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Flora, Life Form and Geographical Distribution of Plants in Tang Soulak Protected Area, Kohkiloye and Boyerahmad Province, Iran

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ABSTRACT

Floristic studies are fundamental for the applied sciences such as rangeland management and conservation. Unique ecological and climatic conditions in the Tang Soulak Protected Area make it a remarkable habitat for the floristic studies. The purpose of this study was to determine floristic composition and their chorology carrying a central importance in vegetation description and analysis. Therefore, 50 quadrats (100 m2) were located according to the nature of vegetation. The species and their abundance-dominance were recorded. 70 plant species, belonging to 21 families, were identified. Plant classification, based on Raunkiaer's life forms revealed Hemicryptophytes as the most abundant (46% of total) species. Therophytes, Phanerophytes and Chamaephytes contained 26, 12 and 4 percents of total plant species, respectively. Chorological characteristics of the plant species showed, about 66% of the total plant species in Tang Soulak area were belonged to the Irano-Turanian Chorotype.

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Introduction

Organisms are extremely diverse. Probably between 5 million to 50 million species of animals, plants and microbes live on Earth today (Ejtehadi et al, 2003).

Less than 2 million of them have been formally identified as species and described in the scientific literature. The rest is presented by specimens in museums waiting to be described, or by individuals in nature waiting to be discovered. Millions of species have lived at some time in the past and are now extinct (Brown and Lomolino, 1998). Just as all individuals eventually die, all species eventually go extinct. It is estimated that 99.9 percent of all species that ever lived are now extinct. This figure is alarming for consideration (Meffe et al, 1997).

Iran as one of the most attractive place to study plant diversity has been identified, as 22% of its 8000 plant species are endemic (Asri, 2000). Flora identification of each region is fundamental to another pure and applied researches in biology.

The view expressed by Tuxen (1942) that the plant can measure habitat factors better than any instrument is symptomatic of the scepticism with which the sociologist regards intensive ecological investigation, in spite of the fact that the only exact knowledge, which he possesses of the tolerance of species has been obtained by extrapolation (often unjustified) from original instrumental measurements (Tuxen, 1942). The knowledge of the floristic composition of an area is a perquisite for any ecological and phytogeographical studies and conservation management activities. In studying any particular element of vegetation, from an ecological viewpoint, the first step should be to determine the facts as they exist on the ground: the facts about the vegetation on the one hand, facts about the habitat, on the other (Nicholes, 1930). If there is a series of facts, which is more sensitive to direct study and accurate characterization than any other, it is the floristic composition of the vegetation. Therefore, recognition and documentation of plant species and their geographical distribution are essential for further researches and for their protection. Loss of genetic diversity and species through habitat destruction will take many years to correct and restore. So the purpose of this research was to document the floristic composition and determine the plant species chorology in Tang Soulak protected area which are important aspects of ecological surveys and conservation.

Several other studies in Iran have done and also reported higher abundance of Hemicryptophytes. Amiri *et al*. (2008) studied floristic of Tiregan in Hezar Masjed Mts (Amiri et al, 2008). Memariani, *et al*. 2009. Also studied floristic of Fereizi in Chenaran, and both found higher abundance of Hemicryptophytes as compared to other life forms (Memariani et al, 2009. In Khabr National Park and Rouchoun wildlife refuge (Irannezhad et al, 2001), and in Meimand (Vakili, 2001), both in Kerman, and in Kalat highlands of Gonabad in Khorasan Razavi (Vaseghi et al, 2008) Hemicryptophytes were the most abundant plant life forms.

Study area

The Study area, Tang Soulak protected area (2428 ha), is located in Kohkiloye and Boyerahmad province in Iran. It is between 50_ 11´- 50_ 17´ longitude and 30_ 35´ - 30_ 37´ latitude (Fig. 1). The study area is located above sea level, in 1000-2331 m range. The average annual precipitation in the study area is about 490 mm. The average annual temperature for the region during the past 20 years is 26 ° C. The number of dry months for the region, are 4 months. The study area is located in the vegetal Iranian and Turanian area and contains a large collection of plants and animals known and reported in the country. The most important mammals in the study area are the wolf, tiger, goats, boar, hyena and Iranian Squirrel...

Methods

Species Collection and Identification

Since any detailed vegetation study is based on description and investigation of plant communities or vegetation segments that must first be recognized in the field (Mueller-Dombois and Ellenberg, 1974). Vegetation sampling was performed during

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the year 2014. In each vegetation type, considering the nature of vegetation, 50 quadrats of the size 100 m^2, were located and abundance-dominance of each species was recorded. In the present study, the abundance dominance data were not subjected to analysis. Species identification and their chorology were completed using Flora of Iranica (Rechinger, 1963-1998), Flora of USSR (Komarov and Shishkin, 1963- 1974), Flora of Turkey (Davis, 1965 – 1988), Flora of Iraq (Townsend et al,1985), Flora of Iran (Assadi, 1988), Color Flora of Iran (Ghahreman, 1980-2002) . Life form classification system of Raunkiaer was used to assign the life form of the species (Raunkiaer, 1934)

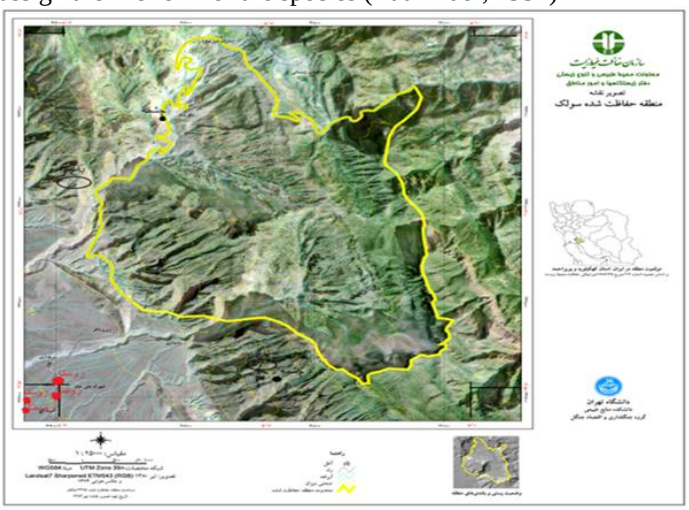

Figure 1. Tang Soulak protected area, Kohkiloye and Boyerahmad Province, Iran

Results and Discussion

The total number of 70 plant species belonging to 21 families were identified in the study area based on (Rechinger, 1963-98), (Komarov, *et al*., 1963-1974), (Davis, 1965-1988), (Townsend and Guest, 1960-1985), (Assadi, *et al*., 1989-2002) and (Ghahreman, 1984 -2002). Species composition of Tang Soulak along with their families, chorotypes and life forms are presented in Table 1. About 66% of the total plant species in Tang Soulak were belonged to the Irano-Turanian Chorotype. (Fig. 2).

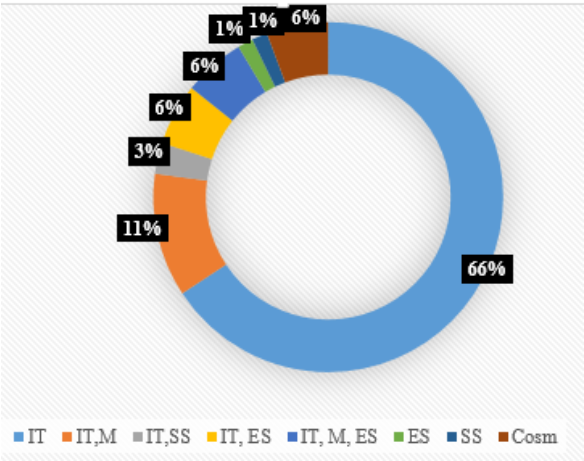

Figure 2. Plant life forms and their relative contribution (percent) in flora in Tang Soulak

(IT= Irano-Turanian, SS= Sahra-Sidian M= Mediterranean, IT-M= Irano-Turanian, Mediterranean. ES= Euro-Siberian, IT-SS= Irano- Turanian, Sahra-Sidian. Cos= Cosmopolid.
IT-M-ES= Irano- Turanian, Mediterranean, Euro-Siberian.
IT-M-SS= Irano- Turanian, Mediterranean, Sahra-Sidian.)

Plant classification, based on Raunkiaer's life forms revealed Hemicryptophytes as the most abundant (46% of total) species. Therophytes, Phanerophytes and Chamaephytes contained 26, 12 and 4 percents of total plant species, respectively (Fig. 3).

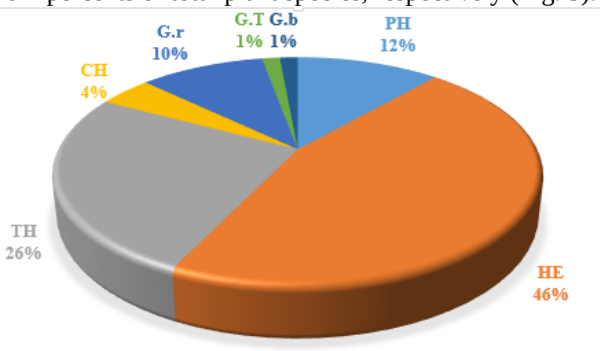

Figure 3. Plant Life forms and their relative percentage in flora in Tang Soulak

He: Hemicryptophytes,
(Th: Therophytes, Ch: Chamaephytes, Ph: Phanerophytes, G.b: Bulbous geophytes, G.r: Rootstock Geophytes, G.t: tuber Geophytes)

Among the 21 plant families found in the Tang Soulak, *Asteraceae* and *Poacea* were the most abundant. (Fig. 4).

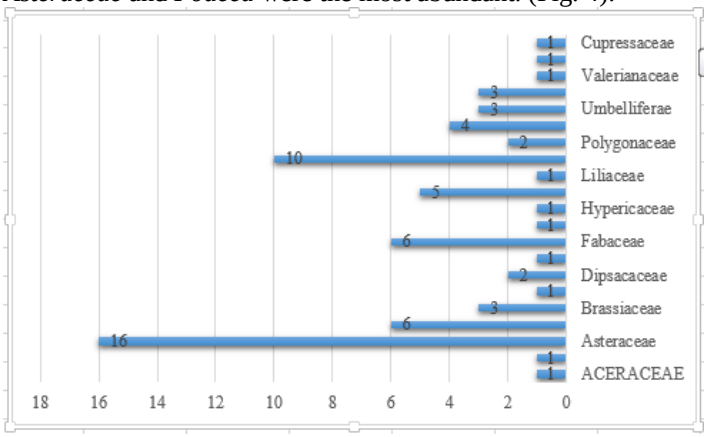

Figure 4. Abundance of plant species in Tang Soulak

Conclusion

Hemicryptophytes was the most abundant life form in Tang Soulak area. Documenting floristic composition of a habitat is valuable for continuing ecological research, management and conservation of plants and animals. Resources available for conservation of species and ecosystems are in short supply relative to the needs for those resources. Targeting conservation and management actions toward the species and ecosystems require clearly established priorities such as study of floristic composition as a principle tool in biodiversity which was considered in the study. So, in this research, identification of 70 plant species in Tang Soulak protected area along with their chorology, plant family and life form are of central importance for further ecological investigation, conservation and management of wildlife refuge of Iran.

Any life forms, in each plant communities vary. That this difference is the basis of the structure of plant communities (Mobin, 1981). Higher frequency of Therophytes and Hemicryptophytes in Tang Soulak area can be related to their high adaptation to the Mediterranean climate conditions (Zohary, 1973). The classification was based on Ranker system, Hemicryptophytes having 46% share of the total number, make up the dominant life form, that it is common in cold and mountainous climate and shows its adaptability with Regional ecological conditions (Ghahremani Nejad and Agheli, 2009).

Table 1. Floristic composition of Tang Soulak. Family name, Chorotype and life form of each species have been presented

rows	Family	Species	Chorotype	Life form
1	Aceraceae	Acer monspessulanum	IT	PH
2	Anacardiaceae	Pistacia atlantica	IT	PH
3	Asteraceae	Achillea wilhelmsii	IT	HE
4		Anthemis sp	IT,SS	TH
5		Artemisia lehmsnniana	IT	CH
6		Tragopogon bakhtiaricus	IT	HE
7		Crupinia crapinastrom	IT,M	TH
8		Taraxicum kotschyi	IT	HE
9		Centaurera virgata	IT	HE
10		Cichorium intybus	IT	HE
11		Cirsium arvense	Cosm	G.r
12		Cirsium vulgare	IT	HE
13		Cousinia bachtiarica	IT, M	HE
14		Helianthus annuus	IT, ES	CH
15		Lactuca sp.	IT, M	TH
16		Scariola orientalis	IT	TH
17		Serratula latifolia	IT	HE
18		Tragopogon montanus	IT	HE
19	Boraginaceae	Anchusa italica	IT	TH
20		Anchusa strigosa	IT	TH
21		Onosma bodeanum	IT	HE
22		Onosma kilouyense	IT	HE
23		Onosma platyphyllum	IT	HE
24		Solenanthus stamineus	IT,M	HE
25	Brassiaceae	Cardaria draba	Cosm	HE
26		Fibigia macrocarpa	IT	HE
27		Micrantha multicaulis	IT	HE
28	Convulvulacea	Convolvulus acanthocladus	IT	CH
29	Dipsacaceae	Pterocephalus canus	IT, M, ES	TH
30		Scabiosa olivieri	IT	TH
31	Euphorbiaceae	Euphorbia helioscopia	IT	HE
32	Fabaceae	Lens culinaris	IT	HE
33		Medicago minima	IT	HE
34		Medicago rigidula	IT, M, ES	HE
35		Trifolium campestre	IT	HE
36		Trifolium repens	IT	HE
37		Trigonella elliptica	IT	TH
38	Geraniaceae	Geranium tuberosum	IT	G. t
39	Hypericaceae	Hypericum helianthemoides	ES	PH
40	Labiatae	Eremostachys macrophylla	IT	HE
41		Nepeta daenensis	IT	TH
42		Nepeta macrociphon	IT	TH
43		Satureja bachtiaric	IT	HE
44		Phlomis aucheri	IT	TH
45	Liliaceae	Muscari neglectum	IT	G.b
46	Poaceae	Agropyron elongatum	IT	G. r
47		Agropyron intermedium	IT	G. r
48		Agropyron tricophorum	IT, ES	G. r
49		Arrhenatherum kotschyi	IT	G. r
50		Bromus danthonia	IT	TH
51		Elymus gentryi	IT, M	HE
52		Elymus sp	IT, M	HE
53		Elymus elongatiformis	IT, M	HE
54		Hodeum bulbosum	IT, M	TH
55		Hordeum glucum	IT, M, ES	TH
56	Polygonaceae	Rheum ribes	IT	G. r
57		Rumex acetosa	IT	G. r
58	Rosaceae	Amygdalus scoparia	IT,SS	PH
59		Crataegus azarolus	IT	PH
60		Rubus caesius	Cosm	PH
61		Rubus persicus	Cosm	PH
62	Umbelliferae	Smyrnium cordifolium	IT, ES	HE
63		Chaerophyllum sp	IT, M, ES	HE
64		Coriandrum sativum	IT	HE
65	Rubiaceae	Cruciata tauica	IT	HE
66		Crucinella sp	IT	HE
67		Galium verum	IT	TH
68	Valerianaceae	Valeriana officinalis	IT, ES	TH
69	Violacea	Viola sp	SS	TH
70	Cupressaceae	Cupressus sempervirens	IT	PH

Therophytes with 26 percent of the frequencies in the region are next. Therophytes prevalence in the region is related to factors such as human intervention, which decreases perennial plants and increases the chance for developing Annual plants (Ghahremani Nejad and Agheli, 2009). Overall, Hemicryptophytes and Phanerophytes, make up 72 percent of the plants in the region. This shows that the climatic conditions of the region are suitable for growing in temperate regions (Ismail-Zadeh et al, 2005). This type of life forms, have an important role in stabilizing soil (Batooli, 2003). Iranian-Turanian elements, with 66%, are in first place. A large percentage of Iranians – Turanian, related to the increase in the height range (Najafi Tireh Shbankareh et al, 2005).

During most of the summer and all winter times, Hemicryptophytes lose their aboveground parts while Therophytes remain as seed. Therefore, these plants avoid summer drought and winter cold stresses (Barbour et al, 1987). In conclusion, rangelands of Tang Soulak area confer a relatively rich floristic composition, which is a result of plant responses to Mediterranean climate as well as intense livestock grazing. A combination of climate and land use impact has led to dominance of Hemicryptophytes and Therophytes. The active growth periods of these life forms are concurrent with the rainy season in early spring (Tavili et al, 2009). Climate and human have significant effect on the flora of all habitats in the Tang Soulak protected area.

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