

Floristic Study of Firozeh Watershed (North Khorasan Province)

Ali Mohammad Asaadi

Department of Natural Resources, Faculty of Agriculture and Natural Resource,
Ferdowsi University of Mashhad, P.O. Box 94615-147, North Khorasan, Shirvan, Bojnord, I.R. Iran

Abstract: Firozeh watershed with an area of 270 km² is located in 20 km South of Bojnord (North Khorasan Province). The altitude of the area ranges is 1280-3010 m. The mean annual rainfall is 385.7 mm and the mean annual temperature is 8.9°C. In order to floristic study in this watershed, plant samples were collected during six growing seasons (2003-2008) and identified using different flora references. The life forms were determined and the biological spectrum of the area was plotted. The position of the area related to phytogeographical classification was investigated based on geographical data and references. In this research 56 family, 243 genera and 405 species were identified. The largest families of region are: compositae with 52 species and poaceae with 47 species. Hemicryptophyte with 149 species are the most frequent life forms in the area. The distribution of the 262 species is restricted to Irano-Turanian region. Of these, 47 species are endemic of Iran. Furthermore, according to the IUCN, three categories of plant species so called vulnerable, lower risk and data deficient are determined. There are total 60 threatened plant species in this area.

Key words: Floristic, life form, chorotype, firozeh, Bojnord, Iran

INTRODUCTION

The diversity of plant life is an essential underpinning of most of the terrestrial ecosystems. Humans and most other animals are almost totally dependent on plants, directly or indirectly. Another important role of plant life is the provision of ecosystem services the protection of watersheds, stabilization of slopes, improvement of soils, medicinal plants, moderation of climate and the provision of a habitat for much of the wild fauna. While, it is generally accepted today that the conservation of all biodiversity should be the goal, understanding the natural distribution of plants (Floristic studies) is central to conserving biodiversity and managing ecosystems for long-term viability and sustainability. Iran is a country with high diverse climate and topography, which leads to diversity in natural and biological resources. Therefore, for management in order to conservation of this diversity, prevention from destruction of habitats, determining the native and resistant species and endangered species and supporting them, recognition of medicinal plants for proper use of them, floristic studies is necessary.

Nowadays, many studies in this field have been doing by researchers, such as: Floristic study of Genu Hormozgan (Najafi *et al.*, 2005), plant species of Vanak-Semirom-Isfahan (Parishani, 2003), Floristic study of Sangdeh-sari (Akbarinia *et al.*, 2004), Floristic study of Darrah Damgahan-Mehriz (Zarezadeh *et al.*, 2007), Floristic study of Ghasemloo (Shohada) Valley, Forest reservoir (Malekmohammadi *et al.*, 2007). While, this sort

of studies is very useful for planning with refer to protection, reclamation and management of valuable species, present study was done in Firozeh region in 2003-2008.

MATERIALS AND METHODS

Firozeh region with 270 km² area is located on the Northern slopes of Aladagh elevations in North East of Iran (North Khorasan Province). This region is situated between 57°02'-57°25' East longitudes and 37°13'-37°23' North latitude. This region is located between the cities of Bojnord and Esfarain. The altitude of the area ranges from 1280-3010 m. The rainiest month is March. The mean annual rainfall is 385.7 mm and the median annual temperature is 8.9°C. The average maximum temperature is 26.5°C in August and minimum temperature is -2.6°C in December (Fig. 1). The climate of this region with using of Emberger method is cold semi-arid to climatic heights. The embrothermic diagram show that drought period is for five months of year and wet season stars in November and continues until May (Fig. 2).

In order to presentation the flora of Firozeh, at first related information such as: Meteorological statistics, Topographic maps were gathered. Then, the specimens were collected in different seasons. The collected samples were then identified and named on classification and terminology applied to various Flora, such as: Flora Iranica Rechinger (1963-1998), Flora of Iran Assadi (1988-2003), Flora of Iran Parsa (1943-1950), Colored Flora of Iran Ghahreman (1975-2002), *Astragalus* communities

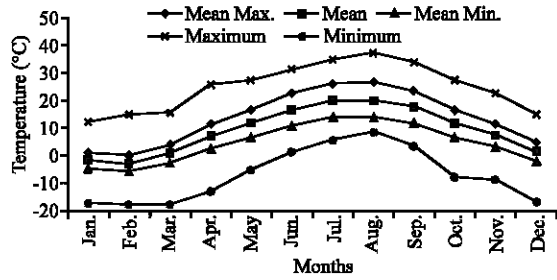


Fig. 1: The line chart of temperatures

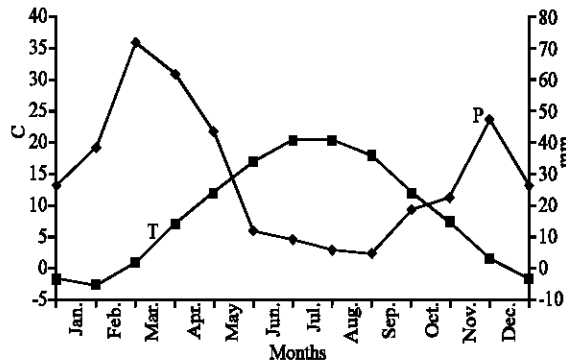


Fig. 2: The lines on 2 Axes chart of embrothermic curve

of Iran Maasoumi (1986-2000). In this manner geographical plant distribution also determined according these Flora. Determining the life form was done by Raunchier (1934)'s method, Endemic species of Iran was determined according to Red data book of Iran Jalili and Jamzad (1999) and chorology of species is based on Zohary (1973) and Takhtajan (1986).

RESULTS AND DISCUSSION

The results of study show that about 405 species belong to 243 Genera and 56 Families have been recognized. Among the existing Families, 47 Families are Dicotyledonous, 7 Families are monocotyledon and 2 Families (Ephedraceae, Cupressaceae) are Gymnosperms. Compositae with 30 Genera and 52 species is the most abundant family in the area, followed by families of Poaceae, Labiatae, Papilionaceae, Brassicaceae and Apiaceae with 47, 35, 31, 28 and 21 species, respectively (Fig. 3 and 4).

Table 1 is a list of all species collected in the area with information about scientific name, chorology, life form and medicinal use.

The life form spectrum of plant species is as follow: Hemicryptophyte 36.79%, Therophyte 25.68%, Chamaephyte 14.07%, Geophytes 13.58% and Phanerophyte 9.88% (Fig. 5).

The Chorotype distributions of species are as follow: Irano-Turanian 64.69%, Irano-Turanian and Mediterranean 11.35%, Cosmopolitan 8.15%, Irano-Turanian, Mediterranean and Euro-Siberian 5.93%, Irano-Turanian and Euro-Siberian 5.18%, Irano-Turanian and Sahara-Sindian 2.47%, Irano-Turanian, Mediterranean and Sahara-Sindian 1.48% and Irano-Turanian, Euro-Siberian and Sahara-Sindian 0.75% (Fig. 6).

Among 405 plant species distributed in the studied area, 47 species are endemic to Iran. Furthermore, according to the IUCN, three categories of plant species so called vulnerable, lower risk and data deficient are determined. There are in total, 60 threatened plant species in this area (Table 2).

Among all plants Hemicryptophyte with 36.79% is dominant and Therophyte with 25.68% is in the next order. In fact life forms of the plants indicate the possibility of adaptation of plants to environmental factors especially climatic condition. According to Archibold (1995) the frequency of Hemicryptophyte plants is due to cold and to altitude climate. On the whole frequency of Hemicryptophyte among the plants of the region show that the effect form of climate area is cold semi-arid to climatic of heights. Therophyte adapted to the dryness of the region and shortage rainfall, because these plants spend vegetative period in the form of seed (Asri, 2003).

Hemicryptophyte adapted to condition of area. They adapted and developed themselves to area by using different ways such as: reserving water, using ground water, reducing their water by losing their leaves and reduction of vegetative growth.

Dominance of Hemicryptophyte and Therophyte clearly indicate the adaptation of these plants to aridity of area.

The low percentage of Chamaephyte, Geophytes and Phanerophyte shows that they are not adapted to existence climate and edaphically situations. Each plant species has it's special ecological area with a known tolerance to life conditions of area. Therefore, the geographical distribution of plant species depending on life conditions of area and adaptation of plants to area (Asri, 2003).

Astragalus diversity with its 12 species in this area which is mountainous shows that *Astragalus* has adapted to the mountainous conditions.

The Chorotype distribution of plants reflects the climate conditions. Considering to this fact that 64.69% plant species in a region are IT elements, so this region belong to IT. IT (the Irano-Turanian region) is characterized by low rainfall and a long dry season.

The existence endemic species indicate diversity in Iran climate. Among 405 plant species distributed in the

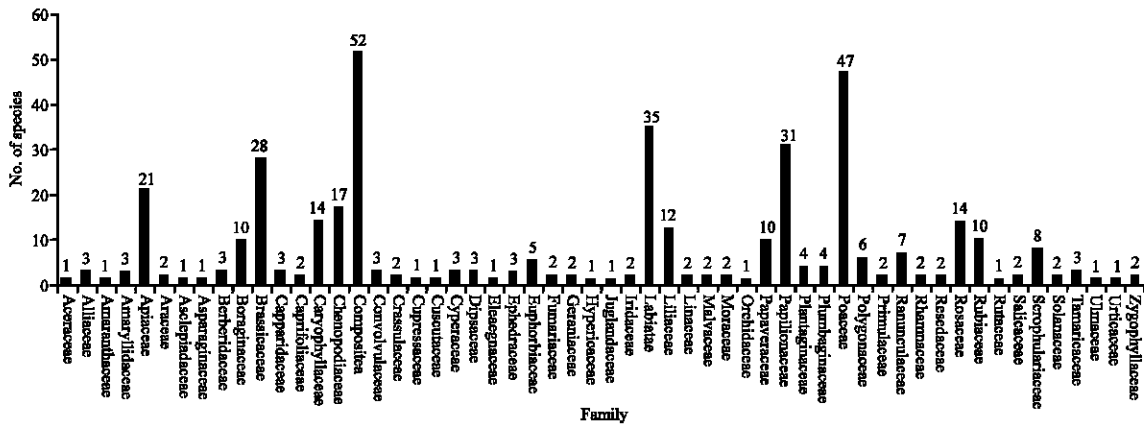


Fig. 3: The column chart of frequency of species in family in Firozeh watershed

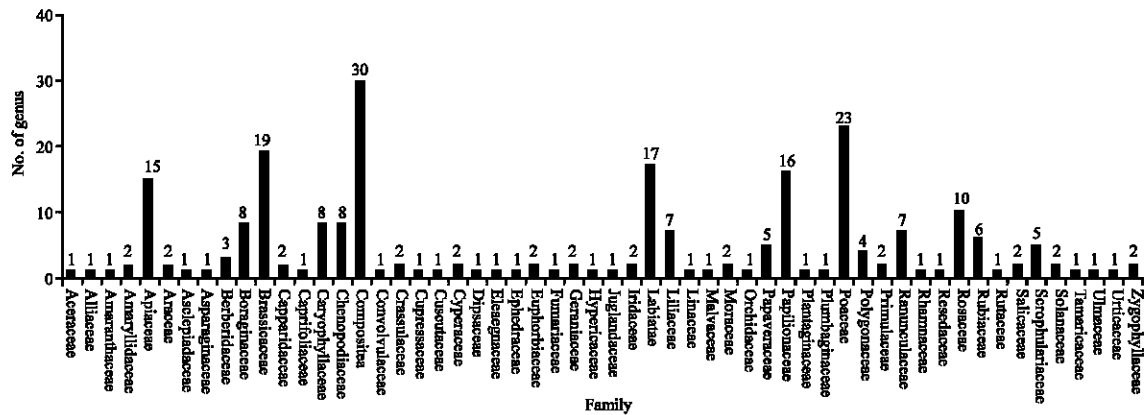


Fig. 4: The column chart of frequency of genus in family in Firozeh watershed

Table 1: Floristic list of firozeh watershed

Scientific name	Life form	Chorotype	Medicinaluse
Aceraceae			
<i>Acer monspessulanum</i> L. Subsp. <i>ibericum</i> (M.B.) Yaltirik	ph	IT,ES(End)	-
Alliaceae			
<i>Allium caspium</i> (Pall.) M.B.	Ge	IT	-
<i>Allium monophyllum</i> Vved.	Ge	IT	-
<i>Allium rotundum</i> L.	Ge	IT	-
Amaranthaceae			
<i>Amaranthus retroflexus</i> L.	Th	Cosm	-
Amaryllidaceae			
<i>Ixiolirion montanum</i> (Labill.) Herb.	Ge	IT,ES,SS	-
<i>Ixiolirion tataricum</i> (Pall.) Herb.	Ge	IT,ES,SS	-
<i>Narcissus tazetta</i> L.	Ge	IT,M,ES	-
Apiaceae			
<i>Actinolema macrolema</i> Boiss.	He	IT	-
<i>Bunium cylindricum</i> (Boiss. Et Hoh) Drule.	He	IT	-
<i>Bunium persicum</i> L.	He	IT	*
<i>Caucalis platycarpus</i> L.	Ch	IT,M	-
<i>Conium maculatum</i> L.	Ch	Cosm	*
<i>Daucus carota</i> L.	Ch	IT,M	*
<i>Eryngium bungi</i> Boiss.	He	IT	-
<i>Eryngium caeruleum</i> M.B.	He	IT	-
<i>Eryngium billardieri</i> Delaroché	He	IT	*
<i>Falcaria vulgaris</i> Bernh	He	IT,M,ES	*
<i>Ferula stenocarpa</i> Boiss	He	IT(End)	-
<i>Ferula ovina</i> Boiss.	He	IT	-

Table 1: Continued

Scientific name	Life form	Chorotype	Medicinal use
<i>Ferula gummosa</i> Boiss	He	IT(End)	*
<i>Ferulago angulata</i> (Schlecht) Boiss.	He	IT(End)	-
<i>Makabaila porphyrodiscus</i> Staph et Wettstein	He	IT(End)	*
<i>Pimpinella saxifraga</i> L.	He	IT	*
<i>Prangos acaulis</i> (DC.) Bornm.	He	IT	-
<i>Prangos gaubæ</i> (Bornm.) Herrmstadt et Heya	He	IT(End)	-
<i>Scandix iberica</i> M.B	Th	IT	-
<i>Schumannia karelinii</i> (Bunge) Korov.	He	IT	-
<i>Zozimia absinthifolia</i> (Vent.) Link.	He	IT	-
Araceae			
<i>Arum orientale</i> M.B	Ge	IT	-
<i>Eminium alberti</i> (Rgl.) Engl	Ge	IT	-
Asclepiadaceae			
<i>Vincetoxicum pumilum</i> Decne.	Ch	IT	-
Asparaginaceae			
<i>Polygonatum polyanthemum</i> (M.B.) Link.	Ge	IT	-
Berberidaceae			
<i>Berberis integerrima</i> Bunge.	Ph	IT	*
<i>Bongardia chrysogonum</i> (L.) Boiss.	Ge	IT,M	*
<i>Leontice leontopetalum</i> L.	Ge	IT,M	-
Boraginaceae			
<i>Anchusa italica</i> Retz.	Ch	Cosm	*
<i>Echium italicum</i> L.	Ch	IT,M	*
<i>Lappula microcarpa</i> (Ledeb.) Gurke in Eegler et parntl.	Th	IT	-
<i>Lithospermum tenuiflorum</i> L. Fil.	Th	IT	-
<i>Nonea caspica</i> (Wild.) G.Don.	Th	IT,ES	-
<i>Nonea persica</i> Boiss.	Th	IT	*
<i>Onosma bulbotrichum</i> DC.	Th	IT	-
<i>Onosma koschyi</i> Boiss.	He	IT(End)	-
<i>Paracaryum persicum</i> (Boiss.)	He	IT(End)	-
<i>Rochelia disperma</i> (L.F.) C.Koch	Th	IT	-
Brassicaceae			
<i>Arabis aucheri</i> Boiss.	Th	IT	-
<i>Alyssum bracteatum</i> Boiss. et Buhse	He	IT(End)	-
<i>Alyssum linifolium</i> Steph et Willd.	Th	IT, M,ES	-
<i>Alyssum longistylum</i> (Sommer and Levier) Grossh. and Schischk	He	IT	-
<i>Alyssum marginatum</i> Steud. et Boiss.	Th	IT	-
<i>Brassica deflexa</i> Boiss. <i>subsp. Deflexa</i>	Th	IT,SS	-
<i>Brassica elongata</i> Ehrh.	He	IT,M	-
<i>Camelina rumelica</i> Velen.	Th	IT	-
<i>Capsella bursa-pastoris</i> (L.) Medicus	Th	Cosm	*
<i>Clypeola jonthlaspi</i> L.	Th	IT,M,ES	-
<i>Conringia perfoliata</i> (C.A.Mey.) Busch.	Th	IT	-
<i>Descurainia sophia</i> (L.) Webb et Berth.	Th	Cosm	*
<i>Erysimum aitchisonii</i> O.E. Schulz	He	IT	-
<i>Erysimum crassipes</i> Fisch. et C.A.Mey.	He	IT	*
<i>Fibigia suffruticosa</i> (Vent.) Sweet.	He	IT	-
<i>Isatis kotschyana</i> Boiss. et Hohen..	He	IT	-
<i>Lepidium draba</i> L.	He	IT	*
<i>Lepidium perfoliatum</i> L.	He	IT,ES	*
<i>Malcolmia africana</i>	Th	IT,SS	-
<i>Malcolmia strigosa</i> Boiss.	Th	IT	-
<i>Matthiola chenopodiifolia</i> Fisch. et C.A.Mey.	Th	IT	-
<i>Matthiola ovatifolia</i> Boiss.	He	IT(End)	-
<i>Peltaria angustifolia</i> DC.	Th	IT	-
<i>Rapistrum rugosum</i> (L.) All.	Th	IT,M,ES	-
<i>Sameraria armena</i> (L.) Desv.	Th	IT	-
<i>Sisymbrium loeselii</i> L.	Th	IT	*
<i>Sisymbrium officinale</i> (L.) Scop.	Th	IT	*
<i>Thlaspi perfoliatum</i> L.	Th	IT	-
Capparidaceae			
<i>Buhsea coluteoides</i> Boiss.	He	IT	-
<i>Buhsea trinervia</i> (DC.) Stapf.	He	IT	-
<i>Capparis spinosa</i> L.	Ch	IT,M,SS	*
Caprifoliaceae			
<i>Lonicera floribunda</i> Boiss. et Buhse	Ph	IT,M	-
<i>Lonicera iberica</i> M.B.	Ph	IT,M	-

Table 1: Continued

Scientific name	Life form	Chorotype	Medicinal use
Caryophyllaceae			
<i>Acanthophyllum crassifolium</i> Boiss.	Ch	IT(End)	*
<i>Acanthophyllum glandulosum</i> Bunge.	Ch	IT	-
<i>Acanthophyllum chloroleucum</i> Rech. F. and Aell.	Ch	IT(End)	-
<i>Dianthus crinitus</i> sm. Var. <i>crossopetalus</i> Boiss.	Ch	IT	-
<i>Dianthus orietalis</i> Adams	Ch	IT	-
<i>Dianthus macranthoides</i> Hausskn. ex Bornm.	Ch	IT(End)	-
<i>Gypsophila virgata</i> Boiss.	Ch	IT	-
<i>Gypsophila bicolor</i> (Freyn et sint) Grossh	Ge	IT	-
<i>Holostium umbellatum</i> L.	Th	IT	-
<i>Mesostomma kotchyans</i> (Fenzl ex Boiss.) Vved.	He	IT	-
<i>Saponaria orientalis</i> L.	Th	IT	-
<i>Silene conoidea</i> L.	Th	IT,M	-
<i>Silene vulgaris</i> (Moench) Garcke.	He	IT	-
<i>Vaccaria oxyodonta</i> Boiss.	Th	IT,M,ES	-
Chenopodiaceae			
<i>Anabasis aphylla</i> L.	Ch	IT	*
<i>Atriplex aucheri</i> Moq.	Th	IT	-
<i>Atriplex tatarica</i> L.	Th	IT	-
<i>Atriplex verrucifera</i> M.B.	Ch	IT	-
<i>Camphorosma monspeliaca</i> L.	Ch	IT	*
<i>Ceratocarpus arenarius</i> L.	Th	IT	-
<i>Chenopodium album</i> L.	Th	Cosm	*
<i>Chenopodium ambrosioides</i> L.	Th	IT	*
<i>Chenopodium botrys</i> L.	Th	IT,M	*
<i>Chenopodium foliosum</i> (Meomch)	Th	IT	*
<i>Chenopodium murale</i> L.	Th	Cosm	*
<i>Kochia prostrata</i> (L.) Schrad.	Ch	IT	-
<i>Kochia scoparia</i> L.	Th	Cosm	-
<i>Noeae minuta</i> Boiss. and Bal.	Th	IT	-
<i>Noeae mucronata</i> (Forssk) Aschers et schweif	Ch	IT	-
<i>Salsola arbusculiformis</i> Drob.	Ch	IT	-
<i>Salsola kali</i> L.	Th	Cosm	*
Compositae			
<i>Achillea micrantha</i> Willd	Th	IT	*
<i>Achillea millefolium</i> L.	He	IT,ES	*
<i>Achillea tenuifolia</i> Lam.	He	IT	*
<i>Achillea wilhelmsii</i> C.Koch	He	IT,ES	*
<i>Acroptilon repens</i> (L.) DC.	He	IT	*
<i>Anthemis kotschyana</i> Boiss.	He	IT	-
<i>Arctium minus</i> (Hild) Benth.	He	IT	*
<i>Artemisia aucheri</i> Boiss.	Ch	IT	*
<i>Artemisia kopetdaghensis</i> Krasch.	Ch	IT	-
<i>Artemisia scoparia</i> Waldst. Et Kit.	Ch	IT,ES	*
<i>Artemisia sieberi</i> Boiss.	Ch	IT,SS	*
<i>Carthamus lanatus</i> L. Subsp. <i>turkestanicus</i> (M.Pop.) Hanelt	Th	IT	*
<i>Carthamus oxyacantha</i> M.B.	Th	IT,M	-
<i>Centaurea aucheri</i> (DC.) Wagenitz.	Ge	IT(End)	-
<i>Centaurea depressa</i> M.B.	Th	IT,M,ES	*
<i>Centaurea kotschyi</i> (Boiss. ex Heldr.) Hayek	Ge	IT	-
<i>Centaurea virgata</i> Lam.	He	IT,ES	-
<i>Chardinia orientalis</i> (L.) Kuntze	Th	IT	-
<i>Cichorium intybus</i> L.	He	Cosm	*
<i>Cirsium arvense</i> (L.) Ledeb.	Ge	Cosm	*
<i>Cirsium congestum</i> Fisch. et C.A. Mey.	He	IT	-
<i>Cirsium vulgare</i> (Savi) Ten.	He	IT	-
<i>Cousinia eryngioides</i> Boiss.	He	IT	-
<i>Cousinia linczewskii</i> Juz.	He	IT	-
<i>Cousinia ironica</i> C. Winkl. and Stauss	He	IT(End)	-
<i>Cousinia smirnowii</i> Trautv.	He	IT	-
<i>Cousinia umbrosa</i> Bunge	He	IT	-
<i>Echinops polygamus</i> Bunge	He	IT(End)	-
<i>Echinops ritro</i> L.	He	IT	-
<i>Echinops ritrodes</i> Bunge.	He	IT	*
<i>Heteropappus altaicus</i> (Willd.) Novopokr Var. <i>altaicus</i>	He	IT	*
<i>Gundelia tournefortii</i> L.	He	IT,M	*
<i>Jurinea stenocalathia</i> Rech.f.	Ch	IT(End)	-

Table 1: Continued

Scientific name	Life form	Chorotype	Medicinal use
<i>Imula oculus-Christi</i> L.	He	IT	-
<i>Lactuca glaucifolia</i> Boiss.	Th	IT	-
<i>Lactuca scarioloides</i> Boiss.	He	IT,ES	-
<i>Leontodon asperrimus</i> (Willd.) Boiss.	Ge	IT	-
<i>Onopordon heteracanthum</i> C.A.Mey.	He	IT	-
<i>Picnomon acarna</i> (L.)Cass.	Th	IT,M	-
<i>Picris strigosa</i> M.B.	He	IT(End)	-
<i>Scariola orientalis</i> (Boiss.) Sojak subsp. Orientalis	Ch	IT	-
<i>Scorzonera tortuosissimo</i> Boiss.	Ge	IT	-
<i>Scorzonera persica</i> Boiss. et Buhse	Ge	IT(End)	-
<i>Serratula latifolia</i> Boiss.	He	IT	*
<i>Sonchus oleraceus</i> L.	He	Cosm	-
<i>Tanacetum myriophyllum</i> Willd	He	IT	-
<i>Taraxacum montanum</i> (C.A. Mey.) DC.	He	IT	-
<i>Taraxacum vulgare</i> Hand. Mzt.	Th	IT	-
<i>Tragopogon Moriginatus</i> Boiss et Buhse.	He	IT	-
<i>Varthemia persica</i> DC.	Ch	IT	-
<i>Xanthium spinosum</i> L.	Th	Cosm	*
<i>Xanthium strumarium</i> L.	Th	IT	*
Convolvulaceae			
<i>Convolvulus arvensis</i> L.	Th	Cosm	*
<i>Convolvulus cantabrica</i> L.	He	IT,M	-
<i>Convolvulus dorycnium</i> L.	Ch	IT	-
Crassulaceae			
<i>Sedum album</i> L.	Ge	IT	-
<i>Sempervivum iranicum</i> Bornm. and Gauba	Ge	IT(End)	-
Cupressaceae			
<i>Juniperus excelsa</i> MB.	Ph	IT,M	*
Cuscutaceae			
<i>Cuscuta approximate</i> Bebingt	Th	IT	-
Cyperaceae			
<i>Cyperus eremicus</i> Rottb.	Ge	Cosm	-
<i>Carex stenophylla</i> Wahlenb.	Ge	Cosm	-
<i>Carex sylvatica</i> Huds.	Ge	Cosm	-
Dipsaceae			
<i>Scabiosa micrantha</i> Desf.	Th	IT	-
<i>Scabiosa olieri</i> Coult	Th	IT	-
<i>Scabiosa rotata</i> M.B.	Th	IT	-
Elaeagnaceae			
<i>Elaeagnus angustifolia</i> L.	Ph	IT,M	*
Ephedraceae			
<i>Ephedra intermedia</i> Stanf	Ph	IT	*
<i>Ephedra major</i> Host.	Ph	IT,ES	*
<i>Ephedra procera</i> Fisch. and Mey.	Ph	IT,SS	*
Euphorbiaceae			
<i>Andrachne aspera</i> Spreng.	He	IT,SS	-
<i>Euphorbia cheiradenia</i> Boiss. et Hohen.	He	IT	-
<i>Euphorbia helioscopia</i> L.	Th	IT,M	-
<i>Euphorbia humilis</i> C.A. Mey. et Ledeb.	He	IT	-
<i>Euphorbia myrsinites</i> L.	He	IT	-
Fumariaceae			
<i>Fumaria asepala</i> Boiss.	Th	Cosm	*
<i>Fumaria parviflora</i> Lam.	Th	IT,ES,M	*
Geraniaceae			
<i>Biebersteinia multifida</i> DC.	Ge	IT	*
<i>Geranium robertianum</i> L.	Ge	IT,M,ES	*
Hypericaceae			
<i>Hypericum scabrum</i> L.	He	IT	*
Juglandaceae			
<i>Juglans regia</i> L.	Ph	IT	*
Iridaceae			
<i>Gladiolus halophilus</i> Boiss. et Heldr.	Ge	IT	-
<i>Iris songarica</i> Schrenk.	Ge	IT	-
Labiatae			
<i>Clinodium vulgare</i> L.	He	IT,M	-
<i>Dracocephalum kotschyi</i> Boiss.	He	IT,M(End)	*
<i>Eremostachys labiosa</i> Bunge	He	IT,M	-

Table 1: Continued

Scientific name	Life form	Chorotype	Medicinal use
<i>Eremostachys laevigata</i> Bge.	He	IT	-
<i>Hymenocrater calycinus</i> (Boiss). Benth.	Ph	IT	*
<i>Hymenocrater elegans</i> Bunge.	Ch	IT	*
<i>Lagochilus cabulicus</i> Benth.	Ch	IT	-
<i>Lagochilus kotschyanus</i> Boiss. in DC.	Ch	IT(End)	-
<i>Lamium album</i> L.	He	IT,M	*
<i>Marrubium parviflorum</i> Fisch. and C.A.Mey.	He	IT,M	-
<i>Marrubium vulgare</i> L.	Ge	IT,M	*
<i>Mentha longifolia</i> L.	He	Cosm	*
<i>Nepeta pungens</i> (Bunge) Benth.	Th	IT	*
<i>Nepeta racemosa</i> Lam.	Ch	IT	-
<i>Nepeta sintenisii</i> Borrm.	He	IT	-
<i>Perovskia abrotanoides</i> Karel.	Ph	IT	*
<i>Perovskia artemisioides</i> Boiss.	Ch	IT	*
<i>Phlomis cancellata</i> Bunge	He	IT	-
<i>Phlomis persica</i> Boiss.	Ch	IT(End)	-
<i>Phlomis anisodonta</i> Boiss.	He	IT	-
<i>Salvia chloroleuca</i> Rech.f. et Aell.	He	IT	-
<i>Salvia nemorosa</i> L.	Ge	IT	*
<i>Salvia reuterana</i> Boiss.	He	IT	*
<i>Salvia syriaca</i> L.	He	IT	-
<i>Scutellaria orientalis</i> L.	He	IT	*
<i>Stachys inflata</i> Bth.	Ch	IT	*
<i>Stachys lavandulifolia</i> Vahl.	Ch	IT	*
<i>Stachys laxa</i> Boiss. and Buhse	Ch	IT(End)	*
<i>Stachys pilifera</i> Benth.	Ch	IT(End)	*
<i>Stachys turcomanica</i> Trautv.	Ge	IT	*
<i>Teucrium polium</i> L.	Ch	Cosm	*
<i>Thymus kotschyanus</i> Boiss. et Hohen.	Ch	IT	*
<i>Thymus fallax</i> fisch et C.A. Mey.	Ch	IT	*
<i>Ziziphora clinopodioides</i> Lam.	Ch	IT	*
<i>Ziziphora tenuior</i> L.	Th	IT,ES	*
Liliaceae			
<i>Bellevalia saiviczii</i> Woron	Ge	IT	-
<i>Fritillaria gibbosa</i> Boiss.	Ge	IT	-
<i>Eremurus olgae</i> Regel	Ge	IT	*
<i>Eremurus spectabilis</i> M.B.	Ge	IT	*
<i>Gagea olgae</i> Regel	Ge	IT	-
<i>Gagea reticulata</i> (Pull.) Roem et schult.	Ge	IT,ES	-
<i>Muscari neglectum</i> Guss.	Ge	IT,M,SS	-
<i>Scilla bisotunensis</i> Speta.	Ge	IT(End)	-
<i>Tulipa cuspidate</i> Staph.	Ge	IT	-
<i>Tulipa humilis</i> Herb.	Ge	IT	-
<i>Tulipa micheliana</i> Hoog.	Ge	IT	-
<i>Tulipa montana</i> Lindl.	Ge	IT(End)	-
Linaceae			
<i>Linum album</i> Ky.	Ge	IT(End)	*
<i>Linum strictum</i> L.	Th	IT,M,SS	-
Malvaceae			
<i>Malva neglecta</i> Wallr.	He	IT,M,ES	*
<i>Malva parviflora</i> L.	He	IT,M	*
Moraceae			
<i>Ficus carica</i> L.	Ph	IT,M,ES	*
<i>Morus alba</i> L.	Ph	IT	*
Orchidaceae			
<i>Orchis mascula</i> L.	Ge	IT	*
Papaveraceae			
<i>Chlidonium majus</i> L.	He	IT	*
<i>Glaucium elegans</i> F. et M.	Th	IT	-
<i>Glaucium oxylobum</i> Boiss. et Buhse.	Th	IT	-
<i>Glaucium vitellinum</i> Boiss.	He(Th)	IT,M	-
<i>Hypecum pendulum</i> L.	Th	IT,M	-
<i>Papaver argemone</i> L.	Th	IT	*
<i>Papaver gaubae</i> Cullen et Rech	Th	IT(End)	-
<i>Papaver rhoeas</i> L.	Th	IT	*
<i>Papaver tenuifolium</i> Boiss. and Hohen.	Th	IT(End)	-
<i>Roemeria refracta</i> DC.	Th	IT	-

Table 1: Continued

Scientific name	Life form	Chorotype	Medicinal use
Papilionaceae			
<i>Ahagi camelorum</i> Fisch.	Ch	IT,M	*
<i>Anthyllis boissieri</i> Sagorski	He	IT	-
<i>Astragalus brachycalyx</i> Syn.	Ph	IT	*
<i>Astragalus brevidens</i> Freyn.	He	IT	-
<i>Astragalus cruciatus</i> Link.	He	IT,ES,SS	-
<i>Astragalus effuses</i> Bunge.	He	IT(End)	-
<i>Astragalus grammocalyx</i> Boiss. et Hoh.	He	IT	-
<i>Astragalus microcephalus</i> Maass and Mozaff.	Ph	IT	-
<i>Astragalus magistratus</i> Maass.	He	IT(End)	-
<i>Astragalus mollis</i> M.B.	He	IT	-
<i>Astragalus remotijugus</i> Boiss.	He	IT	-
<i>Astragalus semnanensis</i> Bornm. et Rech.F.	He	IT(End)	-
<i>Astragalus Senilis</i> Bornm.	He	IT(End)	-
<i>Astragalus pinetorum</i> Boiss.	He	IT	-
<i>Colutea buhsei</i> (Boiss.) Shap.	Ph	IT,ES	-
<i>Colutea persica</i> Boiss.	Ph	IT(End)	-
<i>Coronila varia</i> L.	He	IT,M,ES	*
<i>Glycyrrhiza glabra</i> L.	Ch	IT,M,ES	*
<i>Hedysarum callithrix</i> Bunge et Boiss.	He	IT(End)	-
<i>Lathyrus sativus</i> L.	Th	IT,M	-
<i>Lotus corniculatus</i> L.	He	IT,M	*
<i>Medicago sativa</i> L.	He	Cosm	*
<i>Melilotus officinalis</i> (L.) Lam.	He	Cosm	*
<i>Meristotropis xanthioides</i> Vassilcz.	Ch	IT	-
<i>Onobrychis cornuta</i> (L.) Desv. <i>Subsp. cornuta</i>	Ch	IT	-
<i>Onobrychis gaubae</i> Bornm.	He	IT(End)	-
<i>Onobrychis sativa</i> Lam.	He	IT	-
<i>Onobrychis transcaspica</i> V.Nikitn	He	IT	-
<i>Sophora pachycarpa</i> C.A.Mey.	He	IT	-
<i>Trifolium repens</i> L.	Ge	IT	*
<i>Vicia monantha</i> Retz.	Th	IT,M	-
Plantaginaceae			
<i>Plantago lagopus</i> L.	He	IT,M	-
<i>Plantago lanceolata</i> L.	He	Cosm	*
<i>Plantago major</i> L.	He	Cosm	*
<i>Plantago media</i> L.	He	IT,M	-
Plumbaginaceae			
<i>Acantholimon acmostegium</i> Boiss. et Buhse	Ch	IT(End)	-
<i>Acantholimon aspadanum</i> Buge.	Ch	IT(End)	-
<i>Acantholimon oliganthum</i> Boiss.	Ch	IT(End)	-
<i>Acantholimon scorpius</i> (Jaub. et Sp.) Boiss.	Ch	IT(End)	-
Poaceae			
<i>Aegilops crassa</i> Boiss.	Th	IT	-
<i>Aegilops cylindrica</i> Host.	Th	IT	-
<i>Aegilops ovata</i> L.	Th	IT	-
<i>Agropyron cristatum</i> (L.) Gaert.	He	IT	-
<i>Agropyron imbricatum</i> (M.B.) Roem. et Schult.	He	IT	-
<i>Agropyron intermedium</i> (Host) P. Beauv.	He	IT,ES	-
<i>Agropyron pectinofome</i> Roemen and Schutes.	He	IT	-
<i>Agropyron repens</i> (L.) P. Beauv.	Ge	IT,ES	*
<i>Agropyron trichophorum</i> (Link) Richter.	He	IT,M	-
<i>Agrostis gigantean</i> Roth.	Ge	IT,M	-
<i>Avena wiestii</i> Steud.	Th	IT	-
<i>Boissiera squarrosa</i> (Banks et soland) Nevski	Th	IT	-
<i>Bothriochloa stenophylla</i> (Boiss.) Bor	He	Cosm	-
<i>Bromus briziformis</i> Fisch. et C.A.Mey.	Th	IT,M	-
<i>Bromus danthoniae</i> Trin.	Th	Cosm	-
<i>Bromus gedrosianus</i> Penzes	Th	IT,M,ES	-
<i>Bromus inermis</i> Leyss.	He	IT	-
<i>Bromus riparius</i> Rehman	He	IT	-
<i>Bromus scoparius</i> L.	Th	IT,M,SS	-
<i>Bromus tectorum</i> L.	Th	Cosm	-
<i>Bromus tomentellus</i> Boiss.	He	IT	-
<i>Cynodon dactylon</i> (L.) Pers.	Ge	Cosm	*
<i>Dactylis glomerata</i> L.	He	IT,M	-
<i>Dichanthium annulatum</i> (Forssk) Taff.	Ge	IT,SS	-

Table 1: Continued

Scientific name	Life form	Chorotype	Medicinal use
<i>Eremopyrum confusum</i> Melderis var. <i>confusum</i>	Th	IT	-
<i>Eremopyrum distans</i> (K.Koch) Nevski	Th	IT	-
<i>Eremopyrum orientale</i> (L.) Jaub et Spach	Th	IT,M,ES	-
<i>Festuca ovina</i> L.	He	IT	-
<i>Festuca robra</i> L.	He	IT	-
<i>Heteranthelium piliferum</i> (Banks et Soland.) Hochst.	Th	IT	-
<i>Hordeum bulbosum</i> L.	Ge	IT,M	-
<i>Hordeum glaucum</i> Stand.	Th	IT,M	-
<i>Hordeum violaceum</i> Boiss et Huet.	He	IT	-
<i>Melica persica</i> Kunth subsp. <i>Persica</i>	He	IT	-
<i>Phalaris minor</i> Rezt	Th	IT,M	-
<i>Pennisetum orientale</i> L.C.Rich.	He	IT,SS	-
<i>Phleum pratense</i> Commoni	He	IT,M	*
<i>Phragmites australis</i> (Car.) Trin	Ge	IT,M,SS	-
<i>Poa annua</i> L.	Th	IT,ES	-
<i>Poa bulbosa</i> L.	Ge	IT,M,ES	-
<i>Secale montanum</i> Guss.	He	IT,M,ES	-
<i>Setaria glauca</i> (L.) P.Beauv.	Th	Cosm	-
<i>Stipa barbata</i> Desf.	He	IT,M,SS	-
<i>Stipa hohenacheriana</i> Trin and Rupr.	He	IT	-
<i>Stipa parviflora</i> Desf.	He	IT,M	-
<i>Stipa pennata</i> L.	He	IT	-
<i>Trisetum flavescens</i> (L.) P.Beauv.	He	IT	-
Polygonaceae			
<i>Atraphaxis spinosa</i> L.	Ph	IT	*
<i>Polygonum aviculare</i> L.	Th	Cosm	*
<i>Polygonum persicaria</i> L.	He	IT	-
<i>Pteropyrum aucheri</i> Jaub. et Spach	Ph	IT	-
<i>Rumex elbursensis</i> Boiss.	He	IT(End)	-
<i>Rumex caucasicus</i> Rech.F.	He	IT	-
Primulaceae			
<i>Anagallis arvensis</i> L.	Th	Cosm	*
<i>Androsace maxima</i> L.	Th	IT,M,ES	-
Ranunculaceae			
<i>Adonis flammea</i> Jacq.	Th	IT,M,ES	*
<i>Anemone biflora</i> DC.	Ge	IT	-
<i>Ceratocephalus falcatus</i> (L.) Pers	Th	IT,M,ES	*
<i>Consolida regalis</i> S.F.Gray	Th	IT	*
<i>Delphinium cyphoplectrum</i> Boiss.	He	IT	-
<i>Ranunculus arvensis</i> L.	Th	IT	*
<i>Thalictrum minus</i> L.	Ge	IT	*
Rhamnaceae			
<i>Rhamnus pallasii</i> Fisch. and C.A. Mey.	Ph	IT(End)	*
<i>Rhamnus persica</i> Boiss.	Ph	IT(End)	-
Resedaceae			
<i>Reseda aucheri</i> Boiss.	He	IT,SS	*
<i>Reseda lutea</i> L.	Th	IT,M,ES	*
Rosaceae			
<i>Amygdalus eburnea</i> Spach.	Ph	IT(End)	-
<i>Amygdalus spinosissima</i> Buuuge.	Ph	IT	-
<i>Cerasus incana</i> (Pall.) Spachr	Ph	IT	*
<i>Cerasus microcarpa</i> (C.A. mey) Boiss.	Ph	IT	*
<i>Cerasus pseudoprostrata</i> Pojark.	Ph	IT	-
<i>Cotoneaster multiflora</i> Bge.	Ph	IT	-
<i>Cotoneaster mummularias</i> Fisch. C.A Mey.	Ph	IT,M	*
<i>Crataegus turkestanica</i> A.	Ph	IT,ES	-
<i>Hulthemia persica</i> mich.	Ch	IT	*
<i>Geum kokanicum</i> Regel et Schmalh.	He	IT	*
<i>Potentilla recta</i> L.	Ge	IT	-
<i>Rosa beggeriana</i> Schrenk	Ph	IT	-
<i>Rosa canina</i> L.	Ph	IT,M,ES	*
<i>Rubus caesius</i> L.	Ph	IT,ES	*
<i>Sanguisorba minor</i> Boiss. et Hausskn.	He	IT,M	*
Rubiaceae			
<i>Asperula arvensis</i> L.	Th	IT	*
<i>Asperula odorata</i> L.	He	IT,ES	*
<i>Asperula trichodes</i> J.Gay.	Th	IT	*

Table 1: Continued

Scientific name	Life form	Chorotype	Medicinal use
<i>Crucianella gilanica</i> Trin.	Ch	IT	-
<i>Galium humifusum</i> Bieb.	He	IT	-
<i>Galium verum</i> L.	Ch	IT,ES	*
<i>Phuopsis styloso</i> (Trin) Hook.F.	He	IT,M	-
<i>Rubia florida</i> Boiss.	Ph	IT(End)	-
<i>Rubia tinctorum</i> L.	Th	IT,M	*
<i>Vaillantia hispida</i> L.	Th	IT,M	-
Rutaceae			
<i>Haplophyllum canaliculatum</i> Boiss.	He	IT,SS(End)	-
Salicaceae			
<i>Populus alba</i> L.	Ph	IT,ES	*
<i>Salix alba</i> L.	Ph	IT,M,ES	*
Scrophulariaceae			
<i>Bellardia trixago</i> (L.) All.	Th	IT	-
<i>Dodartia orientalis</i> L.	He	IT	-
<i>Linaria grandiflora</i> Desf.	He	IT	-
<i>Linaria kopetdaghensis</i> Kuprian.	He	IT	-
<i>Linaria simplex</i> (Willd.) DC.	Th	IT,M	-
<i>Verbascum phlomoides</i> L.	He	IT	*
<i>Verbascum songaricum</i> Schrenk ex Fisch.	He	IT	*
<i>Veronica capillipes</i> Nevski	Th	IT	-
Solanaceae			
<i>Datura stramonium</i> L.	Th	Cosm	*
<i>Hyosyamus niger</i> L.	Ch	Cosm	*
Tamaricaceae			
<i>Tamarix indica</i> Willd.	ph	IT	-
<i>Tamarix kotschy</i> Bunge	Ph	IT	-
<i>Tamarix ramosissima</i> Ledeb	ph	IT,ES	-
Ulmaceae			
<i>Celtis caucasica</i> Willd.	Ph	IT	*
Urticaceae			
<i>Urtica dioica</i> L.	He	IT,M	*
Zygophyllaceae			
<i>Peganum harmala</i> L.	He	Cosm	*
<i>Zygophyllum atriplicoides</i> F. et M.	Ph	IT,SS	-

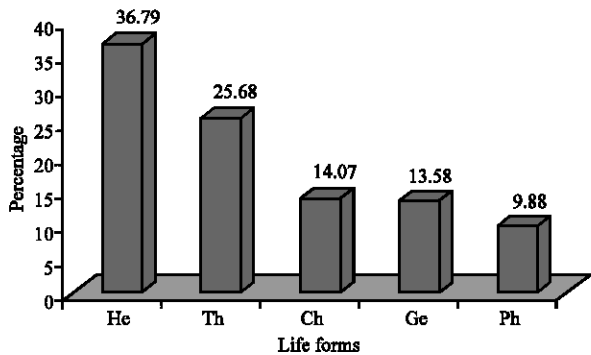


Fig. 5: The column chart of life form of species in Firozeh watershed

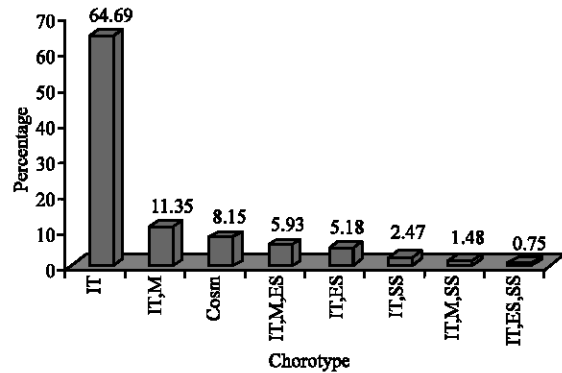


Fig. 6: The column chart of percentage of chorotype of species in Firozeh watershed

studied area, 47 species are endemic to Iran. They compose about 11.6% of the total number of species.

The existence of Compositae family with large diversity is the result of destruction in this region. It is experience understood that the increasing of the number of some plant families including Asteraceae accompanied with destruction in area, following studies support the mentioned fact (Vakili *et al.*, 2001; Archibold, 1995).

According to rich biodiversity of study area, which resulted from floristic study, it is quite possible to concentrate the improving practices and reclamation to area again.

About 141 medicinal species were determined in this area that was shown in Table 1. Some of most important species are as follow: *Capsella bursa-pastoris*, *Descurainia sophia*, *Ephedra intermedia*, *Glycyrrhiza*

Table 2: Plants species list of rare and endangered of firozeh watershed

Scientific name	Species position	Life form
Alliaceae		
<i>Allium monophyllum</i> Vved.	DD	Ge
Apiaceae		
<i>Actinolema macrolema</i> Boiss	LR	He
<i>Ferula gummosa</i> Boiss	LR	He
<i>Ferula stenocarpa</i> Boiss.	LR	He
<i>Ferulago angulata</i> (Schlecht) Boiss.	LR	He
<i>Makabaila porphyrodiscus</i> Staph et Wettstein	LR	He
<i>Prangos gaubae</i> (Bornm.) Herrnstadt et Heya	LR	He
Araceae		
<i>Arum orientale</i> M.B	VU	Ge
Asclepiadaceae		
<i>Vincetoxium pumilum</i> Decne.	LR	Ch
Boraginaceae		
<i>Onosma koschyi</i> Boiss.	LR	He
<i>Paracaryum persicum</i> (Boiss.)	DD	He
Brassicaceae		
<i>Alyssum bracteatum</i> Boiss. et Buhse	LR	He
<i>Mathiola ovatifolia</i> Boiss.	LR	He
Caryophyllaceae		
<i>Acanthophyllum crassifolium</i> Boiss.	LR	Ch
<i>Acanthophyllum chloroleucum</i> Rech. F. and Aell.	DD	Ch
<i>Dianthus orietalis</i> Adams	LR	Ch
<i>Dianthus macranthoides</i> Hausskn. ex Bornm.	LR	Ch
Compositae		
<i>Achillea millefolium</i> L.	LR	He
<i>Anthemis kotschyana</i> Boiss	LR	He
<i>Cousinia iranica</i> C. Winkl. and Stauss	LR	He
<i>Echinops polygamus</i> Bunge	LR	He
<i>Jurinea stenocalathia</i> Rech.f.	LR	Ch
<i>Scorzonera persica</i> Boiss. et Buhse	LR	Ge
<i>Varthemia persica</i> DC.	LR	Ch
Crassulaceae		
<i>Sempervivum iranicum</i> Bornm. and Gauba	LR	Ge
Labiatae		
<i>Dracocephalum kotschyi</i> Boiss.	EN	He
<i>Perovskia artemisioides</i> Boiss.	VU	Ch
<i>Phlomis persica</i> Boiss.	LR	He
<i>Salvia reuterana</i> Boiss.	LR	Ch
<i>Stachys laxa</i> Boiss. and Buhse	LR	Ch
<i>Stachys pilifera</i> Benth.	LR	Ch
<i>Thymus kotschyanus</i> Boiss. et Hohen.	LR	LR
Liliaceae		
<i>Eremurus spectabilis</i> M.B.	LR	Ge
<i>Tulipa montana</i> Lindl.	LR	Ge
Linaceae		
<i>Linum album</i> Ky.	LR	Ge
Orchidaceae		
<i>Orchis mascula</i> L.	LR	Ge
Papaveraceae		
<i>Papaver gaubae</i> Cullen et Rech	DD	Th
<i>Papaver tenuifolium</i> Boiss. and Hohen.	LR	Th
Papilionaceae		
<i>Astragalus effuses</i> Bunge.	LR	He
<i>Astragalus magistratus</i> Maass.	LR	He
<i>Astragalus semnanensis</i> Bornm. et Rech.F.	VU	He
<i>Astragalus Senilis</i> Bornm.	VU	He
<i>Colutea persica</i> Boiss.	LR	Ph
<i>Glycyrrhiza glabra</i> L.	LR	Ch
<i>Hedysarum callithrix</i> Bunge et Boiss.	DD	He
<i>Onobrychis gaubae</i> Bornm.	DD	He
Plumbaginaceae		
<i>Acantholimon acmostegium</i> Boiss. et Buhse	LR	Ch
<i>Acantholimon aspadanum</i> Buge.	DD	Ch
<i>Acantholimon oliganthum</i> Boiss.	DD	Ch
<i>Acantholimon scorpius</i> (Jaub. et Sp.) Boiss.	LR	Ch

Table 2: Continued

Scientific name	Species position	Life form
Poaceae		
<i>Bromus scoparius</i> L.	LR	Th
<i>Phleum pratense</i> Commoni	LR	He
Polygonaceae		
<i>Rumex elbursensis</i> Boiss.	LR	He
Rhamnaceae		
<i>Rhamnus pallasii</i> Fisch. and C.A. Mey.	LR	Ph
<i>Rhamnus persica</i> Boiss.	LR	Ph
Rosaceae		
<i>Amygdalus spinosissima</i> Buge.	LR	Ph
Rubiaceae		
<i>Rubia florida</i> Boiss.	LR	Ph
<i>Rubia tinctorum</i> L.	LR	Th
Rutaceae		
<i>Haplophyllum candiculatum</i> Boiss.	LR	He
Tamaricaceae		
<i>Tamarix indica</i> Willd.	LR	Ph

Vu = Vulnerable, LR = Lower Risk and DD = Data Deficient

glabra, *Ziziphora clinopodioides*, *Ferula gummosa*, *Thymus kotschyanus*, *Dracocephalum kotschyi*, *Stachys lavandulifolia*, *Eremurus olgae*.

CONCLUSION

The study area is very rich with refer to plant diversity. This conclusion is supported by the existence 56 families, 243 genera and 405 species.

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