Centaurea iberica</i> Trev. ex Spreng.	Th	IT/Med		Astraceae
61	<i>Centaurea intricata</i> Boiss. Subsp. <i>kermanshensis</i> Wagenitz	He	IT	*	Astraceae
62	<i>Centaurea irritans</i> Wagenitz	He	IT	*	Astraceae
63	<i>Centaurea solstitialis</i> L.	Th	IT/SS/Med		Astraceae
64	<i>Centaurea virgata</i> Lam. subsp. <i>squarrosa</i> (Willd.) Gugler	He	IT		Astraceae
65	<i>Cephalaria dichaeophora</i> Boiss.	Th	IT	*	Dipsacaceae
66	<i>Cerasus mahaleb</i> (L.) Miller	Ph	IT		Rosaceae
67	<i>Cerasus microcarpa</i> (C. A. Mey.) Boiss. subsp. <i>microcarpa</i>	Ph	IT/ES		Rosaceae
68	<i>Ceratocephalus falcata</i> (L.) Pers	Th	IT/Med		Ranunculaceae
69	<i>Chardinia orientalis</i> (L.) O. Kuntze	Th	IT		Astraceae
70	<i>Chenopodium album</i> L.	Th	Cosm		Chenopodiaceae
71	<i>Chenopodium botrys</i> L.	Th	IT		Chenopodiaceae
72	<i>Cichorium intybus</i> L.	He	Cosm		Astraceae
73	<i>Cleome quinquenervia</i> DC.	Th	IT		Zygophyllaceae
74	<i>Codonocephalum stenocalathium</i> Rech. F.	He	IT		Astraceae
75	<i>Colchicum kotschyi</i> Boiss.	Cr	IT		Liliaceae
76	<i>Corydalis verticillaris</i> DC.	Cr	IT	*	Fumariaceae
77	<i>Cotoneaster luristanica</i> Klotz.	Ph	IT		Rosaceae
●78	<i>Cousinia cylindracea</i> Boiss.	He	IT	*	Astraceae
79	<i>Cousinia pichleriana</i> Bornm. ex Rech. F.	He	IT	*	Astraceae
80	<i>Crataegus pontica</i> C. Koch	Ph	IT		Rosaceae
81	<i>Crocus haussknechtii</i> Boiss.	Cr	IT		Iridaceae
82	<i>Cynodon dactylon</i> (L.) Pers.	Cr	Cosm		Poaceae
83	<i>Dactylis glomerata</i> L.	He	IT/ES		Poaceae
84	<i>Daphne mucronata</i> Royle.	Ph	IT		Tymelaceae
85	<i>Dianthus macranthoides</i> Hausskn ex Bornm.	He	IT/ES	*	Caryophyllaceae
86	<i>Dianthus orientalis</i> Adams subsp. <i>Aphanonerus</i> Rech. F.	He	IT	*	Caryophyllaceae
87	<i>Dianthus szowitzianus</i> Bienert. ex Boiss.	He	IT	*	Caryophyllaceae
88	<i>Digitalis nervosa</i> Steud. & Hochst. Benth.	He	IT/ES		Scrophulariaceae
89	<i>Dionysia zagrica</i> Grey-Wilson	Ch	IT	*	Primulaceae
90	<i>Echinaria capitata</i> (L.) Desf.	Th	IT/Med		Poaceae
●91	<i>Echinops kotschyi</i> Boiss.	He	IT	*	Astraceae
92	<i>Echium italicum</i> L.	He	IT		Boraginaceae
93	<i>Epilobium hirsutum</i> L.	Cr	IT/ES		Onagraceae
94	<i>Eremopoa persica</i> (Trin) Roshev.	Th	IT		Poaceae
95	<i>Erodium cicutarium</i> (L.) Her.	Th	IT/ES/SS		Geraniaceae
96	<i>Eryngium billardieri</i> F. Delaroché	He	IT		Apiaceae
97	<i>Euphorbia aleppica</i> L.	Th	IT		Euphorbiaceae
98	<i>Euphorbia denticulata</i> Lam.	He	IT		Euphorbiaceae
99	<i>Euphorbia macroclada</i> Boiss.	He	IT		Euphorbiaceae
100	<i>Euphorbia macrostegia</i> L.	He	IT	*	Euphorbiaceae
101	<i>Ferula oopoda</i> (Boiss. & Buhse) Boiss.	He	IT		Apiaceae
102	<i>Ferulago angulata</i> (Schlecht.) subsp. <i>Cardochorum</i> (Boiss. & Hausskn.)	He	IT	*	Apiaceae
103	<i>Ferulago macrocarpa</i> (Fenzl) Boiss.	He	IT		Apiaceae
104	<i>Fibigia suffruticosa</i> (Vent Sweet)	He	IT/ES		Brassicaceae
105	<i>Ficus carica</i> subsp. <i>Rupestris</i> (Hausskn. Ex Boiss.) Browicz	Ph	IT		Moraceae
106	<i>Frankenia pulverulenta</i> L.	Th	IT/SS		Frankeniaceae
107	<i>Fritillaria imperialis</i> L.	Cr	IT		Liliaceae
108	<i>Gagea gageoides</i> (Zucc.) Vved.	Cr	IT/ES		Liliaceae
109	<i>Galium elongatum</i> L.	He	IT		Rubiaceae
110	<i>Galium haussknechtii</i> Ehrend.	Th	IT		Rubiaceae
111	<i>Galium setaceum</i> L.	Th	IT		Rubiaceae

112	<i>Garhadiolus angulosus</i> Joub. & Spach	Th	IT		Astraceae
113	<i>Geranium rotundifolium</i> L.	Th	IT/ES/SS		Geraniaceae
114	<i>Geranium stepporum</i> Davis	Cr	IT/ES		Geraniaceae
115	<i>Geranium tuberosum</i> L.	Cr	IT		Geraniaceae
116	<i>Gundelia Tournefortii</i> L.	He	IT		Astraceae
117	<i>Helianthemum salicifolium</i> (L.) Miller.	Th	IT/ES		Cistaceae
118	<i>Heliotropium denticulatum</i> Boiss. & Hausskn.	Ch	IT	*	Boraginaceae
119	<i>Heliotropium europaeum</i> L.	Th	IT/ES		Boraginaceae
120	<i>Hesperis leucoclada</i> Boiss.	He	IT	*	Brassicaceae
121	<i>Heterantheium piliferum</i> (Banks & Soland.) Hochst.	Th	IT/ES		Poaceae
122	<i>Holesteum umbellatum</i> L.	Th	ES/Med		Caryophyllaceae
123	<i>Hordeum bulbosum</i> L.	Cr	IT/Med		Poaceae
124	<i>Hordeum spontaneum</i> C. Koch.	Th	IT		Poaceae
125	<i>Hypericum scabrum</i> L.	He	IT		Hypericaceae
126	<i>Ixiolirion tataricum</i> (Pall.) Herb.	Cr	IT		Amaryllidaceae
127	<i>Lactuca serriola</i> L.	He	IT/ES		Astraceae
128	<i>Lappula sinaica</i> (DC.) Ascherson ex Schweinf.	Th	IT		Boraginaceae
129	<i>Lasiopogon muscoides</i> (Desf.) DC.	Th	IT/SS		Astraceae
130	<i>Lathyrus sativus</i> L.	Th	IT/ES		Papilionaceae
131	<i>Lonicera nummularifolia</i> Jaub & Spach	Ph	IT		Caprifoliaceae
132	<i>Malabaila porphyrodiscus</i> Stapf & Wettst	Th	IT	*	Apiaceae
133	<i>Malva neglecta</i> Wallr	Th	IT/ES		Malvaceae
134	<i>Marrubium vulgare</i> L.	He	IT/ES		Laminaceae
135	<i>Medicago rigidula</i> (L.) All.	Th	IT		Papilionaceae
136	<i>Medicago radiata</i> L.	Th	IT/Med		Papilionaceae
137	<i>Mentha longifolia</i> (L.) Huds.	Cr	IT/ES		Lamiaceae
138	<i>Minuartia meyeri</i> (Boiss.) Bornm.	Th	IT/ES		Caryophyllaceae
139	<i>Nepeta kotschyi</i> Boiss.	He	IT	*	Lamiaceae
140	<i>Nepeta persica</i> Boiss.	Ch	IT		Lamiaceae
141	<i>Nigella oxypetala</i> Boiss.	Th	IT	*	Ranunculaceae
142	<i>Noaea mucronata</i> (Forsk.) Aschers. Et Schweinf.	Ch	IT		Chenopodiaceae
143	<i>Nonnea persica</i> Boiss.	He	IT		Boraginaceae
144	<i>Onobrychis haussknechtii</i> Boiss.	He	IT		Papilionaceae
145	<i>Onopordon acanthium</i> L.	He	IT		Astraceae
146	<i>Onosma bulbotrichum</i> DC.	He	IT	*	Boraginaceae
147	<i>Onosma Haussknechtii</i> Bornm.	Cr	IT		Boraginaceae
148	<i>Onosma Kotschyi</i> Boiss.	He	IT	*	Boraginaceae
149	<i>Onosma microcarpum</i> DC.	He	IT		Boraginaceae
150	<i>Onosma rostellatum</i> lehm.	He	IT/SS		Boraginaceae
151	<i>Onosma sericeum</i> Willd.	He	IT		Boraginaceae
152	<i>Paracaryum undulatum</i> Boiss.	He	IT		Boraginaceae
153	<i>Parietaria judaica</i> L.	Cr	IT/ES/SS		Urticaceae
154	<i>Peganum harmala</i> L.	He	IT/SS/Med		Zygophyllaceae
155	<i>Phlomis bruguieri</i> Desf.	He	IT		Laminaceae
156	<i>Phlomis olivieri</i> Benth.	He	IT	*	Laminaceae
157	<i>Picnomon acarna</i> (L.) Cass.	Th	IT/ES		Astraceae
158	<i>Pimpinella deverroides</i> (Boiss.) Boiss.	He	IT	*	Apiaceae
159	<i>Pistacia atlantica</i> Desf.	Ph	IT		Anacardiaceae
160	<i>Pistacia khinjuk</i> Stocks.	Ph	IT		Anacardiaceae
161	<i>Pisum sativum</i> subsp. <i>sativum</i> L.	Th	IT		Papilionaceae
162	<i>Poa bulbosa</i> L.	Cr	IT/ES/Med		Poaceae
163	<i>Polygonum hyrcanicum</i> Rech. F.	He	IT/ES	*	Polygonaceae
164	<i>Prangos uloptera</i> DC.	He	IT		Apiaceae
165	<i>Ptercephalus kurdicus</i> Vatke	He	IT		Dipsacaceae
166	<i>Ptercephalus plumosus</i> (L.) Coult	Th	IT/ES		Dipsacaceae
167	<i>Quercus brantii</i> Lindl.	Ph	IT		Fagaceae
168	<i>Ranunculus arvensis</i> L.	Th	IT/Med		Ranunculaceae
169	<i>Ranunculus asiaticus</i> L.	Cr	IT/Med		Ranunculaceae
170	<i>Rapistrum rugostum</i> (L.) All.	Th	IT/ES/Med		Brassicaceae
171	<i>Rhamnus kurdica</i> Boiss. & Hohen.	Ph	IT		Rhamnaceae
172	<i>Rhamnus pallasii</i> Fisch. Et Mey.	Ph	IT		Rhamnaceae
173	<i>Rosularia Sempervivum</i> (M. B.) Berger	He	IT		Crassulaceae
174	<i>Rumex ephedroides</i> Bornm.	He	IT	*	Polygonaceae
175	<i>Sameraria elegans</i> Boiss.	Th	IT	*	Brassicaceae
176	<i>Sanguisorba minor</i> Scop.	He	IT/ES		Rosaceae
177	<i>Scabiosa persica</i> Boiss.	Th	IT/ES/Med		Dipsacaceae
178	<i>Scaligera assyriaca</i> Freyn & Bornm.	Cr	IT		Apiaceae
179	<i>Scandix stellata</i> Banks & Soland.	Th	IT/SS		Apiaceae

180	<i>Scariola orientalis</i> (Boiss.) Sojak	Th	IT/SS		Astraceae
181	<i>Scilla bisotunensis</i> Speta	Cr	IT	*	Liliaceae
182	<i>Scrophularia frigida</i> Boiss. subsp. <i>frigida</i>	He	IT	*	Scrophulariaceae
183	<i>Scrophularia striata</i> Boiss.	Ch	IT		Scrophulariaceae
184	<i>Silene chaetodonata</i> Boiss.	Th	IT		Caryophyllaceae
185	<i>Silene chlorifolia</i> Sm.	He	IT/ES		Caryophyllaceae
186	<i>Silene longipetala</i> Vent.	He	IT		Caryophyllaceae
187	<i>Smyrniopsis aucheri</i> Boiss.	He	IT		Apiaceae
188	<i>Smyrniium cordifolium</i> Boiss.	He	IT		Apiaceae
189	<i>Solenathus circinnatus</i> Ledeb.	He	IT/ES		Boraginaceae
190	<i>Stachys kurdica</i> Boiss. & Hohen.	He	IT		Poaceae
191	<i>Stipa hohenackeriana</i> Trin. & Rupr	He	IT		Poaceae
192	<i>Stipa pennata</i> L.	He	IT		Poaceae
193	<i>Taeniatherum crinitum</i> (Schreb.) Nevski.	Th	IT		Poaceae
194	<i>Tanacetum polycephalum</i> Schultz-Bip. subsp. <i>polycephalum</i>	He	IT		Astraceae
195	<i>Taraxacum serotinum</i> (Waldst. & Kit.) Poir.	Th	IT		Astraceae
196	<i>Teucrium orientale</i> L.	He	IT		Laminaceae
197	<i>Teucrium polium</i> L.	He	IT/Med		Laminaceae
198	<i>Thalictrum isopyroides</i> C. A. Mey.	He	IT/ES/Med		Ranunculaceae
199	<i>Thlaspi perfoliatum</i> L.	Th	IT		Brassicaceae
●200	<i>Thymbra spicata</i> L.	Ch	IT	*	Laminaceae
201	<i>Thymus danensis</i> Celak subsp. <i>danensis</i>	Ch	IT	*	Laminaceae
202	<i>Torilis leptophylla</i> (L.) Reichenb.	Th	IT		Apiaceae
203	<i>Torilis tenella</i> (Delile) Reichenb.	Th	IT/Med		Apiaceae
204	<i>Trachynia distachya</i> (L.) Link.	Th	IT		Poaceae
205	<i>Tribulus terrestris</i> L.	Th	IT/ES/SS		Zygophyllaceae
206	<i>Trifolium scabrum</i> L.	Th	IT/Med		Papilionaceae
207	<i>Trigonella elliptica</i> Boiss.	He	IT		Papilionaceae
208	<i>Trigonella filipes</i> Boiss	Th	IT	*	Papilionaceae
209	<i>Tulipa montana</i> Lindl.	Cr	IT		Liliaceae
210	<i>Turgenia latifolia</i> (L.) Hoffm.	Th	IT/ES/Med	*	Apiaceae
211	<i>Umbilicus tropaeolifolius</i> Boiss.	Cr	IT		Crassulaceae
212	<i>Vaccaria grandiflora</i> (Fisch. Ex. DC.) Jaub. & Spach.	Th	IT		Caryophyllaceae
213	<i>Valerianella oxyrrhyncha</i> Fisch & C. A. Mey.	Th	IT/ES		Valerianaceae
214	<i>Velezia rigida</i> L.	Th	IT/Med		Caryophyllaceae
215	<i>Verbascum alceoides</i> Boiss & Hausskn.	He	IT		Scrophulariaceae
216	<i>Verbascum pseudo-digitalis</i> Nab.	He	IT	*	Scrophulariaceae
217	<i>Vicia ervilia</i> (L.) Willd.	Th	IT/ES		Papilionaceae
218	<i>Vicia sativa</i> L.	Th	IT/ES		Papilionaceae
219	<i>Viola modesta</i> Fenzl.	Th	IT/Med		Violaceae
220	<i>Xanthium spinosum</i> L.	Th	Cosm		Astraceae
●221	<i>Zeugandra iranica</i> P. H. Davis	He	IT	*	Campanulaceae
222	<i>Ziziphora capitata</i> L.	Th	IT/ES		Laminaceae
223	<i>Ziziphora clinopodioides</i> Lam.	Ch	IT		Laminaceae
224	<i>Ziziphora tenuir</i> L.	Th	IT		Laminaceae

(*) indicates the endemic and (●) shows the rare species. IT = Irano-Turanian, M = Mediterranean, Es = Euro-Siberian, SS = Saharo-Sindian, Cosm = cosmopolite, Th = therophyte, He = hemicryptophyte, Cr = cryptophyte, Ch = chamaephyte, Ph = phanerophyte

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