



Plant diversity of the Heydari Wildlife Refuge in northeastern Iran, with a checklist of vascular plants

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Abstract

Heydari Wildlife Refuge (HWR) is located in Binalood mountain range of the Razavi Khorassan Province in Northeastern Iran. The area belongs to the central part of Khorassan-Kopet Dagh floristic province, which is a transitional zone between different phytogeographical units in the Irano-Turanian region. We investigated the floristic composition, life-form spectrum and the phytogeography of the area during 2014–2017 by collecting vascular plants and establishing 443 random-quadrats in representative stands of different vegetation types. A total of 588 vascular plant taxa (species and subspecies) belonging to 304 genera and 65 families are recorded as native and naturalized in the study area. The richest plant families are Asteraceae (40 genera/87 species), Fabaceae (15/72), Poaceae (33/60), Brassicaceae (33/49), Lamiaceae (19/32), and Apiaceae (18/27). The genera *Astragalus* (44 species), *Cousinia* (17), and *Allium* (10) are the richest ones. However, the dominant canopy cover belongs to *Acantholimon*, *Astragalus*, *Artemisia*, and *Acanthophyllum* species. Raunkiaer's plant life-form spectrum in the area is dominated by hemicryptophytes (41.50%) and therophytes (28.06%). The core flora of HWR has the Irano-Turanian origin; the widespread elements are also well represented in the study area. Based on the Sørensen dissimilarity index, the HWR has about 50% dissimilarity to the adjacent areas. The study area is inhabited by several Iranian and/or Khorassan-Kopet Dagh endemic (19%), threatened (16%), and narrow-range plant species. The results indicate the importance of the HWR in the plant diversity of NE Iran.

Keywords: Binalood, biogeography, conservation, endemism, flora, Khorassan

Introduction

Iran, with about 7300 vascular plant species (Akhani 2006, Govaerts 2001) in a 1.65 million square kilometers surface area, is the second richest country after Turkey in SW Asia (Davis *et al.* 1994). Iran is predominantly covered by mountain ranges and deserts. The geographic and habitat diversity result in diverse bioclimatic regions and consequently a rich flora and vegetation diversity in the country. The flora of Iran is influenced by three main floristic regions of the Old World, *i.e.* Irano-Turanian (IT), Euro-Siberian (ES), and Saharo-Sindian (SS) (Zohary 1973, Léonard 1988, 1993). The mountainous terrain of the NE Iran belongs to an independent floristic province of the IT region, named “Khorassan-Kopet Dagh” (Memariani *et al.* 2016a). This area is primarily influenced by Central Irano-Turanian desert elements of the south and southwest and by many local and regional endemic taxa exclusively originated in Khorassan-Kopet Dagh (KK) foothills and mountains. Furthermore, there are many widespread species; the flora of surrounding Central Asian, Afghanistan, the Aralo-Caspian and ES regions enrich the plant diversity of KK (Fet 1994, Memariani *et al.* 2016b).

Restoring biodiversity will probably increase ecosystem resistance to climate extremes, which were predicted to become increasingly frequent as the global climate continues to change (Isbell 2015). Investigating the flora of a region is a strategy to know its diversity, and thus the base for management programs and conservation of natural resources (Encina-Domínguez *et al.* 2016). The awareness of the importance of exploring and preserving the floristic diversity of protected areas has dramatically increased in the latest years (Akhani 1998, Jafari & Akhani 2008, Memariani *et al.* 2016a). There is still a major lack of basic knowledge of the plants themselves.

The Heydari Wildlife Refuge (HWR) is located in Razavi Khorassan province. It was designated a Wildlife Refuge in 2002. According to the bioclimatic maps of Iran (Djamali *et al.* 2012) the area has an “Irano-Turanian bioclimate”.

Despite its vast area and crucial position in the central part of KK floristic province, little is known about the floristic composition of the HWR. More recently, there have been local floristic collections made by Joharchi in 2003, resulting in the description of a new species, *Cousinia amicorum* Tscherneva, Joharchi & Ghahremaninejad (in Tscherneva *et al.* 2005). There are several occasional plant collections at the HWR recorded in “*Flora Iranica*” (Rechinger 1963–2015). Nikan *et al.* (2012) studied the floristic composition of the semi-steppe habitats in Baharkish, a small area located in the north of HWR and recorded 156 species from three sites under different grazing intensities. The objectives of this study are: 1) to provide an annotated checklist of the plants and their life-forms, chorotypes and plant endemism in HWR, 2) to compare species composition between HWR and the other areas previously studied in northeastern Iran and 3) to encourage honouring the nature and protecting vegetation along with conserving the wildlife in the area.

Material and Methods

Floristic survey

Field surveys were conducted over a four-year period (2014–2017), during which approximately 3,000 vascular plant specimens were collected. Collected plants plus those coming from random-quadrats, were dried and labeled precisely for herbarium specimens. Plant specimens were identified using relevant Floras, mainly “*Flora Iranica*” (Rechinger 1963–2015), “*Flora of Iran*” (Assadi *et al.* 1988–2013) and complementary literatures (Tzvelev 1976, Maassoumi 2005, 2013, Ranjbar *et al.* 2008, Memariani *et al.* 2007, 2012, Mozaffarian 2012, Fritsch & Abbasi 2013, Tavakkoli *et al.* 2014, Arjmandi *et al.* 2016). The floristic list was presented alphabetically following the APG IV (2016) for the classification of angiosperms, PPG I (2016) for ferns, and Christenhusz *et al.* (2011) for gymnosperms. The chorotype of each taxon was determined according to the distribution data extracted from the above-mentioned Floras and papers. The terminology and delimitation of the main phytogeographical units (IT, Mediterranean, ES, and SS) were based on classical works, particularly Zohary (1973). Following Akhiani (1998), we considered the concept of Léonard (1988) for phytogeographical subdivisions and provinces and the distributional groups were easily characterized either by the geographical directions (*i.e.* IT^{E, C, W}) or by the known geographical provinces (*i.e.* Khorassan-Kopet Dagh: IT^{KK}). Life-forms of the plants were determined according to Raunkiaer (1934). Threat categories were evaluated by the “*Red Data Book of Iran*” (Jalili & Jamzad 1999) and Memariani *et al.* (2016b). Voucher specimens were mainly deposited in the Herbarium of the Faculty of Science, Ferdowsi University of Mashhad (abbreviated here as FUM), and some duplicates were transferred to the Herbarium of Ferdowsi University of Mashhad (FUMH) and Herbarium of Noshahr Botanical Garden (abbreviated here as HNBG). Along with the floristic study, species canopy cover (percentage) of vascular plants was measured in the random variable plots. The Sørensen index of similarity was measured to evaluate the floristic similarity among the study area and three other studied territories in Khorassan-Kopet Dagh floristic province, including Ghorkhod Protected Area (Memariani *et al.* 2016c), Fereizi (Memariani *et al.* 2009), and Baghshangach (Ghahreman *et al.* 2006).

Study Area

Geography

Heydari Wildlife Refuge, with an area of 46350 ha, is situated in the latitudes of 36° 31' to 36° 49' N and longitudes of 58° 29' 7" to 58° 45' 55" E, and is the largest wildlife refuge in Razavi Khorassan province, NE Iran. The elevation ranges from 1400 to 2900 meters above sea level. There are 18 villages in the HWR, mostly in the surroundings, and an uninhabited area (Figure 1). The HWR is a “no-hunting” area for the protection of animal populations, especially urials (*Ovis orientalis* Gmelini), and has been designated and protected since 2002. A wildlife Refuge in Iran is an area administered for the conservation of wildlife.

Climate

According to the nearest synoptic station of Quchan, HWR has a mean annual temperature of 12.7°C and a mean annual precipitation of 315 mm, indicating a cold and arid climate. There is no synoptic station inside the HWR, thus ombrothermic graphs are prepared using 20-year (1994–2014) data from three synoptic stations close to the area (Figure 2). Among those, Quchan is the nearest one and according to our 4-year field surveying, its climate is more similar to the one at the HWR. Precipitation period is autumn–winter–spring; in average, there are 6.5 dry months ($P < 2T$). Due to the high elevations of the HWR (at least 1400 m), more precipitation and lower temperatures are experienced in the study area. There are 23 springs and 6 permanent and seasonal rivers inside the area.

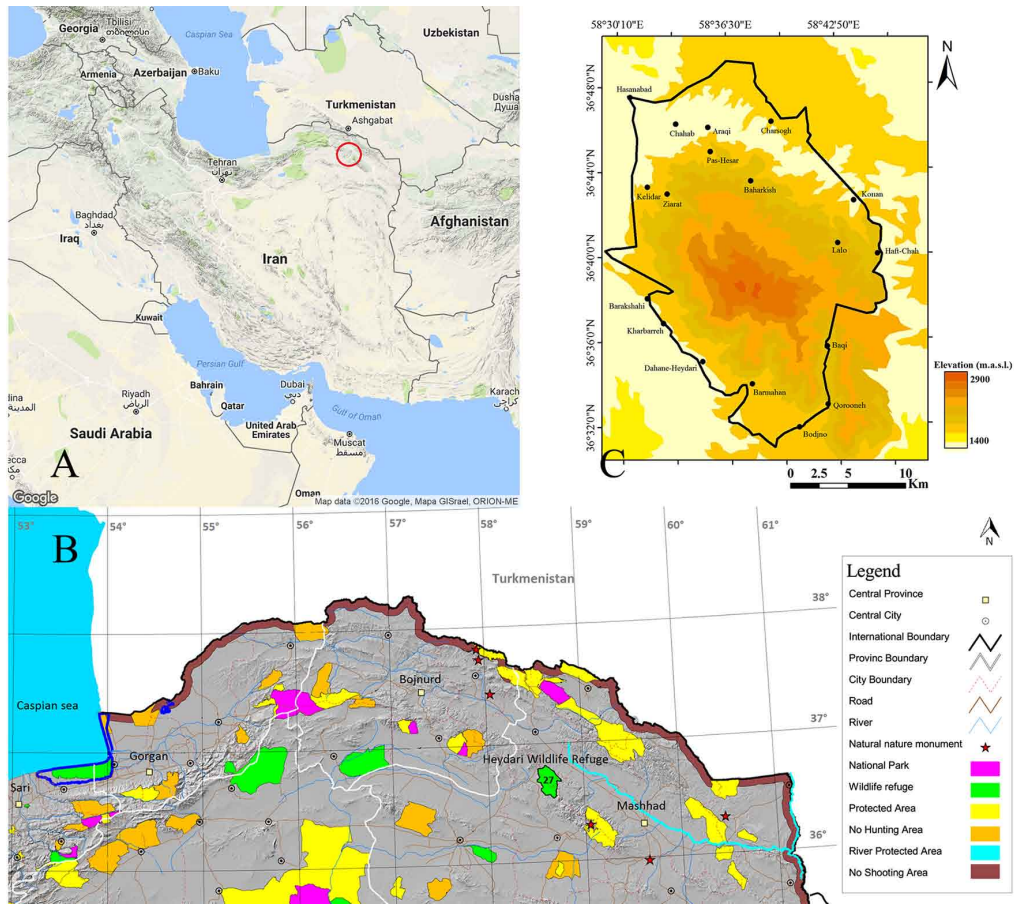


FIGURE 1. A. Map of Iran in the Middle East (prepared in R 2016), the inset shows the position of HWR, B. Protected areas in NE Iran according to Iranian environmental protection categories. HWR is indicated by green color and number 27 (modified from Bali & Bahmanpoor 2012), C. Topographic map of HWR, showing villages surrounding the area (prepared by M. Javidi).

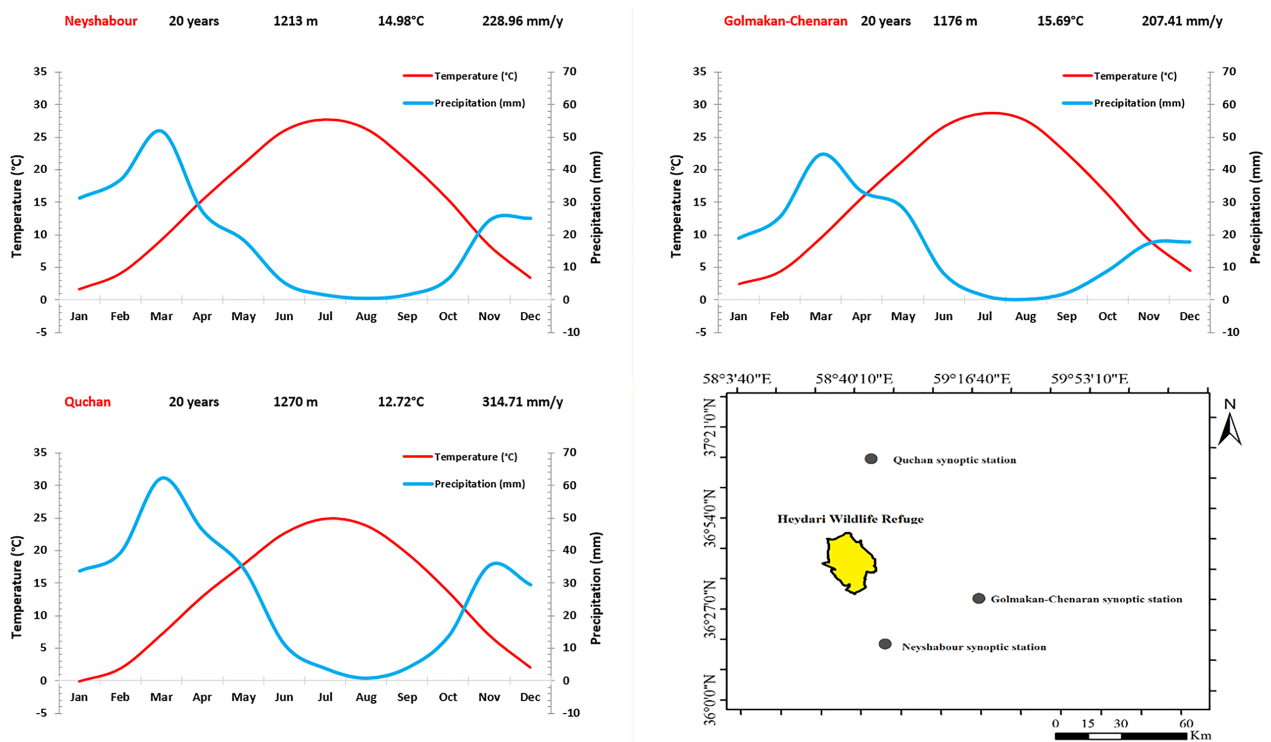


FIGURE 2. Climatic diagrams of three stations close to the HWR. **Up-left:** Neyshabour, **Up-right:** Golmakan-Chenaran, and **Down-left:** Quchan. Climatological data are obtained from the website of the meteorological organization of Iran (IRIMO 2016). **Down-right:** geographical positions of three synoptic stations and HWR.

Results

Floristic composition

The total number of 588 species and infraspecific taxa of vascular plants belonging to 304 genera and 65 families has been collected and identified from the study area (Appendix I). Angiosperms include Dicots with 472 species, 243 genera, and 47 families followed by Monocots with 111 species, 57 genera, and 14 families. Gymnosperms include three species, two genera and two families, and Ferns are represented by two species, two genera and two families. The richest families are Asteraceae (40 genera/87 species), Fabaceae (15/72), Poaceae (33/60), Brassicaceae (33/49), Lamiaceae (19/32), and Apiaceae (18/27) (Table 1).

TABLE 1. List of the most species-rich vascular plant families (with ≥ 10 species) in HWR.

Families	Genera	Species/infraspecific taxa	Number of genera with ≥ 4 species
Asteraceae	40	87	6
Fabaceae	15	72	3
Poaceae	33	60	3
Brassicaceae	33	49	1
Lamiaceae	19	32	1
Apiaceae	18	27	2
Caryophyllaceae	13	24	1
Boraginaceae	12	19	2
Ranunculaceae	10	16	1
Rubiaceae	5	15	1
Rosaceae	7	14	1
Plantaginaceae	3	14	1
Polygonaceae	4	11	1
Caprifoliaceae	6	10	1
Amaryllidaceae	1	10	1

The genera *Astragalus* Linnaeus (1753: 755) (44 species), *Cousinia* Cassini (1827: 503) (17 species), and *Allium* Linnaeus (1753: 294) (10 species) are the richest ones; however, the species of *Acantholimon* Boissier (1846b: 69), *Astragalus*, *Artemisia* Linnaeus (1753: 845), and *Acanthophyllum* Meyer (1831: 210) make the dominant canopy cover in the area. Table 2 shows 32 genera presented by four or more species in the HWR. Figures 3 and 4 show the characteristic landscapes and selected rare and threatened plants in the HWR.

Based on the Sørensen similarity index, the floristic composition of the HWR is 57.65, 47.48 and 47.81% similar to the adjacent areas of Fereizi, Ghorkhod Protected Area, and Baghshangach, respectively.

TABLE 2. List of the most species-rich vascular plant genera with more than four species in HWR.

Genera	species	Genera	species	Genera	species
<i>Astragalus</i>	44	<i>Poa</i>	6	<i>Eremurus</i>	4
<i>Cousinia</i>	17	<i>Polygonum</i>	6	<i>Gagea</i>	4
<i>Allium</i>	10	<i>Taraxacum</i>	6	<i>Hedysarum</i>	4
<i>Alyssum</i>	10	<i>Cirsium</i>	5	<i>Iris</i>	4
<i>Veronica</i>	9	<i>Hymenocrater</i>	5	<i>Lappula</i>	4
<i>Bromus</i>	7	<i>Valerianella</i>	5	<i>Onobrychis</i>	4
<i>Galium</i>	7	<i>Acantholimon</i>	4	<i>Ranunculus</i>	4
<i>Scorzonera</i>	7	<i>Acanthophyllum</i>	4	<i>Rochelia</i>	4
<i>Stipa</i>	7	<i>Bunium</i>	4	<i>Rosa</i>	4
<i>Euphorbia</i>	6	<i>Carex</i>	4	<i>Tragopogon</i>	4
<i>Ferula</i>	6	<i>Centaurea</i>	4	Genera (< 4 spp.)	272

Life-form

Hemicryptophytes (41.50%) and therophytes (28.06%) are the dominant life-forms in the HWR. Cryptophytes (geophytes) having different regenerating bodies include 15.13% of the species. Finally, 11.39% and 3.91% of the species are chamaephytes and phanerophytes, respectively (Figure 5).



FIGURE 3. Characteristic landscapes in HWR; **a:** *Juniperus polycarpus* woodlands, **b:** mountain steppes of thorn-cushion formations, **c:** *Eremurus spectabilis* in high mountain thorn-cushion steppes, **d:** *Stipa*-steppes, **e:** harvesting *Gundelia tournefortii* as a winter forage in southern lowlands of HWR, **f:** grazing pressure near villages (Photos by **a:** M. Khaleqipoor, **b–f:** Z. Atashgahi).

Phytogeography

More than two-thirds of species (69.13%) in the area belong to the Irano-Turanian floristic region. Widespread elements (11.84%), *i.e.* pluri-regional, sub-cosmopolitan and cosmopolitan species, make up a remarkable proportion of the flora followed by tri-regionals (9.43%) and bi-regionals (9.26%) with a relatively wide distribution range. The Euro-Siberian species have an inconsiderable frequency (0.34%) in the phytogeographical spectrum of the area (Figure 6). The main subdivisions of Irano-Turanian elements are widespread IT (26.8%), Central IT (20.34%), IT elements endemic to KK floristic province (16.38%), and Central-Eastern IT (11.16%) (Figure 7). Sixty-four species (10.88%) are endemic to Iran; however, there are 115 sub-endemic or regional endemic taxa (19.56%) in the study area occurring mainly in Iran and in one or both of adjacent countries, *i.e.* Turkmenistan and Afghanistan (Appendix I). Four-fifths of endemic and sub-endemic plants (76 taxa) have been evaluated as threatened species. In total, 96 plant species (16.33%) are threatened in HWR. Based on the previous data, *Cousinia amicorum* was the only known local endemic of the HWR (Figure 4b–c), yet a new survey (Mehregan & Assadi 2016) shows the occurrence of the species in the other Iranian parts of KK floristic province.



FIGURE 4. Selected rare and threatened plants of HWR in their habitats; **a:** *Helictotrichon turcomanicum*, an endangered species in Iran, **b–c:** *Cousinia amicorum*, an endangered and endemic species in their small habitat in the southern part of HWR, **d:** *Nepeta binaloudensis*, an endangered, endemic, and medicinal plant inhabited on wet soils in the central parts of the study area, **e:** *Astragalus esferayanicus*, an endangered, rare, and endemic species, **f:** *Iris loczyi*, a vulnerable plant on higher elevations, **g:** *Phlomis binaloudensis*, an endangered, endemic species in NW foothills of HWR, close to the Chahab valley, **h:** *Delphinium turkmenum* Lipsky, endemic to Khorassan-Kopet Dagh, and **i:** *Acanthophyllum adenophorum*, an endemic cushion plant, found in low foothills of the study area (Photos by: Z. Atashgahi).

Vegetation and physiognomy

Approximately 40 percent of the study area is covered by vegetation. The mountainous subalpine vegetation of the area is dominated by thorn-cushion plants mainly as different combinations of *Astragalus* spp., *Acantholimon* spp., *Acanthophyllum* spp., and *Onobrychis cornuta* (Linnaeus 1763: 1060) Desvaux (1814: 81) (Figure 3 a–b). *Acantholimon erinaceum* (Jaubert & Spach 1844: 163) Linczevski (in Komarov 1952: 370), *Astragalus verus* Olivier (1807: 342), *Acantholimon raddeanum* Czerniakowska (1930: 276), and *Acanthophyllum glandulosum* Bunge ex Boissier (1867: 565) are the most frequent thorn-cushion species. In the lower elevations, the cushion plants are replaced by the steppe flora of *Artemisia* and *Artemisia-Astragalus*. Meadow steppes are mainly described as *Festuca valesiaca* Schleicher ex Gaudin (1811:242) and *Elymus* Linnaeus (1753: 83)-*Stipa* Linnaeus (1753: 78) steppes, or mosaic stands of *Leymus* Hochstetter (1848: 118) steppes in some west-facing slopes. *Leymus* steppes are described as semi-dense patches of up to 60% canopy cover. In the lower belt of the mountains, especially on the well-developed soils, there are mixtures of *Acantholimon erinaceum* and *Acanthophyllum adenophorum* Freyn (1902–1903: 867) as cushion forms, as well as *Stipa caucasica* Schmalhausen (1892: 293), *S. hohenackeriana* Trinius & Ruprecht (1842: 80), *S. holosericea* Trinius (1831: 81) as perennial grasses (Figure 3 d).

The woodlands of *Juniperus polycarpus* Koch (1849: 303) var. *turcomanica* (Fedtschenko 1932: 14) Adams (Adams *et al.* 2008) occur as small patches in the uplands of the HWR. The vast stands of these juniper woodlands in the southwest of the area extend from the highest elevation (about 2900 m) to the lowest parts (about 1700 m) of the Heydari River (Figure 3 a). The natural regeneration of juniper trees is observed in this stand; however, in the other areas, the juniper woodlands are distributed as isolated stands or as single old-growth individual trees with no observable seedlings. Open to semi-dense shrublands are formed in mesic valleys composed mainly of *Cotoneaster* spp., *Lonicera nummulariifolia* Jaubert & Spach (1843: 133), *Ephedra major* Host (1831: 671), and *Berberis integerrima* Bunge (1844: 145).

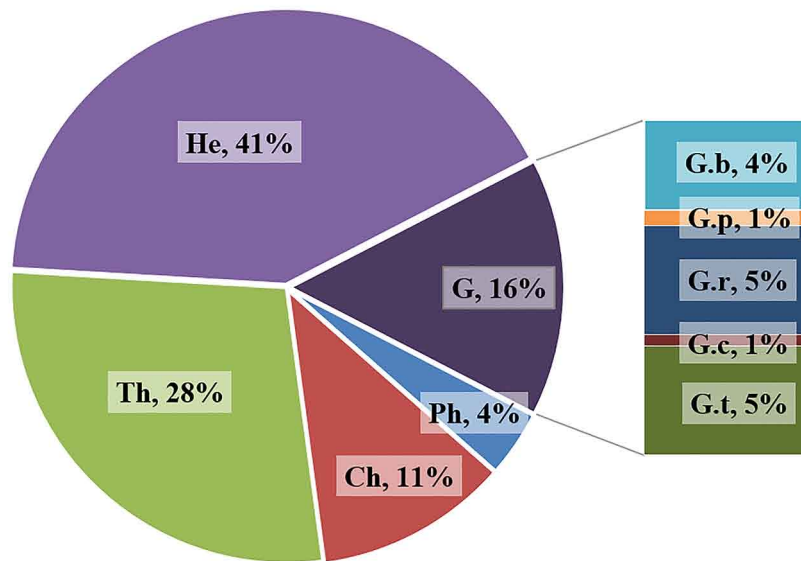


FIGURE 5. The life-form spectrum of the flora of HWR. Ch: chamaephyte, G.b: bulbous geophyte, G.c: cormous geophyte, G.t: tuberous geophyte, G.r: rhizomatous geophyte, G.p: parasitic geophyte, He: hemicryptophyte, Ph: phanerophyte, and Th: therophyte.

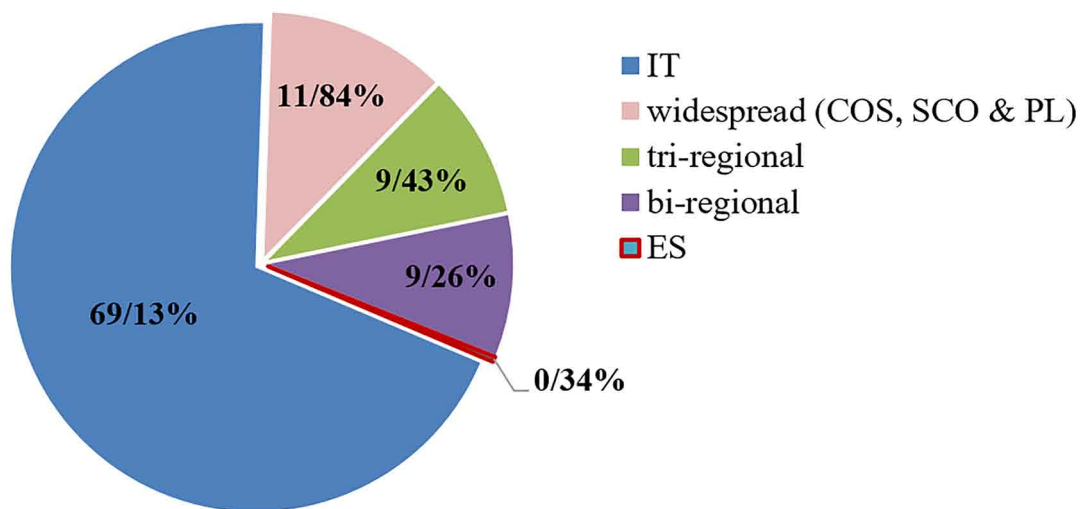


FIGURE 6. The proportion of the phytogeographical groups in the flora of HWR. Tri-regional (include: IT-ES-M, IT-ES-SS, and IT-M-SS), Bi-regional (include: IT-ES, IT-M, IT-SS, and ES-M), IT: Irano-Turanian, ES: Euro-Siberian, M: Mediterranean, SS: Sahara-Sindian, COS: Cosmopolitan, SCO: Sub-cosmopolitan, and PL: Pluri-regional.

Marl foothills are mainly covered by halophytic species viz. *Krascheninnikovia ceratoides* (Linnaeus 1753: 979) Gueldenstaedt (1772: 555), *Salsola arbusculiformis* Drobow (1916: 142), and *Reaumuria alternifolia* Britten (1916:110). The lands close to the summer villages, nomads' pastures and areas along the side of roads are covered by ruderal and invasive communities.

Discussion

The total number of 588 species and infraspecific taxa, 304 genera, and 65 families of vascular plants reported here reveal the significance of the plant biodiversity of the area. Angiosperms include Dicots (472 spp., 243 genera and 47 families) followed by Monocots (111, 57 and 14), show the dominance of dicots (dicots to monocots ratio of four to one) in the study area, typical to Iranian and Middle Asian floras (Kamakhina 1994). Gymnosperms and Ferns have

a minor contribution to the floristic composition of the HWR. The richest plant families are Asteraceae, Fabaceae, Poaceae, Brassicaceae, Lamiaceae, and Apiaceae. The majority of the species belong to small numbers of families. These characteristics have also been reported for the floristic composition of the several areas in Iran (Ghahreman *et al.* 2006, Memariani *et al.* 2016a,c), of total flora of Iran (Ghahremaninejad & Nejad Falatoury 2016), and Turkmenistan (Kamakhina 1994). Diverse terrains such as marl foothills, sliding slopes, rocks, streams, rivers, upland- villages and available aquifers as well as meadows, and invasive plant communities make the HWR harboring a diverse flora.

The genera *Astragalus*, *Cousinia*, and *Allium* are the richest; however, the dominant vegetation cover belongs to the *Acantholimon*, *Astragalus*, *Artemisia* and *Acanthophyllum* species. Characteristic mega-genera for the IT region include *Astragalus*, *Acanthophyllum*, *Acantholimon*, *Cousinia*, *Eremurus* Marschall von Bieberstein (1810: 61), and *Eremostachys* Bunge (1830: 414) (Manafzadeh *et al.* 2016). *Astragalus* is a characteristic IT element (Manafzadeh *et al.* 2016) and according to Maassoumi (2005), the total number of taxa of this genus in Iran is 804 so this country is one of the main center of speciation for this genus. *Cousinia* as one of the largest genera of Asteraceae and one of the 50 largest genera of flowering plants (Frodin 2004; López-Vinyallonga *et al.* 2009), has the highest species diversity in the IT region and the mountains of Central Asia (López-Vinyallonga *et al.* 2009).

It has been reported that 22 (Jalili & Jamzad 1999) to 24% (Akhani 2006) of the plant taxa are endemic to Iran. The average number of endemics per million hectares of the whole country is 10.46 species (Jalili & Jamzad 1999). The occurrence of two sub-endemic genera *viz.* *Diaphanoptera* Rechinger (1940: 41) (Caryophyllaceae) and *Sclerorhachis* (Rechinger 1944: 4) Rechinger (1968: 242) (Asteraceae), and 64 Iranian endemic species in the HWR demonstrates a high rate of plant endemism in such a small area. The total 66 plant taxa (11.22% of the flora of HWR) are endemic to the KK floristic province, *i.e.* NE Iran and S Turkmenistan. The rate of the endemism in the KK is about 14% of the total flora (Memariani *et al.* 2016a,b). Except for *Ranunculus cicutarius* Schlechtendal (1819: 25) as a Euro-Siberian/Hyrcanian (ES^{HY}) regionally endemic species, all other endemics in the HWR belong to the IT region. The families over-represented in terms of endemics include Fabaceae, Asteraceae, and Lamiaceae. The genera *Astragalus* and *Cousinia* have the highest number of endemic species in the HWR. According to the “*Red Data Book of Iran*” (Jalili & Jamzad 1999), there is a similar picture for families and genera of the total flora of Iran.

Most of the endemics in the study area represent hemicryptophyte or chamaephyte life-forms. Hemicryptophytes are the dominant life-form (41.50%) in the HWR followed by therophytes (28.06%). Cryptophytes (Geophytes), with different regenerating bodies, present 15.13% of species. Finally, 11.39% and 3.91% of the species are chamaephytes or phanerophytes, respectively. The cold and semi-arid climate of the HWR provide suitable conditions for the occurrence of hemicryptophytes. Approximately 20% of the flora of Iran (Jalili & Jamzad 1999) and 13% of the World's flora (Raunkiaer 1934) are annuals. Therefore, by comparison, the flora of HWR is rich in annuals. The number of therophytes often decreases with increasing elevation as they become quite rare in the higher elevations. Nevertheless, annual species of *Polygonum* Linnaeus (1753: 359) and *Veronica* Linnaeus (1753: 9) are well-represented in the sub-alpine flora of HWR. Although chamaephytes have a relatively low contribution to the life-form spectrum (11.39%), they play a major role in the vegetation of the HWR as suffruticose and thorny cushion formations.

According to the classification of floristic regions (Zohary 1973, Takhtajan 1986, Léonard 1988, 1993), the study area is located in the Irano-Turanian (IT) region. IT elements comprise more than 69% of the flora of the HWR. Widespread elements (11.84%), *i.e.* pluri-regional, sub-cosmopolitan and cosmopolitan species, make up a remarkable proportion of the flora. The IT region is differentiated from neighboring areas by the degree of continentality, seasonality of precipitation, and winter temperature. Continentality is the most important bioclimatic factor responsible for floristic differences between sub-regions of the IT region. The vast range of the IT region appears to be homogeneous in physiognomy, but different vegetation types are extremely rich in taxonomic, genetic, and beta-diversity (Djamali *et al.* 2012). Main subdivisions of IT elements in HWR are widespread IT (26.8%), Central IT (20.34%), IT elements endemic to KK floristic province (16.38%), and Central-Eastern IT (11.16%). The IT region has long been regarded as the source of many taxa, especially xerophytes, found in adjacent regions (Manafzadeh *et al.* 2013). The “donor” character of the IT region, by which new species disperse into neighboring regions, renders it particularly important to a conservation standpoint.

Juniperus polycarpus is considered a resistant pioneer tree species in the harsh climatic conditions of stony slopes at elevations ranging from 1000 to 3500 m in Iran (Pirani *et al.* 2011). This plant is easily resistant to dry summers and harsh winters. It forms open woodlands mixed with *Amygdalus scoparia* Spach (1843: 109) and *Pistacia atlantica* Desfontaines (1799: 364) in the central and western parts of Iran (Zohary 1973), and also with *Acer monspessulanum* Linnaeus (1753: 1056) in the northeast of Iran (Akhani 1998, Memariani 2016a, 2016c); however, *J. polycarpus* associates with *Cotoneaster* Medikus (1789: 154), *Lonicera* Linnaeus (1753: 173), and *Ephedra* Linnaeus (1753: 1040) species in the HWR. Indigenous people use *J. polycarpus* for the backbone of buildings, firewood, *etc.* In the

past decades, removal of the canopy through clear-cutting was responsible for the changes of juniper woodlands to the steppes in the NE Iran.

Many water resources in the area, such as temporary and permanent rivers, streams and springs, caused a unique habitat for hydrophyte plants. Although most of such wet habitats do not have a major role in the whole vegetation of the area, but they are important ecosystems with regard to biodiversity. The riparian vegetation in the HWR consists of communities dominated mainly by *Salix* Linnaeus (1753: 1015) spp., *Berberis integerrima*, *Tamarix ramosissima* Ledebour (1829: 424), *Rosa beggeriana* Schrenk (1841: 73), and *Calamagrostis pseudophragmites* (Haller 1797: 11) Koeler (1802: 106). The “Alatman River” and the Alatman earth-dam in the north of the HWR, surrounded densely by *Phragmites australis* (Cavanilles 1799: 100) Trinius ex Steudel (1841: 324), have made a suitable habitat for *Zannichellia palustris* Linnaeus (1753: 969) which is the only hydrophyte plant in the HWR.

Based on the Sørensen similarity Index, the floristic composition of HWR revealed the greatest similarity (57.64%), to the flora of Fereizi (Memariani *et al.* 2009). The Fereizi area is closest in distance to the HWR comparing with the two others; Ghorkhod Protected Area (Memariani *et al.* 2016c) and Baghshangach (Ghahreman *et al.* 2006) have less than 50% similarity of the floristic composition to HWR. The Fereizi and Baghshangach are located in the central Khorassan-Kopet Dagh in the Binalood mountain range, while the Ghorkhod P. A. is located in the western Khorassan-Kopet Dagh. More studies on the floristic composition of different habitats in Binalood and Kopet Dagh ranges may reveal the distinctiveness of the flora.

Anthropogenic and environmental changes decrease the resistance of ecosystem productivity to climate events and drive biodiversity loss, which probably causes ecosystem instability (Isbell 2015). The HWR has traditionally been used for grazing, harvesting for firewood, winter forage, and medical purposes. The most important medicinal plants include: *Nepeta binaloudensis* Jamzad (1991: 25) (Figure 4 d), *Hymenocrater* Fischer & Meyer (1835: 39) spp., *Stachys lavandulifolia* Vahl (1790: 42), *Ziziphora clinopodioides* Lamarck (1791: 63), *Ferula* Linnaeus (1753: 246) spp., *Elwendia* Linnaeus (1753: 243) spp., *Astragalus* spp., *etc.* Forage species as winter silages include *Medicago* Linnaeus (1753: 778) spp., *Onobrychis* Miller (1754: 970) spp., *Trifolium* Linnaeus (1753: 764) spp., grasses, and even thorny species like *Gundelia tournefortii* Linnaeus (1753: 814) (Figure 3 e). The additional other ecosystem services in the HWR contain clean water, hunting, climbing, tourism, *etc.* In recent years, the disturbing effect by the humans has arisen due to the return of aboriginal inhabitants to rural areas with new housing, introduction of invasive species, and increasing pressure of grazing (Figure 3 f). These disturbances have led to a more urgent necessity to organize conservation activities and recording the floristic richness.

Furthermore, the HWR is housing many endemic, rare, vulnerable or endangered species. For example, *Helictotrichon turcomanicum* Czopanov (1970: 23), a rare species, is reported as a second record in Iran after Memariani *et al.* (2016c). The type locality for *Cousinia amicorum* is located in the study area. *Carex serotina* subsp. *philocrena* Kukkonen (1984: 387) and *Linum album* Kotschy ex Boissier (1846a: 27), mainly distributed in central and western parts of Iran, are recorded as new to the flora of Khorassan. At least ten plant species such as *Nepeta binaloudensis* (Figure 4 d) and *Astragalus assadii* Maassoumi & Podlech (in Podlech & Maassoumi 1987: 98) are endangered taxa. Many species *viz.* *Astragalus catacamptus* Bunge (1870: 191), *A. controversus* Maassoumi & Podlech (in Podlech & Maassoumi 1987: 98), *etc.* are vulnerable and facing a high risk of extinction in the wild in the medium-term future (Figure 4, Appendix I). The HWR is the habitat of 114 species that are endemic to Iran or to the NE of Iran and neighbouring countries (Turkmenistan and Afghanistan). The HWR is known as the “Heaven of Mouflons” for supporting many herds of urials. Protection of the plant diversity of the HWR should be given urgent priority by government and the people of this region.

Conclusion

The occurrence of 588 species and infraspecific taxa of vascular plants in a semi-arid, continental climate condition, reveals the significance of the plant diversity of the Heydari Wildlife Refuge (HWR) in NE Iran. Diverse physiography and habitats such as springs, rivers, shallow aquifers as well as meadows, reflect the HWR harboring a diverse flora. The HWR with its high rate of plant endemism (19.56%) is home to two regionally endemic genera and 114 endemic and sub-endemic plant species. Considering the conservation status and the life-form of the plants, most of the endemics in the HWR are endangered or vulnerable which include hemicryptophytes or chamaephytes. Well-adapted to cold and drought, hemicryptophytes are dominant life-forms followed by therophytes, in the HWR. Chamaephytes as suffruticose or thorny cushions also play a major role in the vegetation, but minor in the life-form spectrum of the HWR. The HWR is located in the center of Khorassan-Kopet Dagh (KK) province of Irano-Turanian (IT) floristic

region. Approximately 69% of the HWR's flora encompasses IT elements. The “donor” character of the IT region to the neighboring areas, is extensible to the HWR because it has approximately 50% floristic similarities to the adjacent areas based on the Sørensen index, besides accommodating diverse elements of IT subdivisions. Judging from an annotated list of floristic composition and diverse plant formations (cushion steppes, grasslands, sparse woodlands, hydrophytes, *etc.*) resulted from this study, the HWR needs an urgent priority to the government and the aboriginals for conserving and maintaining the title “Heaven of Mouflons” by supporting the urial herds' habitat.

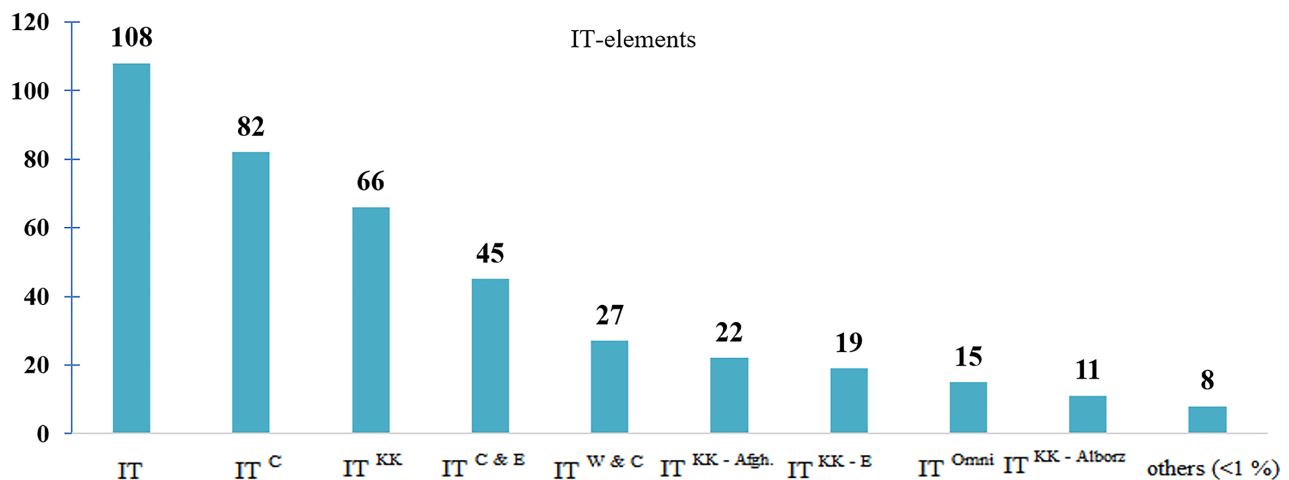


FIGURE 7. The numbers of Irano-Turanian elements in the flora of HWR. Delimitation and abbreviation of chorological subdivisions are based on Akhani (1998) and Memariani *et al.* (2016a). IT (or IT^{Omni}): Species distributed widely in the whole Irano-Turanian region or with a wide range that cannot be categorized within the subdivisions defined in this work; IT^{KK}: Mountainous areas in NE Iran and Kopet Dag range in southern Turkmenistan; IT^{KK-Afgh.}: Mountainous areas in the NE Iran and Kopet Dag range in the S Turkmenistan and also N and NW Afghanistan; IT^{W & C}: Preliminarily defined as the Anatolian and western Iranian montane and sub-montane flora; IT^C: Species whose distribution is confined to the montane and sub-montane areas and the steppes in Central Iran (southern slopes of the Alborz Range, eastern slopes of the Zagros Range), mountains in NE Iran and S Turkmenistan (IT^{KK}) and most of the west and central parts of Afghanistan; IT^E: Species occurring mainly in the Middle and Central Asia but with disjunct occurrences in one or a few localities in eastern Khorassan-Kopet Dag; IT^{Alborz}: Species exclusively distributed in the montane steppes along the Alborz Range.

Acknowledgements

We wish to thank the office of the Vice President for Research and Technology, Ferdowsi University of Mashhad for financial support (grant number: 33474). Special thanks go to the staff of “Department of Environment” of Razavi Khorassan Province for giving permission to collect the botanical specimens, and to the HWR's guard officers, especially Mr. Barakshahi, Hatami and Javanbakht for their invaluable cooperation in the field. We also wish to acknowledge with appreciation V. Jafari, Z. Maleki, H. Atashgahi and S. Tavakoli for the field trips, and Dr. Y. Nasseh for identification of *Astragalus* spp., Dr. F. Memariani for identification of the grasses and confirming the chorotypes, M.R. Joharchi for identification of several critical taxa, and M. Javidi for helping in the preparation of the maps.

References

- Adams, R.P., Morris, J.A. & Schwarzbach, A.E. (2008) Taxonomic study of *Juniperus excelsa* and *J. polycarpus* using SNPs from nrDNA and cp *trnC-trnD*, plus essential oils and RAPD data. *Phytologia* 90 (2): 208–225.
- Akhani, H. (1998) Plant Biodiversity of Golestan National Park, Iran. *Stapfia* 53: 1–411.
- Akhani, H. (2006) Flora Iranica: Facts and figures and a list of publications by K.H. Rechinger on Iran and Adjacent Areas. *Rostaniha* 7 (2): 19–61.
- APG IV (2016) An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants. APG IV. *Botanical Journal of the Linnean Society* 181: 1–20.

<https://doi.org/10.1111/boj.12385>

- Arjmandi, A.A., Sharghi, H.R., Memariani, F. & Joharchi, M.R. (2016) *Rosa kokanica* (Rosaceae) in Binaloud Mountains: A new record for the flora of Iran. *Iranian Journal of Botany* 22 (1): 11–15.
- Assadi, M., Maassoumi, A.A., Khatamsaz, M. & Mozaffarian, V. (Ed.) (1988–2013) *Flora of Iran*, vols. 1–77. Research Institute of Forests and Rangelands Publications, Tehran. [in Persian]
- Bali, A. & Bahmanpoor, A. (2012) *The map of protected areas in Iran*. Publication of Department of Environment of Iran.
- Boissier, E. (1846a) *Diagnoses Plantarum Orientalium Novarum*. ser. 1, No. 6. B. Hermann, Leipzig, 136 pp.
- Boissier, E. (1846b) *Diagnoses Plantarum Orientalium Novarum*. ser. 1, No. 7. B. Hermann, Leipzig, 130 pp.
- Boissier, E. (1867) *Flora Orientalis*. vol. 1. H. Georg, Basel, 1017 pp.
- Britten, J. (1916) *Reaumuria alternifolia* comb. nov. *Journal of Botany, British and Foreign* 54: 110–111.
- Bunge, A. von (1830) *Eremostachys* Bunge. In: Ledebour, C.F., Meyer, C.A. & Bunge, A. von, *Flora Altaica*, vol. 2. G. Reimer, Berlin, pp. 414–416.
- Bunge, A. von (1844) Hortorum botanicorum plantae novae et adnotationes in indicibus seminum a. 1843 depositae. *Linnaea* 18 (2): 145–494.
- Bunge, A. von (1870) Generis Astragali species Gerontogaeae, pars prior claves diagnosticae. *Mémoires de l'Académie impériale des sciences de St.-Petersbourg*, VIIe série 7 (15): 1–254.
- Cassini, H. (1827) Saussuree, *Saussurea*. In: Cuvier, F. (Ed.) *Dictionnaire des Sciences Naturelles*, vol. 47. Lavrault, Paris, pp. 494–513.
- Cavanilles, A.J. (1799) *Anales de Historia Natural*. En la Imprenta Real, Madrid, 306 pp.
- Christenhusz, M.J.M., Reveal, J.L., Farjon, A., Gardner, M.F., Mill, R.R. & Chase, M.W. (2011) A new classification and linear sequence of extant gymnosperms. *Phytotaxa* 19 (1): 55–70.
<https://doi.org/10.11646/phytotaxa.19.1.3>
- Czerniakowska, E.G. (1930) Letzte Neuheiten über die Flora Turkmenistans und Nordpersiens. *Repertorium Specierum Novarum Regni Vegetabilis* 27: 262–287.
<https://doi.org/10.1002/fedr.4870271606>
- Czopanzov, P. (1970) New species of grasses from Turkmenia. *Novosti Sistematiki Vysshikh Rastenii* 6: 22–24.
- Davis, S.D., Heywood, V.H. & Hamilton, A.C. (Eds.) (1994) *Centers of Plant Diversity: A guide and strategy for their Conservation*, vol. 1. Europe, Africa, South West Asia and the Middle East. IUCN Publications Unit, Cambridge, 354 pp.
- Desfontaines, R.L. (1799) *Flora Atlantica: sive historia plantarum quae in Atlante, agro tunetano et algeriensi crescunt*, vol. 2. L.G. Desgranges, Paris, 458 pp.
- Desvaux, N.A. (1814) Monographie du genre *Onobrychis*. *Journal de Botanique, Appliquée à l'Agriculture, à la Pharmacie, à la Médecine et aux Arts* 3: 79–84.
- Djamali, M., Brewer, S., Breckle, S.W. & Jackson, S.T. (2012) Climatic determinism in phytogeographic regionalization: A test from the Irano-Turanian region, SW and Central Asia. *Flora* 207: 237–249.
<https://doi.org/10.1016/j.flora.2012.01.009>
- Drobow, V.P. (1916) New plants from Turkestan. *Trudy Botaničeskago Muzeja Imperatorskoj Akademii Nauk* 16: 133–144.
- Encina-Domínguez, J.A., Estrada-Castillón, E., Villarreal Quintanilla, J.A., Villaseñor, J.L., Cantú-Ayala, C.M. & Arévalo, J.R. (2016) Floristic richness of the Sierra de Zapalinamé, Coahuila, Mexico. *Phytotaxa* 283 (1): 1–42.
<https://doi.org/10.11646/phytotaxa.283.1.1>
- Fedtschenko, B.A., Popov, M.G., Borisova, A.G., Raikova, I.A. & Rozhevits, R.Y. (1932) *Flora Turkmenii*. Turkmenskoe gosudarstvennoe izd., Ashkhabad.
- Fet, V. (1994) Biogeographic position of Khorassan-Kopet Dag. In: Fet, V. & Atamuradov, K.I. (Eds.) *Biogeography and Ecology of Turkmenistan*. Kluwer Academic Publisher, Dordrecht, pp. 197–204.
https://doi.org/10.1007/978-94-011-1116-4_12
- Fischer, F.E.L. von & Meyer, C.A. von (1835) *Index Seminum, quae Hortus Botanicus Imperialis Petropolitanus pro Mutua Commutatione Offert. Accedunt Animadversiones Botanicae Nonnullae*. Petropoli, St. Petersburg, 42 pp.
- Frey, J.F. (1902–1903) Plantae ex Asia media. *Bulletin de l'Herbier Boissier, Sér. 2* 3: 857–872.
- Fritsch, R.M. & Abbasi, M. (2013) *A Taxonomic Review of Allium subg. Melanocrommyum in Iran*. Leibniz-Institut für Pflanzengenetik und Kulturpflanzenforschung Gatersleben (IPK), Gatersleben, 240 pp.
- Frodin, D.G. (2004) History and concepts of big plant genera. *Taxon* 53 (3): 753–776.
<https://doi.org/10.2307/4135449>
- Gaudin, J. (1811) *Agrostologia Helvetica, definitionem descriptionemque graminum et plantarum eis affinium in Helvetia sponte nascentium complectens*. vol. 1. Paschoud, Geneva, 361 pp.
- Gahreman, A., Heydari, J., Attar, F. & Hamzeh'ee, B. (2006) A floristic study of the southwestern slopes of Binaloud elevations (Iran: Khorassan Province). *Journal of Science (University of Tehran)* 32 (1): 1–12.

- Ghahremaninejad, F. & Nejad Falatoury, A. (2016) An update on the flora of Iran: Iranian angiosperm orders and families in accordance with APG IV. *Nova Biologica Reperta* 3 (1): 80–107.
<https://doi.org/10.21859/acadpub.nbr.3.1.80>
- Govaerts, R. (2001) How many species of seed plants are there? *Taxon* 50 (4): 1085–1090.
<https://doi.org/10.2307/1224723>
- Gueldenstaedt, A.I. (1772) *Krascheninnikovia*, novum plantarum genus. *Novi Commentarii Academiae Scientiarum Imperialis Petropolitanae* 16: 548–560.
- Haller, A. von (1797) Tentamen additamentorum et observationum ad historiam stirpium helveticarum spectantium. *Archiv für die Botanik* 1 (2): 1–12.
- Hochstetter, C.F. (1848) Nachtraglicher Commentar zu meiner Abhandlung: “Aufbau der Graspflanze etc”. *Flora* 7: 105–118.
- Host, N.T. (1831) *Flora Austriaca*. vol. 2. Sumptibus Frider. Beck Bibliopolam University, Viennae, 768 pp.
- IRIMO (2016) *Analytical reports & climatic data*. I.R. of Iran Meteorological Organization. Available from: <http://www.irimo.ir/> (accessed 12 October 2016)
- Isbell, F., Craven, D., Connolly, J., Loreau, M., Schmid, B., Beierkuhnlein, C., Bezemer, T.M., Bonin, C., Bruelheide, H., de Luca, E., Ebeling, A., Griffin, J.N., Guo, Q., Hautier, Y., Hector, A., Jentsch, A., Kreyling, J., Lanta, V., Manning, P., Meyer, S.T., Mori, A.S., Naeem, S., Niklaus, P.A., Polley, H.W., Reich, P.B., Roscher, C., Seabloom, E.W., Smith, M.D., Thakur, M.P., Tilman, D., Tracy, B.F., van der Putten, W.H., van Ruijven, J., Weigelt, A., Weisser, W.W., Wilsey, B. & Eisenhauer, N. (2015) Biodiversity increases the resistance of ecosystem productivity to climate extremes. *Nature* 526 (7574): 574–577.
<https://doi.org/10.1038/nature15374>
- Jafari, S.M. & Akhiani, H. (2008) Plants of Jahan Nama Protected Area, Golestan Province, N. Iran. *Pakistan Journal of Botany* 40 (4): 1533–1554.
- Jalili, A. & Jamzad, Z. (1999) *Red Data Book of Iran*. Research Institute of Forests and Rangelands Publications, Tehran, 748 pp.
- Jamzad, Z. (1991) *Nepeta menthoides* Boiss. & Buhse and species allied to it in Iran. *Iranian Journal of Botany* 5 (1): 17–27.
- Jaubert, H.F. & Spach, É. (1843) *Illustrationes Plantarum Orientalium*, vol. 1. Apud Roret Bibliopolam, Paris.
- Jaubert, H.F. & Spach, É. (1844) *Illustrationes Plantarum Orientalium*, vol. 2. Apud Roret Bibliopolam, Paris.
- Kamakhina, G.L. (1994) Kopet Dagh-Khorassan flora: Regional features of Central Kopet Dagh. In: Fet, V. & Atamuradov, K.I. (Ed.) *Biogeography and Ecology of Turkmenistan*. Kluwer Academic Publisher, Dordrecht, pp. 129–148.
https://doi.org/10.1007/978-94-011-1116-4_8
- Koch, K.H.E. (1849) Beiträge zu einer Flora des Orientes. *Linnaea* 22: 177–596.
- Koeler, G.L. (1802) *Descriptio Graminum in Gallia et Germania tam sponte nascentium quam humana industria copiosius provenientium*. Francofurti ad Moenum, Varrentrapp et Wenner, 384 pp.
- Kukkonen, I.T.K. (1984) New infraspecific taxa and nomenclatural combinations in *Carex* (Cyperaceae) in the Flora Iranica area. *Annales Botanici Fennici* 21(4): 384–389.
- Lamarck, J.B.A.P.M. (1791) *Tableau encyclopédique et méthodique des trois règnes de la nature*. Botanique. Paris, 496 pp.
<https://doi.org/10.5962/bhl.title.218>
- Ledebour, C.F. (1829) *Flora Altaica*, vol. 1. G. Reimer, Berlin, 440 pp.
- Léonard, J. (1988) *Contribution à l'étude de la flore et de la végétation des desert d'Iran, Fascicule 8. Étude des Aries de distribution, Les phytchories, Les chorotypes*. Jardin Botanique National de Belgique, Meise, 190 pp.
- Léonard, J. (1993) Comparisons between the phytochorological spectra of three Iranian deserts and those of various surrounding regions. *Bulletin du Jardin Botanique National de Belgique* 62: 389–396.
<https://doi.org/10.2307/3668284>
- Lincevski, L.A. (1952) *Plumbaginaceae*. In: Komarov, V.L. (Ed.) *Flora of USSR*, vol. 18. Izdatel'stvo Akademi Nauk SSSR, Leningrad (English translation from Russian, JPST & Keter Press. 1968–2002), pp. 292–474.
- Linnaeus, C. (1753) *Species Plantarum*. Laurentius Salvius, Stockholm, 1200 pp.
- Linnaeus, C. (1763) *Species Plantarum*, vol. 2. 2nd Edition. Laurentius Salvius, Stockholm, pp. 785–1684.
- López-Vinyallonga, S., Mehregan, I., Garcia-Jacas, N., Tscherneva, O., Susanna, A. & Kadereit, W.J. (2009) Phylogeny and evolution of the *Arctium-Cousinia* complex (Compositae, Cardueae-Carduinae). *Taxon* 58 (1): 153–171.
- Maassoumi, A.A. (2005) *The Genus Astragalus in Iran*, vol. 5. Research Institute of Forests and Rangelands. Technical Publication, Tehran, 362 pp.
- Maassoumi, A.A. (2013) A contribution to the taxonomy of the genus *Oxytropis* (Fabaceae) in Iran. *Iranian Journal of Botany* 19 (1): 1–28.
- Manafzadeh, S., Salvo, G. & Conti, E. (2013) A tale of migrations from east to west: the Irano-Turanian floristic region as a source of Mediterranean xerophytes. *Journal of Biogeography* 41 (2): 366–379.
<http://dx.doi.org/10.1111/jbi.12185>

- Manafzadeh, S., Staedler, Y.M. & Conti, E. (2016) Visions of the past and dreams of the future in the Orient: the Irano-Turanian region from classical botany to evolutionary studies. *Biological Reviews* 92 (3): 1365–1388.
<https://doi.org/10.1111/brv.12287>
- Marschall von Bieberstein, F.A. (1810) *Centuria Plantarum Rariorum Rossiae Meridionalis*. Parte 1. Charkov.
- Medikus, F.K. (1789) *Philosophische Botanik mit kritischen Bemerkungen: Von den mannigfaltigen Umhüllungen der Saamen*, vol. 1. In der neuen Hof und Akademischen Buchhandlung, Mannheim, 266 pp.
- Mehregan, I. & Assadi, M. (2016) A synopsis of *Cousinia* sect. *Pseudactinia* (Cardueae, Asteraceae) including a new species from NE Iran. *Phytotaxa* 257 (3): 271–279.
<https://doi.org/10.11646/phytotaxa.257.3.5>
- Memariani, F., Joharchi, M.R. & Khassanov, F.O. (2007) *Allium* L. subgen. *Rhizirideum* sensu lato in Iran, two new records and a synopsis of taxonomy and phytogeography. *Iranian Journal of Botany* 13 (1): 12–20.
- Memariani, F., Joharchi, M.R., Ejtehadi, H. & Emadzade, Kh. (2009) A contribution to the flora and vegetation of Binalood mountain range, NE Iran: Floristic and chorological studies in Fereizi region. *Ferdowsi University International Journal of Biological Sciences* 1: 1–17.
- Memariani, F., Joharchi, M.R. & Arjmandi, A.A. (2012) A revision of *Bromus* sect. *Triniusia* (Poaceae) in Khorassan (Iran). *Rostaniha* 13 (2): 189–196.
- Memariani, F., Zarrinpour, V. & Akhiani, H. (2016a) A review of plant diversity, vegetation, and phytogeography of the Khorassan-Kopet Dagh floristic province in the Irano-Turanian region (northeastern Iran–southern Turkmenistan). *Phytotaxa* 249 (1): 8–30.
<https://doi.org/10.11646/phytotaxa.249.1.4>
- Memariani, F., Akhiani, H. & Joharchi, M.R. (2016b) Endemic plants of the Khorassan-Kopet Dagh floristic province in the Irano-Turanian region: diversity, distribution patterns and conservation status. *Phytotaxa* 249 (1): 31–117.
<https://doi.org/10.11646/phytotaxa.249.1.5>
- Memariani, F., Joharchi, M.R. & Akhiani, H. (2016c) Plant diversity of Ghorkhod Protected Area, NE Iran. *Phytotaxa* 249 (1): 118–158.
<https://doi.org/10.11646/phytotaxa.249.1.6>
- Meyer, C.A. von (1831) *Verzeichniss der Pflanzen des Caspischen Meeres*. Kaiserliche Academie der Wissenschaften, St. Petersburg, 241 pp.
- Miller, P. (1754) *The Gardeners Dictionary*. ed. 4. Printed for the author, London, without pagination.
- Mozaffarian, V. (2012) A revision of *Polygonum* L. *sensu lato* (Polygonaceae) in Iran. *Iranian Journal of Botany* 18 (2): 159–174.
- Nikan, M., Ejtehadi, H., Jankju, M., Memariani, F., Hasanpour, H. & Noadoost, F. (2012) Floristic composition and plant diversity under different grazing intensities: case study semi steppe rangeland, Baharkish, Quchan. *Iranian journal of Range and Desert Research* 19 (2): 306–320. [in Persian]
- Olivier, G.A. (1807) *Voyage dans l'empire Othoman, L'Égypte et la Perse, fait par ordre du gouvernement, pendant les six premières années de la République*, vol. 3. H. Agasse, Paris.
- Pirani, A., Moazzeni, H., Mirinejad, S., Naghibi, F. & Mosaddegh, M. (2011) Ethnobotany of *Juniperus excelsa* M. Bieb. (Cupressaceae) in Iran. *Ethnobotany Research & Applications* 9: 335–341.
<https://doi.org/10.17348/era.9.0.335-341>
- Podlech, D. & Maassoumi, A.A. (1987) Nine new taxa of the genus *Astragalus* sect. *Caprini* from Iran. *Iranian Journal of Botany* 3 (2): 95–110.
- PPG I (2016) A community-derived classification for extant lycophytes and ferns. *Journal of Systematics and Evolution* 54: 563–603.
<https://doi.org/10.1111/jse.12229>
- R Core Team (2016) R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria
 Available from: <https://www.R-project.org/> (accessed 1 February 2018)
- Ranjbar, M., Karamian, R., Olanj, N. & Johartchi, M.R. (2008) A key and four new species of *Hedysarum* (Fabaceae) in Iran. *Nordic Journal of Botany* 26: 10–20.
<https://doi.org/10.1111/j.1756-1051.2008.00114.x>
- Raunkiaer, C. (1934) *The Life Form of Plants and Statistical Plant Geography*. Clarendon Press, Oxford, 632 pp.
- Rechinger, K.H. (1940) Plantae novae iranicae. I. *Repertorium Specierum Novarum Regni Vegetabilis* 48: 33–48.
<https://doi.org/10.1002/fedr.4870482102>
- Rechinger, K.H. (1944) Ergebnisse einer botanischen Reise nach dem Iran, 1937. IV. Teil. *Annalen des Naturhistorischen Museums in Wien* 54 (2): 1–28.
- Rechinger, K.H. (1968) Notizen zur Orient-Flora, Nr. 104–108. *Anzeiger der Österreichische Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Klasse* 105: 241–245.
- Rechinger, K.H. (Ed.) (1963–2015) *Flora Iranica*, vols. 1–181. Akademische Druck- u. Verlagsanstalt, Graz; vol. 175. Akademische Verlagsgesellschaft, Salzburg; vols. 176–181. Verlag des Naturhistorischen Museums, Wien.

- Schlechtendal, D.F.L. (1819) *Animadversiones botanicae in Ranunculeas Candollii*. vol. 1. Typis Ioannis Friderici Starckii, Berolini, 30 pp.
- Schmalhausen, J. (1892) Neue Pflanzenarten aus dem Kaukasus. *Berichte der Deutsche Botanischen Gesellschaft* 10: 284–294.
- Schrenk, A.G. von (1841) *Enumeratio plantarum novarum a cl. Schrenk lectarum*. Petropoli, 77 pp.
- Spach, É. (1843) Monographia generis *Amygdalus*. *Annales des Sciences Naturelles; Botanique, sér: 2* 19: 106–128.
- Steudel, E.G. von (1841) *Nomenclator Botanicus*. Editio secunda, part II. Typus et Sumptibus J.G. Cottae, Stutgartiae et Tubingae, 810 pp.
- Stocks, J.E. (1852) Notes on Beloochistan plants. *Hooker's Journal of Botany and Kew Garden Miscellany* 4: 142–150.
- Takhtajan, A. (1986) *Floristic Regions of the world*. Translated by Milderred, E. M., University of California Press, 522 pp.
- Tavakkoli, S., Kazempour Osaloo, S. & Mozaffarian, V. (2014) *Atraphaxis binaludensis* (Polygonaceae), a new species from northeastern Iran. *Iranian Journal of Botany* 20 (1): 1–4.
- Trinius, C.B. von (1831) Graminum genera quaedam speciesque complures descriptionibus illustravit. *Mémoires de l'Académie Imperiale des Sciences. Sér. 6, Sciences Mathématiques, Physiques et Naturelles* 1: 54–93.
- Trinius, C.B. von & Ruprecht, F.J. (1842) *Species Graminum Stipaceorum*. Typis Academiae Imperialis Scientiarum, Petropoli, 189 pp.
- Tscherneva, O.B., Joharchi, M.R. & Ghahremani-nejad, F. (2005) *Cousinia amicorum* Tschern., Joharchi et Ghahremani-nejad, *sp. nov* (sect. *Sciadocousinia* Tschern.). *Botanicheskii Zhurnal* 90 (3): 411–412. [in Russian with English abstract]
- Tzvelev, N.N. (1976) *Grasses of the Soviet Union*. Nauka Publishers, Leningrad.
- Vahl, M. (1790) *Symbolae botanicae, sive plantarum, tam earum, quas in itinere, imprimis orientali*. Part 1. Impensis auctoris, excudebant N. Möller et filius, Hauniae, 85 pp.
- Zohary, M. (1973) *Geobotanical Foundations of the Middle East*. 2 vols. Gustav Fischer Verlag, Stuttgart, 765 pp.

Appendix I. Checklist of vascular plants of the HWR. Life-forms: Ch (chamaephyte), G.b (bulbous geophyte), G.c (cormous geophyte), G.t (tuberous geophyte), G.r (rhizomatous geophyte), G.p (parasitic geophyte), He (hemicyptophyte), Ph (phanerophyte), Th (therophyte). Chorotypes according to Akhani (1998) and Memariani *et al.* (2009, 2016a,b,c). IT: Irano-Turanian (for chorological subdivisions of IT elements, refer to Fig. 7); ES: Euro-Siberian; M: Mediterranean; SS: Sahara-Sindian; COS: Cosmopolitan; SCO: Sub-cosmopolitan; PL: Pluri-regional. Iranian endemics are marked by one and regional endemics by two asterisks. Threat categories are given only for those species evaluated by Jalili & Jamzad (1999) [1] and Memariani *et al.* (2016b) [2] for plant species of Iran: EN (Endangered), VU (Vulnerable), LR (Lower Risk), DD (Data Deficient), LC (Least Concern), and NT (Near Threatened). All specimens are preserved in the Faculty of Science Herbarium, Ferdowsi University of Mashhad (FUM). Some duplicates are deposited in the Herbarium of Ferdowsi University of Mashhad (FUMH) and Herbarium of Noshahr Botanical Garden (HNBG).

No.	Families and species/infraspecific taxa	Life-form	Chorotype	Threat category [Ref.]	Herbarium No.
Amaranthaceae Juss. (including Chenopodiaceae Vent.)					
1	<i>Ceratocarpus arenarius</i> L.	Th	IT ^{C & E}		7200
2	<i>Chenopodium foliosum</i> Asch.	Th	PL		7201
3	<i>Chenopodium glaucum</i> L.	Th	PL		7202
4	<i>Dysphania botrys</i> (L.) Mosyakin & Clemants (= <i>Chenopodium botrys</i> L.)	Th	PL		7203, 8084
5	<i>Krascheninnikovia ceratoides</i> (L.) Gueldenst.	Ch	IT-ES-M		7204, 8082–3
6	<i>Noaea mucronata</i> (Forssk.) Asch. & Schweinf.	Ch	IT-ES-M		7205, 8081
7	<i>Salsola arbusculiformis</i> Drobow	Ch	IT ^{KK-E}		7206, 8080
8	<i>Spinacia turkestanica</i> Iljin	Th	IT ^{C & E}		7207
Amaryllidaceae J.St.-Hil.					
9	<i>Allium ampeloprasum</i> L.	G.b	IT-ES-M		7208, 8079
10	<i>Allium atroviolaceum</i> Boiss.	G.b	IT		7209
11	<i>Allium cristophii</i> Trautv.	G.b	IT ^{KK*}	LC [2]	7210, 8079
12	<i>Allium ellisii</i> Hook.f.	G.b	IT ^{KK*}	VU [2]	7211
13	<i>Allium kopetdagense</i> Vved.	G.b	IT ^{KK}	LC [2]	7212
14	<i>Allium kuhshorkhense</i> R.M.Fritsch & Joharchi	G.b	IT ^{KK*}	NT [2]	7213, 7078, 8078
15	<i>Allium rubellum</i> M.Bieb.	G.b	IT ^{Cauc.-Turk.}		7214, 8077
16	<i>Allium scabriscapum</i> Boiss.	G.b	IT ^{W & C}		7215, 7076
17	<i>Allium tenuicaule</i> Regel	G.b	IT ^{KK-E}		7216, 8075
18	<i>Allium xiphopetalum</i> Aitch. & Baker	G.b	IT ^{C & E}		7217, 8074
Apiaceae Lindl.					
19	<i>Bupleurum falcatum</i> L.	Ch	IT ^{Omni}		7222, 8067, 8068
20	<i>Chaerophyllum macrospermum</i> (Willd. ex Spreng.) Fisch. & C.A.Mey. ex Hohen.	G.t	IT ^{Omni}		7223, 8066
21	<i>Conium maculatum</i> L.	He	PL		7224
22	<i>Elwendia afghanica</i> (Beauverd) Pimenov & Kljuykov	G.t	IT ^{KK-E}		7218, 8071–3
23	<i>Elwendia cylindrica</i> (Boiss. & Hausskn.) Pimenov & Kljuykov	G.t	IT		7219, 8069–70
24	<i>Elwendia intermedia</i> (Korovin) Pimenov & Kljuykov	G.t	IT ^{KK-E}		7220
25	<i>Elwendia persica</i> (Boiss.) Pimenov & Kljuykov	G.t	IT ^{C & E}		7221, 8064
26	<i>Eryngium billardieri</i> F.Delaroche	He	IT ^C		7225
27	<i>Eryngium bungei</i> Boiss.	He	IT ^C		7226, 8065
28	<i>Falcaria vulgaris</i> Bernh.	He	IT-ES-M		7227
29	<i>Ferula alliacea</i> Boiss.	He	IT ^{C*}		7228
30	<i>Ferula diversivittata</i> Regel & Schmalh.	He	IT ^{C & E}		7229, 8063
31	<i>Ferula flabelliloba</i> Rech.f. & Aellen	He	IT ^{KK*}	VU [1], EN [2]	7230
32	<i>Ferula gummosa</i> Boiss.	He	IT ^C	LR [1]	7231
33	<i>Ferula ovina</i> (Boiss.) Boiss.	He	IT ^{C & E}		7232, 8061, 8085
34	<i>Ferula szowitziana</i> DC.	He	IT ^{W & C}		7233
35	<i>Galagania tenuisecta</i> (Regel & Schmalh.) M.G.Vassiljeva & Pimenov	G.t	IT ^{KK-E}		7234
36	<i>Heracleum persicum</i> Desf. ex Fisch., C.A.Mey. & Avé-Lall.	He	IT ^C		7235
37	<i>Johrenia platycarpa</i> Boiss.	He	IT ^{C*}		7236, 8060
38	<i>Pimpinella tragium</i> Vill.	He	IT-ES-M		7237
39	<i>Prangos latiloba</i> Korovin	He	IT ^C		7238, 8059

No.	Families and species/infraspecific taxa	Life-form	Chorotype	Threat category [Ref.]	Herbarium No.
40	<i>Pseudotrachydium vesiculososulatum</i> (Rech.f.) Pimenov & Kljuykov	Ch	IT ^{KK-Afgh.}		7239, 45496(FUMH)
41	<i>Scandix stellata</i> Banks & Sol.	Th	IT-M		7240, 8057-8
42	<i>Semenovia tragioides</i> (Boiss.) Pimenov & V.N. Tikhom.	He	IT ^C		7241
43	<i>Turgenia latifolia</i> (L.) Hoffm.	Th	IT-M		7242
44	<i>Zeravschania aucheri</i> (Boiss.) Pimenov	He	IT ^{C*}		7243, 8055-6, 8062
45	<i>Zosima absinthifolia</i> Link Apocynaceae Juss.	He	IT ^{Omni}		7244
46	<i>Vincetoxicum pumilum</i> Decne. Araceae Juss.	He	IT ^{KK}	LR [1], LC [2]	7245
47	<i>Arum rupicola</i> Boiss. Asparagaceae Juss.	G.t	IT ^{W & C}		7246, 8113
48	<i>Asparagus breslerianus</i> Schult. & Schult.f.	Ch	IT ^{Omni}		7247
49	<i>Bellevalia saviczii</i> Woronow	G.b	IT ^C		7248, 8054
50	<i>Fessia khorassanica</i> (Meikle) Speta	G.b	IT ^{KK*}	DD [1], VU [2]	7249, 8052-3
51	<i>Hyacinthus litwinovii</i> Czerniak.	G.b	IT ^{KK}	LR [1], NT [2]	7250, 8051
52	<i>Muscari neglectum</i> Guss. ex Ten.	G.b	IT-ES-M		7251
53	<i>Polygonatum sewerzowii</i> Regel Asphodelaceae Juss.	G.r	IT ^{KK-E}		7252, 8050
54	<i>Eremurus luteus</i> Baker	G.r	IT ^C		7779
55	<i>Eremurus olgae</i> Regel	G.r	IT ^{KK-E}		7780, 7784
56	<i>Eremurus spectabilis</i> M.Bieb.	G.r	IT		7781
57	<i>Eremurus stenophyllus</i> (Boiss. & Buhse) Baker (= <i>Eremurus stenophyllus</i> subsp. <i>stenophyllus</i>)	G.r	IT ^{C & E*}	LR [1]	7782
58	<i>Eremurus stenophyllus</i> subsp. <i>aurantiacus</i> (Baker) Wendelbo Aspleniaceae Newman	G.r	IT ^E		7783
59	<i>Asplenium ruta-muraria</i> L. Asteraceae Bercht. & J.Presl	G.r	COS		7253
60	<i>Achillea arabica</i> Kotschy	He	PL		7254
61	<i>Achillea santolinoides</i> subsp. <i>wilhelmsii</i> (K.Koch) Greuter (= <i>Achillea wilhelmsii</i> K.Koch)	He	IT		7255
62	<i>Arctium lappa</i> L.	He	PL		7256
63	<i>Arctium umbrosum</i> (Bunge) Kuntze	He	IT ^{KK-E}		8037-8038
64	<i>Artemisia kopetdaghensis</i> Krasch., Popov & Lincz. ex Poljakov	Ch	IT ^{KK-Afgh.}		7257, 8048-9
65	<i>Artemisia scoparia</i> Waldst. & Kitam.	Ch	PL		7258
66	<i>Centaurea behen</i> L.	He	IT		7259
67	<i>Centaurea benedicta</i> (L.) L. (= <i>Cnicus benedictus</i> L.)	Th	IT-M		7260
68	<i>Centaurea iberica</i> Trevir. ex Spreng.	He	IT-ES ^{EH}		7261
69	<i>Centaurea virgata</i> Lam.	Ch	IT		7262, 8047
70	<i>Chardinia orientalis</i> (L.) Kuntze	Th	IT ^{W & C}		7263, 8046, 8087
71	<i>Cichorium intybus</i> L.	He	PL		7264
72	<i>Cirsium arvense</i> (L.) Scop.	He	PL		7265
73	<i>Cirsium bornmuelleri</i> Sint. ex Bornm.	He	IT ^{KK}	VU [2]	7266, 8045
74	<i>Cirsium pseudolappaceum</i> Kharadze	He	IT ^{KK-E}		7267
75	<i>Cirsium sorocephalum</i> Fisch. & C.A.Mey. (= <i>Cirsium congestum</i> Fisch. & C.A.Mey. ex DC.)	He	IT		7268
76	<i>Cirsium vulgare</i> (Savi) Ten.	He	PL		7269
77	<i>Cousinia amicorum</i> Tscherneva, Joharchi & Ghahrem.-Nejad	He	IT ^{KK*}	VU [2]	7270, 45486(FUMH)
78	<i>Cousinia attariae</i> Assadi & Joharchi	He	IT ^{KK*}	EN [2]	7271
79	<i>Cousinia bienertii</i> Bunge	He	IT ^{KK*}	DD [1], EN [2]	7273
80	<i>Cousinia concolor</i> Bunge	He	IT ^{KK-Alborz*}	DD [1]	7272, 8043
81	<i>Cousinia congesta</i> Bunge	He	IT ^C		7274, 8044
82	<i>Cousinia deserti</i> Bunge	He	IT ^C		7275

No.	Families and species/infraspecific taxa	Life-form	Chorotype	Threat category [Ref.]	Herbarium No.
83	<i>Cousinia elata</i> Boiss. & Buhse	He	IT ^{KK-Alborz*}		7276
84	<i>Cousinia eryngioides</i> Boiss.	He	IT ^{C*}		7277, 8042
85	<i>Cousinia euchlora</i> Bornm. & Rech.f.	He	IT ^{KK}	VU [1,2]	7278
86	<i>Cousinia freynii</i> Bornm. & Sint.	He	IT ^{KK*}	EN [2]	7279
87	<i>Cousinia lasiandra</i> Bunge	He	IT ^{C*}	LR [1]	8124
88	<i>Cousinia lasiolepis</i> Boiss.	He	IT ^{C*}		7280, 8041, 45487–8(FUMH)
89	<i>Cousinia microcarpa</i> Boiss.	He	IT ^{KK-Afgh.}		7281
90	<i>Cousinia multiloba</i> DC.	He	IT ^C		7282
91	<i>Cousinia smirnowii</i> Trautv.	He	IT ^{KK*}		7283, 8039, 8040
92	<i>Cousinia stahliana</i> Bornm. & Gauba	He	IT ^{KK*}	NT [2]	7284
93	<i>Cousinia verbascifolia</i> Bunge	He	IT ^{KK*}	LR [1], NT [2]	7285
94	<i>Crepis pulchra</i> L.	Th	IT		7286
95	<i>Crepis turcomanica</i> Krasch.	G.r	IT ^{KK}	NT [2]	7287, 8036
96	<i>Cyanus depressus</i> (M.Bieb.) Soják (= <i>Centaurea depressa</i> M.Bieb.)	Th	IT		7288
97	<i>Cymbolaena griffithii</i> (A.Gray) Wagenitz	Th	IT		7289, 8035
98	<i>Echinops leiopolyceroides</i> Mozaff.	He	IT ^{KK*}	LC [2]	7290
99	<i>Echinops orientalis</i> Trautv.	He	IT ^{W & C}		7291
100	<i>Echinops ritrodes</i> Bunge	He	IT ^C		7292, 8034
101	<i>Erigeron acris</i> subsp. <i>pyncotrichus</i> (Vierh.) Grierson	He	PL		7293, 8032–3
102	<i>Garhadiolus hedynois</i> Jaub. & Spach (= <i>Garhadiolus angulosus</i> Jaub. & Spach)	Th	IT		7294
103	<i>Gundelia tournefortii</i> L.	He	IT		7295
104	<i>Helichrysum ocephalum</i> Boiss.	He	IT ^C		7296
105	<i>Inula peacockiana</i> (Aitch. & Hemsl.) Korovin (= <i>Codonocephalum peacockianum</i> Aitch. & Hemsl.)	He	IT		7297
106	<i>Inula rhizocephala</i> Schrenk	G.r	IT ^{C & E}		7298
107	<i>Jurinea radians</i> Boiss.	He	IT ^{C*}	DD [1]	7299
108	<i>Jurinea sintenisii</i> Bornm.	Ch	IT ^{KK}	DD [1], LC [2]	7300, 8031
109	<i>Koelpinia linearis</i> Pall.	Th	IT-SS		7301, 8030
110	<i>Lactuca orientalis</i> (Boiss.) Boiss. (= <i>Scariola orientalis</i> Boiss.)	Ch	IT		7302, 8028
111	<i>Lactuca persica</i> Boiss.	G.t	IT		7303, 8029
112	<i>Lactuca serriola</i> L.	He	IT-ES-M		7304
113	<i>Launaea acanthodes</i> (Boiss.) Kuntze	Ch	IT ^C		7305
114	<i>Leontodon asperrimus</i> (Willd.) Endl.	He	IT ^{W & C}		7306
115	<i>Onopordum leptolepis</i> DC.	He	IT		7307
116	<i>Picnomon acarna</i> (L.) Cass.	He	IT-M		7308
117	<i>Pulicaria gnaphalodes</i> (Vent.) Boiss.	Ch	IT ^C		7309
118	<i>Rhaponticum repens</i> (L.) Hidalgo (= <i>Acroptilon repens</i> (L.) DC.)	He	PL		7310
119	<i>Sclerorhachis platyrachis</i> (Boiss.) Podlech ex Rech.f.	He	IT ^{KK}	LC [2]	7311
120	<i>Scorzonera laciniata</i> Jacq.	He	IT-ES-M		7312
121	<i>Scorzonera leptophylla</i> (DC.) Krasch. & Lipsch.	G.t	IT ^{Cauc.-Turk.}		7316, 8146
122	<i>Scorzonera phaepappa</i> (Boiss.) Boiss.	G.t	IT ^{W & C}		7313, 8027, 8023
123	<i>Scorzonera raddeana</i> C.Winkl.	G.t	IT ^C		7317, 8026
124	<i>Scorzonera stenocephala</i> Boiss.	G.t	IT ^{W & C*}	LR [1]	7314, 8022
125	<i>Scorzonera szovitzii</i> DC.	G.t	IT ^{Cauc.-Alburz}		7315
126	<i>Scorzonera tunicata</i> Rech.f. & Köie	G.t	IT ^C		8148
127	<i>Senecio paulsenii</i> subsp. <i>khorsanicus</i> (Rech.f. & Aellen) B.Nord.	G.r	IT ^C		7318, 8025
128	<i>Serratula latifolia</i> Boiss.	He	IT ^C		7319
129	<i>Sonchus oleraceus</i> (L.) L.	Th	PL		7320
130	<i>Tanacetum khorsanicum</i> (Krasch.) Parsa	He	IT ^{KK*}	DD [1], NT [2]	7321, 8156
131	<i>Tanacetum parthenium</i> (L.) Sch.Bip.	He	PL		7322, 8155

No.	Families and species/infraspecific taxa	Life-form	Chorotype	Threat category [Ref.]	Herbarium No.
132	<i>Taraxacum afghanicum</i> Soest	He	IT ^E		7323
133	<i>Taraxacum microcephaloides</i> Soest	He	IT		7326
134	<i>Taraxacum sonchoides</i> (D.Don) Sch.Bip. (= <i>Taraxacum montanum</i> (C.A.Mey.) DC.)	He	IT		7329
135	<i>Taraxacum</i> sp.	He			7324–5, 7327–8, 8147
136	<i>Taraxacum syriacum</i> Boiss.	He	IT		7330–1
137	<i>Thevenotia persica</i> DC.	Th	IT ^C		7332
138	<i>Tragopogon collinus</i> DC.	He	IT ^C		7333, 8021, 8154
139	<i>Tragopogon gaudanicus</i> Boriss.	He	IT ^C		7334
140	<i>Tragopogon montanus</i> S.A.Nikitin	He	IT ^{C & E}		7335, 8024
141	<i>Tragopogon vaginatus</i> Ownbey & Rech.f.	He	IT ^{W & C}		7336
142	<i>Tripleurospermum disciforme</i> (C.A.Mey.) Sch.Bip.	Th	IT		7337, 8086
143	<i>Tussilago farfara</i> L.	G.t	IT-ES-M		7338
144	<i>Varthemia persica</i> DC.	Ch	IT ^C		7339
145	<i>Xanthium spinosum</i> L.	Th	COS		7340
146	<i>Xeranthemum longepapposum</i> Fisch. & C.A.Mey.	Th	IT		7341
Berberidaceae Juss.					
147	<i>Berberis integerrima</i> Bunge	Ph	IT		7342, 8018–20, 8122
148	<i>Bongardia chrysogonum</i> (L.) Spach	G.t	IT		7343, 8017
149	<i>Leontice leontopetalum</i> L.	G.t	IT-M		7344, 8016
Biebersteiniaceae Schnizl.					
150	<i>Biebersteinia multifida</i> DC.	G.t	IT		7345, 8088
Boraginaceae Juss.					
151	<i>Anchusa azurea</i> Mill.	He	IT-ES		7346
152	<i>Asperugo procumbens</i> L.	Th	PL		7347
153	<i>Buglossoides tenuiflora</i> (L.f.) I.M.Johnst.	Th	IT-M		7348
154	<i>Caccinia macranthera</i> (Banks & Sol.) Brand	Th	IT		7349
155	<i>Echium italicum</i> L.	He	IT-M		7350
156	<i>Heterocaryum szovitsianum</i> (Fisch. & C.A.Mey.) A.DC.	Th	IT		7613
157	<i>Lappula barbata</i> (M.Bieb.) Gürke	Th	IT-M		7351, 8015, 8089
158	<i>Lappula microcarpa</i> (Ledeb.) Gürke	Th	IT		7352, 8012–4
159	<i>Lappula sessiliflora</i> Gürke	Th	IT		7353
160	<i>Lappula sinaica</i> (A.DC.) Asch. & Schweinf.	Th	IT		7354
161	<i>Myosotis stricta</i> Link ex Roem. & Schult.	Th	IT-ES-M		7355
162	<i>Nonnea caspica</i> G. Don	Th	IT		7356
163	<i>Onosma dichroantha</i> Boiss.	He	IT ^{W & C}		7357
164	<i>Onosma longiloba</i> Bunge	He	IT ^{KK-Alborz}		7358, 8011, 8090
165	<i>Paracaryum heratense</i> (Rech.f. & Riedl) Kamelin	He	IT ^{KK-Afgh.}		7359
166	<i>Rochelia cardiosepala</i> Bunge	Th	IT		7360
167	<i>Rochelia disperma</i> (L.f.) K.Koch	Th	IT ^C		7361, 8010
168	<i>Rochelia peduncularis</i> Boiss.	Th	IT		7362, 8009
169	<i>Rochelia persica</i> Bunge ex Boiss.	Th	IT		7363, 8008, 8140
Brassicaceae Burnett					
170	<i>Aethionema carneum</i> (Banks & Sol.) B.Fedtsch.	Th	IT		7364, 8007
171	<i>Aethionema trinervium</i> (DC.) Boiss.	Ch	IT		7365, 8006
172	<i>Alliaria petiolata</i> (M.Bieb.) Cavara & Grande	He	IT-ES-M		8127
173	<i>Alyssum alyssoides</i> (L.) L.	Th	IT-ES-M		7366, 8005
174	<i>Alyssum dasycarpum</i> Stephan ex Willd.	Th	IT		7367
175	<i>Alyssum desertorum</i> Stapf	Th	IT-ES-M		7368
176	<i>Alyssum heterotrichum</i> Boiss.	Th	IT ^C		7369
177	<i>Alyssum lanceolatum</i> Baumg.	Ch	IT ^{KK-Afgh.}		7370, 8001–4
178	<i>Alyssum linifolium</i> Stephan ex Willd.	Th	IT-M		7371, 8103
179	<i>Alyssum singarense</i> Boiss. & Hausskn.	He	IT ^W		7372, 7998–8000
180	<i>Alyssum stapfii</i> Vierh.	Th	IT		7373, 7997
181	<i>Alyssum szovitsianum</i> Fisch. & C.A.Mey.	Th	IT ^C		7374, 7995–6
182	<i>Alyssum turkestanicum</i> Regel & Schmalh.	Th	IT ^{C & E}		7375, 8091

No.	Families and species/infraspecific taxa	Life-form	Chorotype	Threat category [Ref.]	Herbarium No.
183	<i>Arabis nova</i> Vill.	Th	IT-ES-M		7376, 8120
184	<i>Asperuginoides axillaris</i> (Boiss. & Hohen.) Rauschert (= <i>Buchingera axillaris</i> Boiss. & Hohen.)	Th	IT	LR [1]	7377
185	<i>Barbarea plantaginea</i> DC.	He	IT		7378, 7994
186	<i>Brassica elongata</i> Ehrh.	He	IT-ES-M		7379
187	<i>Camelina rumelica</i> Velen.	Th	IT-ES-M		7380
188	<i>Capsella bursa-pastoris</i> (L.) Medik.	Th	PL		7381
189	<i>Chorispota tenella</i> (Pall.) DC.	Th	IT ^{Omni}		7382, 8119
190	<i>Clypeola jonthlaspi</i> L.	Th	IT-M		7383, 7993
191	<i>Conringia clavata</i> Boiss.	Th	IT		7384, 8118
192	<i>Conringia orientalis</i> (L.) Dumort.	Th	IT-ES-M		7385, 7992
193	<i>Crambe cordifolia</i> subsp. <i>kotschyana</i> (Boiss.) Jafri (= <i>Crambe kotschyana</i> Boiss.)	He	IT		7386
194	<i>Descurainia sophia</i> (L.) Webb ex Prantl	Th	PL		7387
195	<i>Diptychocarpus strictus</i> (Fisch. ex M.Bieb.) Trautv.	Th	IT-ES		7388
196	<i>Draba nuda</i> (Bél.) Al-Shehbaz & M.Koch (= <i>Drabopsis verna</i> K.Koch)	Th	IT-ES-M		7389, 8092
197	<i>Erophila verna</i> (L.) DC.	Th	PL		7390
198	<i>Erysimum badghisi</i> (Korsh.) Lipsky ex N.Busch	He	IT ^{KK-Afgh.}		7391
199	<i>Erysimum ischnostylum</i> Freyn & Sint	He	IT ^{KK-Afgh.}		7392, 7989–91
200	<i>Euclidium syriacum</i> (L.) R.Br.	Th	IT		7393
201	<i>Fibigia suffruticosa</i> (Vent.) Sweet	Ch	IT ^C		7394, 7988
202	<i>Goldbachia laevigata</i> (M.Bieb.) DC.	Th	IT		7395
203	<i>Graellsia integrifolia</i> (Rech.f.) Rech.f.	He	IT ^{KK*}	LR [1], NT [2]	7396
204	<i>Lepidium draba</i> L. (= <i>Cardaria draba</i> (L.) Desv.)	He	IT-ES		7397, 7987
205	<i>Lepidium latifolium</i> L.	He	IT-ES-M		7398, 7986
206	<i>Lepidium litwinowii</i> (Lipsky) Al-Shehbaz (= <i>Stroganowia litwinowii</i> Lipsky)	He	IT ^{KK}	NT [2]	7399, 7985
207	<i>Litwinowia tenuissima</i> (Pall.) Woronow ex Pavlov (= <i>Euclidium tenuissimum</i> (Pall.) B.Fedtsch.)	Th	IT ^{C & E}		7400
208	<i>Malcolmia africana</i> (L.) R.Br.	Th	IT-M-SS		7401
209	<i>Matthiola afghanica</i> Rech. fil. & Koie	He	IT ^{KK-Afgh.}		7402, 8101
210	<i>Matthiola alyssifolia</i> Bornm.	He	IT ^{C & E}		7403, 7984
211	<i>Neotorularia dentata</i> (Freyn & Sint.) Hedge & J. Léonard	Th	IT ^C		7404
212	<i>Pachypterygium brevipes</i> Bunge	Th	IT ^{C & E}		8102
213	<i>Peltaria angustifolia</i> DC.	Th	IT ^C		7406, 8117
214	<i>Pseudoclasia turkestanica</i> (Lipsky) A.V.Vassil.	He	IT ^{KK-E}		7407, 7982–3
215	<i>Sisymbrium loeselii</i> L.	Th	IT-ES		7408
216	<i>Sisymbrium septulatum</i> DC.	Th	IT		7409
217	<i>Tauscheria lasiocarpa</i> Fisch. ex DC.	Th	IT		7410
218	<i>Thlaspi arvense</i> L.	Th	PL		7411
Capparaceae Juss.					
219	<i>Capparis spinosa</i> L.	Ph	SCO		7412
Caprifoliaceae Juss.					
220	<i>Cephalaria microcephala</i> Boiss.	He	IT ^C		7460, 7953
221	<i>Lomelosia olivieri</i> (Coul.) Greuter & Burdet (= <i>Scabiosa olivieri</i> Coul.)	Th	IT		7413
222	<i>Lonicera nummulariifolia</i> Jaub. & Spach	Ph	IT		7414, 7980–1, 4887(HNMG)
223	<i>Pteroccephalus afghanicus</i> Boiss.	He	IT ^C		7461
224	<i>Valeriana sisymbriifolia</i> Vahl	He	IT ^{W & C}		7415, 7979
225	<i>Valerianella cymbocarpa</i> C.A.Mey.	Th	IT		7416
226	<i>Valerianella oxyrhyncha</i> Fisch. & C.A.Mey.	Th	IT		7417, 7978
227	<i>Valerianella plagiostephana</i> Fisch. & C.A.Mey.	Th	IT		7418
228	<i>Valerianella szovitsiana</i> Fisch. & C.A.Mey.	Th	IT ^{Omni}		7419, 7976
229	<i>Valerianella tuberculata</i> Boiss.	Th	IT		7420, 7977
Caryophyllaceae Juss.					

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230	<i>Acanthophyllum adenophorum</i> Freyn	Ch	IT ^{KK}	LC [2]	7421, 7975
231	<i>Acanthophyllum glandulosum</i> Bunge ex Boiss.	Ch	IT ^{C & E}		7422, 7972–4
232	<i>Acanthophyllum korshinskyi</i> Schischk.	Ch	IT ^{KK-Afgh.}		8158
233	<i>Acanthophyllum pachystegium</i> Rech.f.	Ch	IT ^C		7423
234	<i>Bufonia oliveriana</i> Ser.	Ch	IT ^C		7424
235	<i>Bufonia sintenisii</i> Freyn	Ch	IT ^{KK-Afgh.}		7425, 7971
236	<i>Cerastium dichotomum</i> L.	Th	IT		7426, 7970
237	<i>Cerastium dichotomum</i> subsp. <i>inflatum</i> Cullen (= <i>Cerastium inflatum</i> Link ex Desf.)	Th	IT		7427
238	<i>Dianthus crinitus</i> subsp. <i>turcomanicus</i> (Schischk.) Rech.f.	Ch	IT ^{KK-Afgh.}		7428, 7969
239	<i>Dianthus polylepis</i> Bien. ex Boiss.	Ch	IT ^{KK}	VU [1,2]	7429, 8138
240	<i>Diaphanoptera khorasanica</i> Rech.f.	Ch	IT ^{KK*}	VU [1,2]	8125–6
241	<i>Gypsophila</i> sp.	He			7430
242	<i>Herniaria glabra</i> L.	Th	IT-M		7431
243	<i>Holosteum umbellatum</i> subsp. <i>glutinosum</i> (M.Bieb.) Nyman (= <i>Holosteum glutinosum</i> (M.Bieb.) Fisch. & C.A.Mey.)	Th	IT		7432, 7968
244	<i>Lepyrodiclis holosteoides</i> (C.A.Mey.) Fenzl ex Fisch. & C.A.Mey.	Th	IT		7433
245	<i>Lepyrodiclis holosteoides</i> × <i>stellarioides</i>	Th	IT ^{C & E}		7442
246	<i>Lepyrodiclis stellarioides</i> Fisch. & C.A.Mey.	Th	IT ^C		7434, 8093
247	<i>Mesostemma kotschyana</i> (Fenzl ex Boiss.) Vved.	He	IT		7435, 7966–7
248	<i>Minuartia hamata</i> (Hauskn.) Mattf.	Th	IT-M		7436
249	<i>Minuartia meyeri</i> (Boiss.) Bornm.	Th	IT		7437, 7965
250	<i>Silene bupleuroides</i> L.	He	IT-M		7438
251	<i>Silene indeprensa</i> Schischk.	Ch	IT ^{KK}	NT [2]	7439, 7964, 8137
252	<i>Silene swertiaefolia</i> Boiss.	He	IT ^{W & C}		7440, 7963, 8094
253	<i>Stellaria alsinoides</i> Boiss. & Buhse	Th	IT ^{C & E}		7441, 7961–2
Cleomaceae Bercht. & J.Presl					
254	<i>Cleome coluteoides</i> Boiss.	He	IT ^C		7443
Colchicaceae DC.					
255	<i>Colchicum kotschyi</i> Boiss.	G.c	IT ^{W & C}		7444, 7920
256	<i>Colchicum robustum</i> (Bunge) Stef.	G.c	IT ^{C & E}		7445, 7960
Convolvulaceae Juss.					
257	<i>Convolvulus arvensis</i> L.	He	SCO		7446, 8095
258	<i>Convolvulus dorycnium</i> L.	He	IT ^{C & E}		7447
259	<i>Convolvulus lineatus</i> L.	He	IT-ES-M		7448
260	<i>Cuscuta campestris</i> Yunck.	Th (holoparasite)	PL		7452
261	<i>Cuscuta europaea</i> L. (= <i>Cuscuta brevistyla</i> A.Braun ex A.Rich.)	Th (holoparasite)	PL		7453, 7958
Crassulaceae J.St.-Hil.					
262	<i>Pseudosedum multicaule</i> (Boiss. & Buhse) Boriss.	He	IT ^C		7449
263	<i>Rosularia radicata</i> (Boiss. & Hohen.) Eggl	He	IT ^{C & E}		7450
Cupressaceae Gray					
264	<i>Juniperus polycarpos</i> K.Koch var. <i>turcomanica</i> (B.Fedtsch.) R.P.Adams	Ph	IT ^{KK}		7451, 7959, 1675(HN BG)
Cyperaceae Juss.					
265	<i>Bolboschoenus schmidii</i> (Raymond) Holub	G.r	IT ^{C & E}		7454
266	<i>Carex diluta</i> M.Bieb.	G.r	IT-ES-M		7455
267	<i>Carex serotina</i> subsp. <i>philocrena</i> (V.I.Krecz.) Kukkonen	He	IT		8096
268	<i>Carex songorica</i> Kar. & Kir.	He	IT-ES		7456, 7458
269	<i>Carex stenophylla</i> Wahlenb.	He	PL		7457, 7956
270	<i>Scirpoides holoschoenus</i> (L.) Soják	G.r	PL		7459, 7954
Elaeagnaceae Juss.					
271	<i>Elaeagnus angustifolia</i> L.	Ph	IT-M		7462, 7951–2
Ephedraceae Dumort.					
272	<i>Ephedra intermedia</i> Schrenk & C.A.Mey.	Ph	IT ^C		7463, 9278(HN BG)
273	<i>Ephedra major</i> Host	Ph	IT-ES-M		7464, 7948–50, 1821(HN BG)

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Equisetaceae Michx					
274	<i>Equisetum ramosissimum</i> Desf.	G.r	PL		7465, 7947
Euphorbiaceae Juss.					
275	<i>Euphorbia aucheri</i> Boiss.	Th	IT ^C		7466, 7946
276	<i>Euphorbia boissieriana</i> (Woronow) Prokh.	He	IT		7467, 7944–5
277	<i>Euphorbia bungei</i> Boiss.	He	IT ^{W & C}		7468, 7942–3
278	<i>Euphorbia franchetii</i> B.Fedtsch.	Th	IT ^{KK-E}		7469
279	<i>Euphorbia microsciadia</i> Boiss.	He	IT ^C		7470, 7939–41
280	<i>Euphorbia szovitsii</i> Fisch. & C.A.Mey.	Th	IT		7471
Fabaceae Lindl.					
281	<i>Alhagi maurorum</i> Medik. (= <i>Alhagi camelorum</i> DC.)	He	IT-M-SS		7472
282	<i>Astragalus (Incani) ackerbergensis</i> Freyn & Sint.	He	IT ^{KK}	VU [1], LC [2]	7474, 8098
283	<i>Astragalus (Hololeuce) alyssoides</i> Lam.	He	IT ^{W & C}	VU [1]	7475
284	<i>Astragalus (Erioceras) anacamptus</i> Bunge	He	IT ^{KK-Alborz*}	VU [1]	7476, 7937, 8157
285	<i>Astragalus (Caprini) assadii</i> Maassoumi & Podlech	He	IT ^{KK*}	EN [1], VU [2]	7477
286	<i>Astragalus (Astragalus) basineri</i> Trautv.	He	IT ^{KK-Afgh.}		7478, 7936
287	<i>Astragalus (Sesamei) biovulatus</i> Bunge	Th	IT ^{W & C}	LR [1]	7479
288	<i>Astragalus (Onobrychioidei) brevidens</i> Freyn & Sint.	He	IT ^{KK}	LC [2]	7480, 7935, 8133
289	<i>Astragalus (Incani) caespititius</i> Podlech	He	IT ^{C*}		7481
290	<i>Astragalus (Annulares) campylorhynchus</i> Fisch. & C. Mey.	Th	IT ^{C & E}		7482
291	<i>Astragalus (Erioceras) catacamptus</i> Bunge	He	IT ^{W & C*}	VU [1]	7483, 7934, 8099
292	<i>Astragalus (Rhacophorus) cerasocrenus</i> Bunge	He	IT ^{KK}	VU [1], LC [2]	7473, 7938
293	<i>Astragalus (Hymenostegis) chrysostachys</i> Boiss.	Ch	IT ^{W & C}		7484, 7932
294	<i>Astragalus (Erionotus) citrinus</i> Bunge	He	IT ^C		7485, 7930–1, 8129
295	<i>Astragalus citrinus</i> subsp. <i>barrowianus</i> (Aitch. & Baker) Podlech	He	IT ^{KK-Afgh.}		7486
296	<i>Astragalus (Ankylotus) commixtus</i> Bunge	Th	IT		7487, 8096
297	<i>Astragalus (Caprini) controversus</i> Maassoumi & Podlech	He	IT ^{KK*}	VU [1,2]	7488
298	<i>Astragalus (Erionotus) curvipes</i> Trautv.	He	IT ^{KK}	LC [2]	7489
299	<i>Astragalus (Dipelta) dipelta</i> Bunge	Th	IT ^C		7490, 7929
300	<i>Astragalus (Trachycercis) durandianus</i> Aitch. & Baker	He	IT ^{C*}	LR [1]	7491
301	<i>Astragalus (Caprini) esferayanicus</i> Podlech & Maassoumi	He	IT ^{KK*}	VU [1], EN [2]	7494, 8097
302	<i>Astragalus (Caprini) gompholobium</i> Bunge	He	IT ^C		7495, 7928
303	<i>Astragalus (Incani) gululsaranii</i> Podlech	He	IT ^{KK*}	DD [2]	7496
304	<i>Astragalus (Ammodendron) hekmat-safaviae</i> Ghahrem.	Ch	IT ^{KK*}		7497
305	<i>Astragalus (Sesamei) kerkukiensis</i> Bornm.	Th	IT ^C	DD [1]	7498
306	<i>Astragalus (Erioceras) khongensis</i> Maassoumi, Joharchi & Podlech	He	IT ^{C*}		7499
307	<i>Astragalus (Acanthoplace) lycioides</i> Boiss.	Ch	IT ^{C*}	VU [1]	7500, 7927, 7933
308	<i>Astragalus (Cystium) masenderanus</i> Bunge	He	IT ^C		7501, 7927
309	<i>Astragalus (Incani) mercklinii</i> Boiss. & Buhse	He	IT ^C		7502, 8128
310	<i>Astragalus (Caprini) nephtonensis</i> Freyn	He	IT ^{KK-Afgh.}	LR [1]	7503
311	<i>Astragalus (Oxyglottis) oxyglottis</i> M.Bieb.	Th	IT-M		7504
312	<i>Astragalus (Cremoceras) pendulinus</i> Popov & B.Fedtsch.	He	IT ^{KK}	LC [2]	7505, 7926, 8130
313	<i>Astragalus (Ammodendron) podolobus</i> Boiss.	Ch	IT		7493
314	<i>Astragalus (Caprini) pseudoindurascens</i> Sirj. & Rech.f.	He	IT ^{KK*}	LR [1], VU [2]	7506, 8131
315	<i>Astragalus (Caprini) pseudokurumensis</i> Sirj. & Rech.f.	He	IT ^{KK*}	VU [1], DD [2]	7507
316	<i>Astragalus (Anthylloidei) raddei</i> Basil.	He	IT ^{KK}	DD [2]	7508, 7924–5
317	<i>Astragalus (Oxyglottis) schmalhausenii</i> Bunge	Th	IT ^{C & E}		7509
318	<i>Astragalus (Astragalus) sieversianus</i> Pall.	He	IT ^{KK-E}		7510
319	<i>Astragalus (Theiochrus) siliquosus</i> Boiss.	He	IT		7511, 7923

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320	<i>Astragalus (ammodendron)</i> sp.	Ch	-		7512
321	<i>Astragalus (Ankylotus) stalinskyi</i> Sirj.	Th	IT ^{C & E}		7513
322	<i>Astragalus (Malacothrix) suluklensis</i> Freyn & Sint.	He	IT ^{KK*}	LC [2]	7492, 8100, 7922
323	<i>Astragalus (Dissitiflori) sumbari</i> Popov	He	IT ^{KK}	LC [2]	7514, 7921
324	<i>Astragalus (Platonychium) verus</i> Olivier	Ch	IT ^C	LR [1]	7515
325	<i>Astragalus (Cytisodes) zoshkensis</i> Ghahr.-Nejad	Ch	IT ^{KK*}	EN [2]	7516
326	<i>Cicer tragacanthoides</i> Jaub. & Spach	He	IT ^C	LR [1]	7517, 7918
327	<i>Colutea buhsei</i> (Boiss.) Shap.	Ph	IT ^{KK-Alborz-ES^{HY}}		7518, 7917
328	<i>Glycyrrhiza glabra</i> L.	G.r	IT-ES-M	LR [1]	7519
329	<i>Glycyrrhiza triphylla</i> Fisch. & C.A.Mey. (= <i>Meristotropis xanthioides</i> Vassilcz.)	G.r	IT ^C		7520, 7916
330	<i>Hedysarum glabrifoliolatum</i> Ranjbar	He	IT ^{KK*}		7521
331	<i>Hedysarum kopetdaghi</i> Boriss.	He	IT ^{KK}	NT [2]	7522
332	<i>Hedysarum renzii</i> Rech.f.	He	IT ^{C*}	LR [1]	7523
333	<i>Hedysarum wrightianum</i> Aitch. & Baker	He	IT ^C		7524, 7914
334	<i>Lathyrus inconspicuus</i> L.	Th	IT-M		7525
335	<i>Lotus corniculatus</i> L.	He	PL		7526, 7913
336	<i>Medicago lupulina</i> L.	Th	PL		7527
337	<i>Medicago monantha</i> (C.A.Mey.) Trautv. (= <i>Trigonella monantha</i> C.A.Mey.)	Th	IT		7528
338	<i>Medicago sativa</i> L.	He	PL		7529
339	<i>Melilotus officinalis</i> (L.) Pall.	He	IT-ES-M		7530
340	<i>Onobrychis amoena</i> Popov & Vved.	Ch	IT ^{C & E}	DD [1]	7531
341	<i>Onobrychis chorassanica</i> Boiss.	He	IT ^{KK-E}		7532, 7911
342	<i>Onobrychis cornuta</i> (L.) Desv.	Ch	IT ^{Ommi}		7533, 7910
343	<i>Onobrychis verae</i> Sirj.	He	IT ^{KK-Afgh.}	DD [1]	7534, 7908–9
344	<i>Ononis afghanica</i> Sirj. & Rech.f.	Ch	IT ^{KK-Afgh.}		7535, 7907
345	<i>Oxytropis binaludensis</i> Vassilcz.	He	IT ^{KK*}	DD [1,2]	7536, 7905–6
346	<i>Oxytropis hypsophila</i> Bunge	He	IT ^{KK*}	DD [1], VU [2]	7538
347	<i>Oxytropis</i> sp.	He	-		7537, 7540
348	<i>Oxytropis suavis</i> Boriss.	He	IT ^{KK*}	NT [2]	7539, 7541, 7912
349	<i>Trifolium pratense</i> L.	He	IT-ES-M		7542
350	<i>Trifolium repens</i> L.	He	IT-ES-M		7543
351	<i>Trifolium resupinatum</i> L.	Th	IT-ES-M		7544
352	<i>Vicia subvillosa</i> (Ledeb.) Boiss.	G.r	IT ^{C & E}		7545, 7904
Gentianaceae Juss.					
353	<i>Gentiana olivieri</i> Griseb.	G.r	IT		7546
Geraniaceae Juss.					
354	<i>Erodium cicutarium</i> (L.) L'Hér.	Th	IT-ES-M		7547, 7903
355	<i>Geranium collinum</i> Stephan ex Willd.	G.r	IT-ES		7548
356	<i>Geranium kotschyi</i> Boiss.	G.t	IT ^C		7549, 7901–2
357	<i>Geranium rotundifolium</i> L.	Th	IT-ES-M		7550
Hypericaceae Juss.					
358	<i>Hypericum helianthemoides</i> (Spach) Boiss.	He	IT ^C		7551
359	<i>Hypericum scabrum</i> L.	He	IT ^{W & C}		7552, 7899, 7900
Iridaceae Juss.					
360	<i>Crocus michelsonii</i> B. Fedtsch.	G.c	IT ^{KK}	LR [1], VU [2]	7553
361	<i>Gladiolus atrovioleaceus</i> Boiss.	G.b	IT-M		7554
362	<i>Iris fosteriana</i> Aitch. & Baker	G.t	IT ^{KK-Afgh.}		7555, 7898, 8135
363	<i>Iris kopetdagensis</i> (Vved.) B.Mathew & Wendelbo	G.t	IT ^{KK-Afgh.}		7556, 7897
364	<i>Iris loczyi</i> Kanitz	G.r	IT ^{KK-E}	VU [1]	7557, 7896
365	<i>Iris songarica</i> Schrenk	G.r	IT ^{C & E}		7558
Ixioliriaceae Nakai					
366	<i>Ixiolirion tataricum</i> (Pall.) Schult. & Schult.f.	G.b	IT		7559
Juglandaceae DC. ex Perleb					
367	<i>Juglans regia</i> L.	Ph	PL		7560

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Juncaceae Juss.					
368	<i>Juncus articulatus</i> L.	He	SCO		7561, 7957
369	<i>Juncus gerardii</i> Loisel.	He	SCO		7562, 7895
370	<i>Juncus inflexus</i> L.	He	PL		7563, 7892–4
Lamiaceae Martinov					
371	<i>Clinopodium graveolens</i> (M.Bieb.) Kuntze (= <i>Acinos graveolens</i> (M.Bieb.) Link)	Th	IT-ES-M		7564, 7880, 7878
372	<i>Hymenocrater bituminosus</i> Fisch. & C.A.Mey.	Ch	IT ^C		7566, 7891
373	<i>Hymenocrater calycinus</i> (Boiss.) Benth.	Ch	IT ^{KK-Alborz*}		7567, 7889–90, 7915
374	<i>Hymenocrater elegans</i> Bunge	Ch	IT ^{KK-Alborz}		7568, 7888
375	<i>Hymenocrater oxyodontus</i> Rech.f.	Ch	IT ^{C*}	DD [1]	7569
376	<i>Hymenocrater platystegius</i> Rech.f.	Ch	IT ^{KK*}	LR [1]	7570, 7886–7, 8143–4
377	<i>Lagochilus cabulicus</i> Benth.	Ch	IT ^C		7571, 7885
378	<i>Lallemantia iberica</i> (M.Bieb.) Fisch. & C.A.Mey.	Th	IT-M		7572
379	<i>Lamium amplexicaule</i> L.	Th	SCO		7573
380	<i>Leonurus turkestanicus</i> V.I.Krecz. & Kuprian.	He	IT ^{KK-E}		7574, 7884
381	<i>Marrubium vulgare</i> L.	He	PL		7575
382	<i>Mentha longifolia</i> (L.) L.	He	PL		7576
383	<i>Nepeta binaloudensis</i> Jamzad	He	IT ^{KK*}	EN [1,2]	7577
384	<i>Nepeta pungens</i> (Bunge) Benth.	Th	IT ^{C & E}		7578
385	<i>Nepeta ucranica</i> subsp. <i>kopetdaghensis</i> (Pojark.) Rech.f.	He	IT ^{KK}	NT [2]	7883
386	<i>Phlomis cancellata</i> Bunge	He	IT ^{KK-Afgh.}		7580, 7882
387	<i>Phlomoides binaludensis</i> Salmaki & Joharchi	He	IT ^{KK*}	EN [2]	7581
388	<i>Phlomoides labiosa</i> (Bunge) Adylov, Kamelin & Makhm. (= <i>Eremostachys labiosa</i> Bunge)	He	IT ^{KK-E}		7582, 8142
389	<i>Phlomoides labiosiformis</i> (Popov) Adylov, Kamelin & Makhm. (= <i>Eremostachys labiosiformis</i> (Popov) Knorrning)	He	IT ^C		7583
390	<i>Phlomoides molucelloides</i> (Bunge) Salmaki	G.t	IT ^{W & C}		7565
391	<i>Salvia abrotanoides</i> (Kar.) Sytma (= <i>Perovskia abrotanoides</i> Kar.)	Ch	IT ^{C & E}		7579, 3222(HNMG)
392	<i>Salvia chloroleuca</i> Rech.f. & Aellen	He	IT ^{KK-Alborz}		7584, 7881, 8141
393	<i>Salvia virgata</i> Jacq.	He	IT-M		7585
394	<i>Scutellaria luteo-coerulea</i> Bornm.	He	IT ^{KK}	NT [2]	7586
395	<i>Sideritis montana</i> L.	Th	IT-ES-M		7587
396	<i>Stachys lavandulifolia</i> Vahl	He	IT ^C		7588, 7879
397	<i>Stachys setifera</i> C.A.Mey.	He	IT		7589
398	<i>Stachys trinervis</i> Aitch. & Hemsl.	Ch	IT ^{KK-Afgh.}		7590
399	<i>Teucrium polium</i> L.	Ch	IT-M		7591
400	<i>Ziziphora clinopodioides</i> subsp. <i>pseudodasyantha</i> (Rech.f.) Rech.f.	Ch	IT-ES		7592
401	<i>Ziziphora clinopodioides</i> subsp. <i>rigida</i> (Boiss.) Rech.f.	Ch	IT-ES		7593, 7876
402	<i>Ziziphora tenuior</i> L.	Th	IT ^{Omni}		7594, 7877
Liliaceae Juss.					
403	<i>Fritillaria gibbosa</i> Boiss.	G.b	IT ^C		7595, 7875
404	<i>Gagea chomutovae</i> (Pascher) Pascher	G.b	IT ^{C & E}		7596
405	<i>Gagea gageoides</i> (Zucc.) Vved.	G.b	IT ^{W & C}		7597, 7874
406	<i>Gagea kunawurensis</i> (Royle) Greuter (= <i>Gagea stipitata</i> Merckl. ex Bunge, = <i>Gagea ova</i> Stapf)	G.b	IT		7598, 8104–5
407	<i>Gagea reticulata</i> (Pall.) Schult. & Schult.f.	G.b	IT		7599, 7873
408	<i>Tulipa biflora</i> Pall.	G.b	IT ^{C & E}		7600
409	<i>Tulipa micheliana</i> Hoog	G.b	IT ^{KK-Alborz}		7601, 7871–2
Linaceae DC. ex Perleb					
410	<i>Linum album</i> Kotschy ex Boiss.	He	IT ^{C*}	LR [1]	7602
411	<i>Linum austriacum</i> L.	Ch	IT-ES-M		7603
Malvaceae Juss.					
412	<i>Alcea rhyticarpa</i> (Trautv.) Iljin	He	IT ^{KK-E}		7604

No.	Families and species/infraspecific taxa	Life-form	Chorotype	Threat category [Ref.]	Herbarium No.
413	<i>Malva neglecta</i> Wallr. Nitrariaceae Lindl.	He	PL		7605, 7870
414	<i>Peganum harmala</i> L. Onagraceae Juss.	He	PL		7606
415	<i>Epilobium hirsutum</i> L.	G.r	PL		7607
416	<i>Epilobium minutiflorum</i> Hausskn. Orchidaceae Juss.	G.r	IT		7608, 7869
417	<i>Anacamptis palustris</i> (Jacq.) R.M.Bateman, Pridgeon & M.W.Chase (= <i>Orchis palustris</i> Jacq.) Orobanchaceae Vent.	G.b	IT-ES-M		7609
418	<i>Leptorhabdos parviflora</i> (Benth.) Benth.	Th	IT ^{C & E}		7761, 8116
419	<i>Orobanche kotschyi</i> Reut.	G.p	IT		7611, 7867
420	<i>Orobanche stocksii</i> Boiss.	G.p	IT ^C		8123
421	<i>Pedicularis pycnantha</i> Boiss.	He	IT ^C		7765
422	<i>Pedicularis rechingeri</i> Wendelbo	He	IT ^{KK*}	LR [1], NT [2]	45558(FUMH)
423	<i>Phelipanche hohenackeri</i> (Reut.) Soják	G.p	IT		7610, 7868, 7766
424	<i>Phelipanche schultzei</i> (Mutel) Pomel Papaveraceae Juss.	G.p	IT-M		7612
425	<i>Corydalis aitchisonii</i> Popov	G.t	IT ^{KK-Afgh.}		7614, 7868
426	<i>Corydalis chionophila</i> Czerniak.	G.t	IT ^{KK}	LR [1], NT [2]	7615
427	<i>Fumaria vaillantii</i> Loisel.	Th	IT-ES-M	LR [1]	7616
428	<i>Glaucium elegans</i> Fisch. & C.A.Mey.	Th	IT ^{C & E}		7617
429	<i>Hypecoum pendulum</i> L.	Th	IT-M		7618
430	<i>Papaver decaisnei</i> Hochst. & Steud. ex Elkan	Th	IT		7619, 7867, 8136
431	<i>Roemeria hybrida</i> (L.) DC.	Th	IT-M-SS		7620
432	<i>Roemeria refracta</i> DC. Plantaginaceae Juss.	Th	IT		7621, 8137
433	<i>Linaria khorasanensis</i> Hamdi & Assadi	He	IT ^{KK*}	VU [2]	7762, 7788, 8115
434	<i>Linaria odora</i> (M.Bieb.) Fisch.	He	IT-ES		7763, 7789–90
435	<i>Linaria simplex</i> DC.	Th	IT-M		7764
436	<i>Plantago lanceolata</i> L.	He	IT-ES-M		7622, 7866
437	<i>Plantago major</i> L.	He	SCO		7623
438	<i>Veronica anagallis-aquatica</i> L.	G.r	IT		7624
439	<i>Veronica arguteserrata</i> Regel & Schmalh.	Th	IT		7625, 7865
440	<i>Veronica beccabunga</i> L.	He	PL		7626
441	<i>Veronica biloba</i> schreb. ex L.	Th	IT ^{Omi}		7627
442	<i>Veronica campylopoda</i> Boiss. (= <i>Veronica capillipes</i> Nevski)	Th	IT ^{Omi}		7628, 7863–4, 8114
443	<i>Veronica hederifolia</i> L.	Th	IT-ES-M		7629
444	<i>Veronica intercedens</i> Bornm.	Th	IT ^{C & E}		7630
445	<i>Veronica khorassanica</i> Czerniak.	He	IT ^{KK}	NT [2]	7631, 7862
446	<i>Veronica rubrifolia</i> Boiss. Plumbaginaceae Juss.	Th	IT	LR [1]	7632, 7860–1
447	<i>Acantholimon erinaceum</i> (Jaub. & Spach) Lincz.	Ch	IT ^{C & E}		7633, 7859
448	<i>Acantholimon pterostegium</i> Bunge	Ch	IT ^{KK*}	LC [2]	7634
449	<i>Acantholimon quinquelobum</i> Bunge	Ch	IT ^{C*}		7635
450	<i>Acantholimon raddeanum</i> Czerniak. Poaceae Barnhart	Ch	IT ^{KK-E}		7636, 7856–8
451	<i>Aegilops crassa</i> Boiss.	Th	IT ^{W & C}		7637
452	<i>Aegilops triuncialis</i> L.	Th	IT-M		7638
453	<i>Agropyron cristatum</i> (L.) Gaertn. (= <i>Agropyron pectinatum</i> (M.Bieb.) P.Beauv.)	He	PL		7639
454	<i>Agropyron desertorum</i> (Fisch. ex Link) Schult.	He	IT		7640
455	<i>Alopecurus arundinaceus</i> Poir.	He	PL		7641, 8153
456	<i>Arrhenatherum kotschyi</i> Boiss.	He	IT		7642
457	<i>Boissiera squarrosa</i> (Sol.) Nevski	Th	IT-M		7643, 7855

No.	Families and species/infraspecific taxa	Life-form	Chorotype	Threat category [Ref.]	Herbarium No.
458	<i>Bromus danthoniae</i> Trin. ex C.A.Mey	Th	PL		7644, 7854
459	<i>Bromus japonicus</i> Thunb.	Th	PL		7645
460	<i>Bromus kopetdagensis</i> Drobow	He	IT ^{KK-Alborz*}	LR [1]	7646, 7850–3, 8149, 8107
461	<i>Bromus oxyodon</i> Schrenk	Th	IT ^{C & E}	DD [1]	7647
462	<i>Bromus pseudodanthoniae</i> Drobow	Th	IT		7648
463	<i>Bromus tectorum</i> L.	Th	PL		7649, 7849
464	<i>Bromus tomentellus</i> Boiss.	He	IT ^{C & E}		7650
465	<i>Calamagrostis pseudophragmites</i> (Haller f.) Koeler	He	IT-ES-M		7651, 7848
466	<i>Catabrosa aquatica</i> (L.) P.Beauv.	He	PL		7652
467	<i>Colpodium parviflorum</i> Boiss. & Buhse	He	IT		7653
468	<i>Cynodon dactylon</i> (L.) Pers.	He	PL		7654
469	<i>Dactylis glomerata</i> L.	He	PL		7655, 7848
470	<i>Elymus hispidus</i> (Opiz) Melderis	He	IT-ES-M		7656, 7844–7
471	<i>Elymus longiaristatus</i> (Boiss.) Tzvelev	He	IT ^C		7657
472	<i>Elymus repens</i> (L.) Gould	He	IT-ES-M		7658, 8106
473	<i>Eremopoa persica</i> (Trin.) Roshev.	Th	IT-M		7659
474	<i>Eremopyrum bonaepartis</i> (Spreng.) Nevski	Th	IT		7660, 8108
475	<i>Eremopyrum distans</i> (K.Koch) Nevski	Th	IT		7661
476	<i>Festuca valesiaca</i> Schleich. ex Gaudin	He	IT-ES		7662, 7843, 7839
477	<i>Glyceria notata</i> Chevall. (= <i>Glyceria plicata</i> (Fr.) Fr.)	He	PL		7663
478	<i>Helictotrichon turcomanicum</i> Czopanov	He	IT ^{KK}	EN [2]	7664, 45697(FUMH)
479	<i>Henrardia persica</i> (Boiss.) C.E.Hubb.	Th	IT ^{W & C}		7665, 7842
480	<i>Heterantherium piliferum</i> (Sol.) Hochst. ex Jaub. & Spach	Th	IT		7666, 7841
481	<i>Hordeum brevisubulatum</i> (Trin.) Link	He	IT		7667
482	<i>Hordeum bulbosum</i> L.	He	IT-M		7668, 7840
483	<i>Hordeum murinum</i> L.	Th	IT-M		7669
484	<i>Leymus tianschanicus</i> (Drobow) Tzvelev	He	IT		7670, 7838
485	<i>Lolium subulatum</i> (Banks & Sol.) Eig	He	IT		7671
486	<i>Melica ciliata</i> L.	He	IT-ES-M		7672
487	<i>Melica persica</i> Kunth	He	IT		7673, 7836–7
488	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	He	SCO		7674
489	<i>Piptatherum holciforme</i> (M.Bieb.) Roem. & Schult.	He	IT-M		7675
490	<i>Poa annua</i> L.	Th	SCO		7676
491	<i>Poa bulbosa</i> L.	He	IT-ES-M		7677, 8109
492	<i>Poa pratensis</i> L.	He	PL		7678
493	<i>Poa sinaica</i> Steud.	He	IT-SS		7679
494	<i>Poa trivialis</i> L.	He	PL		7680, 8150
495	<i>Poa versicolor</i> Besser	He	IT		7681, 8151
496	<i>Polypogon monspeliensis</i> (L.) Desf.	Th	PL		7682, 8152
497	<i>Polypogon viridis</i> (Gouan) Breistr.	Th	PL		7683
498	<i>Rhizocephalus orientalis</i> Boiss.	Th	IT ^{W & C}		7684
499	<i>Sclerochloa dura</i> (L.) P.Beauv.	Th	PL		7685
500	<i>Setaria viridis</i> (L.) P.Beauv.	Th	PL		7686
501	<i>Stipa arabica</i> Trin. & Rupr.	He	IT		7687, 7834
502	<i>Stipa caragana</i> Trin.	He	IT ^{Omni}		7688, 7833
503	<i>Stipa caucasica</i> Schmalh.	He	IT		7689, 7831–2
504	<i>Stipa hohenackeriana</i> Trin. & Rupr.	He	IT ^{Omni}		7690, 7830, 7835
505	<i>Stipa holosericea</i> Trin.	He	IT ^{Cauc.-Turk.}		7691, 7829
506	<i>Stipa lessingiana</i> Trin. & Rupr.	He	IT-ES		7692, 7828
507	<i>Stipa</i> sp.	He	-		7693
508	<i>Taeniatherum caput-medusae</i> (L.) Nevski	Th	IT-ES-M		7694, 7826–7
509	<i>Vulpia myuros</i> (L.) C.C.Gmel.	Th	IT-M		7695
510	<i>Vulpia persica</i> (Boiss. & Buhse) Krecz. & Bobrov	Th	IT		7696
Polygonaceae Juss.					
511	<i>Atraphaxis binaludensis</i> S. Tavakkoli, Mozaff. & Kaz. Osaloo	Ch	IT ^{KK*}	DD [2]	7697, 7825
512	<i>Atraphaxis spinosa</i> L.	Ch	IT		7698, 8145

No.	Families and species/infraspecific taxa	Life-form	Chorotype	Threat category [Ref.]	Herbarium No.
513	<i>Polygonum afghanicum</i> Meisn.	Ch	IT ^C		7699, 7824
514	<i>Polygonum arenastrum</i> Boreau	Th	SCO		7700
515	<i>Polygonum aviculare</i> L.	Th	COS		7701
516	<i>Polygonum molliiforme</i> Boiss.	Th	PL		7702, 7822–3
517	<i>Polygonum rottboellioides</i> Jaub. & Spach	Th	IT ^C		7703, 7820–1
518	<i>Polygonum thymifolium</i> Jaub. & Spach	Ch	IT ^C		7704, 7818–9
519	<i>Pteropyrum aucheri</i> Jaub. & Spach	Ch	IT ^C		7705
520	<i>Rumex chalepensis</i> Mill.	He	IT		7706
521	<i>Rumex crispus</i> L.	He	SCO		7707
Potamogetonaceae Bercht. & J.Presl					
522	<i>Zannichellia palustris</i> L.	G.r	COS		7708
Primulaceae Batsch ex Borkh.					
523	<i>Androsace maxima</i> L.	Th	IT-ES-M		7709, 8110
524	<i>Dionysia tapetodes</i> Bunge	Ch	IT ^{KK-Afgh.}		7710
Ranunculaceae Juss.					
525	<i>Adonis aestivalis</i> L.	Th	IT-ES-M		7711
526	<i>Anemone biflora</i> var. <i>petiolulosa</i> (Juz.) Ziman (= <i>Anemone petiolulosa</i> Juz.)	G.t	IT ^{C & E}		7712, 7817, 8134
527	<i>Ceratocephala falcata</i> (L.) Pers.	Th	IT-ES-M		7713, 7816
528	<i>Ceratocephala testiculata</i> (Crantz) Besser	Th	IT-ES-M		7714, 7815
529	<i>Clematis orientalis</i> L.	Ch	IT		7715, 7814, 8413(HNGB)
530	<i>Consolida orientalis</i> (J.Gay) Schrödinger	Th	IT-M		7716
531	<i>Consolida rugulosa</i> (Boiss.) Schrödinger	Th	IT ^C		7717
532	<i>Delphinium turkmenum</i> Lipsky	G.r	IT ^{KK*}	LC [2]	7718
533	<i>Eranthis longistipitata</i> Regel	G.t	IT ^{KK-E}		7719
534	<i>Nigella integrifolia</i> Regel	Th	IT ^{C & E}		7720
535	<i>Ranunculus aucheri</i> Boiss. (= <i>Ranunculus elbursensis</i> var. <i>aucheri</i> (Boiss.) Parsa)	G.t	IT ^{Omi}	LR [1]	7721
536	<i>Ranunculus buhsei</i> Boiss.	G.r	IT ^{Cauc.-Alburz & C}	LR [1]	7722
537	<i>Ranunculus cicutarius</i> Schldtl.	G.t	ES ^{HY*}		7723
538	<i>Ranunculus sewerzowii</i> Regel (= <i>Ranunculus leptorrhynchus</i> Aitch. & Hemsl.)	G.t	IT ^{E-ES^{Hy}}		7724
539	<i>Thalictrum isopyroides</i> C.A.Mey.	G.r	IT ^{Omi}		7725
540	<i>Thalictrum sultanabadense</i> Stapf	He	IT ^C		7726
Resedaceae Martinov					
541	<i>Reseda lutea</i> L.	He	IT-ES-M		7727
Rhamnaceae Juss.					
542	<i>Rhamnus pallasii</i> Fisch. & C.A.Mey.	Ph	IT-ES		7728
Rosaceae Juss.					
543	<i>Cotoneaster kotschyi</i> (C.K.Schneid.) G.Klotz	Ph	IT		7730, 7809–12, 3145(HNGB)
544	<i>Cotoneaster ovatus</i> Pojark.	Ph	IT ^{KK-Alborz*}		7731, 7808, 8139, 3175(HNGB)
545	<i>Crataegus pseudoheterophylla</i> Pojark. subsp. <i>turcomanica</i> (Pojark.) K.I.Chr.	Ph	IT ^{KK}	VU [2]	7732
546	<i>Crataegus spathulata</i> Michx. (= <i>Crataegus microcarpa</i> Lindl.)	Ph	ES ^{Euxi.-Hy}		7733, 3285(HNGB)
547	<i>Geum kokanikum</i> Regel & Schmalh.	He	IT ^{C & E}		7734
548	<i>Potentilla nuda</i> Boiss.	He	IT	LR [1]	7735
549	<i>Prunus microcarpa</i> C.A.Mey.	Ph	IT ^{W & C}		7736, 7807, 3287(HNGB)
550	<i>Prunus pseudoprostrata</i> (Pojark.) Rech.f.	Ch	IT ^{KK-Alborz}		7737, 7805–6, 3255(HNGB)
551	<i>Prunus spinosissima</i> (Bunge) Franch. (= <i>Amygdalus spinosissima</i> Bunge)	Ph	IT ^{C & E}		7729, 7813
552	<i>Rosa beggeriana</i> Schrenk ex Fisch. & C.A.Mey.	Ph	IT ^{C & E}		7738, 7804, 3170(HNGB)

No.	Families and species/infraspecific taxa	Life-form	Chorotype	Threat category [Ref.]	Herbarium No.
553	<i>Rosa canina</i> L.	Ph	IT-ES-M		7739
554	<i>Rosa kokanica</i> (Regel) Regel ex Juz.	Ph	IT ^{C&E}		7740, 45440(FUMH)
555	<i>Rosa persica</i> Michx. ex Juss.	Ch	IT ^{C&E}		7741
556	<i>Sanguisorba minor</i> Scop.	He	IT-ES-M		7742, 7803
Rubiaceae Juss.					
557	<i>Asperula glomerata</i> subsp. <i>turcomanica</i> (Pobed.) Ehrend. & Schönb.-Tem.	Ch	IT		7743, 7801–2
558	<i>Asperula setosa</i> Jaub. & Spach	Th	IT		7744, 7799–800
559	<i>Callipeltis cucullaris</i> (L.) DC.	Th	IT-M		7745, 7798
560	<i>Crucianella chlorostachys</i> Fisch. & C.A.Mey.	Th	IT		7746
561	<i>Crucianella gilanica</i> subsp. <i>transcaspica</i> (Ehrend.) Ehrend. & Schönb.-Tem.	He	IT		7747, 7797
562	<i>Galium aparine</i> L.	Th	PL		7752, 45674(FUMH)
563	<i>Galium ceratopodium</i> Boiss.	Th	IT-SS	DD [1]	7748, 8112
564	<i>Galium humifusum</i> M.Bieb.	He	IT-M		7749, 7796, 8111
565	<i>Galium pojarkovae</i> Pobed.	He	IT ^{KK*}	VU [2]	7750
566	<i>Galium setaceum</i> Lam.	Th	IT-M		7751
567	<i>Galium spurium</i> L.	Th	IT-ES-M		7794–5
568	<i>Galium tricorutum</i> Dandy	Th	IT-ES-SS		7753
569	<i>Rubia florida</i> Boiss.	Ch	IT ^{C*}	LR [1]	7754, 7792–3
570	<i>Rubia rigidifolia</i> Pojark.	Ch	IT		7755, 7791
571	<i>Rubia tinctorum</i> L.	Ch	IT	LR [1]	7756
Rutaceae Juss.					
572	<i>Haplophyllum acutifolium</i> (DC.) G.Don	He	IT ^{C&E}		7757
Salicaceae Mirb.					
573	<i>Salix excelsa</i> S.G.Gmel.	Ph	IT		7759
574	<i>Salix</i> sp.	Ph	-		7758, 8121
Santalaceae R.Br.					
575	<i>Thesium kotschyianum</i> Boiss.	G.r	IT ^{W&C}		7760
Scrophulariaceae Juss.					
576	<i>Scrophularia striata</i> Boiss.	He	IT		7767
577	<i>Scrophularia variegata</i> M.Bieb.	He	IT ^C		7768, 7787
578	<i>Verbascum cheiranthifolium</i> Boiss.	He	IT ^{W&C}		7769, 7786
Solanaceae Juss.					
579	<i>Hyoscyamus reticulatus</i> L.	He (biennial)	IT-ES-M		7770
580	<i>Solanum americanum</i> Mill. (= <i>Solanum nigrum</i> L.)	Th	COS		7771
Tamaricaceae Link					
581	<i>Reaumuria alternifolia</i> (Labill.) Britten	Ch	IT		7772, 6124(HNMG)
582	<i>Tamarix ramosissima</i> Ledeb.	Ph	PL		7773, 7785, 2301(HNMG)
Thymelaeaceae Juss.					
583	<i>Diarthron vesiculosum</i> (Fisch. & C.A.Mey.) C.A.Mey.	Th	IT		7405
Typhaceae Juss.					
584	<i>Typha minima</i> Funck	He	IT-ES		7774
585	<i>Typha</i> sp.	He	-		7775
Ulmaceae Mirb.					
586	<i>Ulmus minor</i> Mill.	Ph	ES-M		7776
Urticaceae Juss.					
587	<i>Urtica dioica</i> L.	He	SCO		7777
Violaceae Batsch					
588	<i>Viola occulta</i> Lehm.	Th	IT ^{Omni}		7778