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Flora, Life Form and Geographical Distribution of Plants in West-South Forests of Iran (Case Study: Vezg, Yasouj)

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ABSTRACT: Identification of flora in each region, plays an important role in maintaining the national reserves of each country. This study was carried out to identify the species, life form and geographical distribution of plants in Vezg region, which is located at Southeastern of Yasouj, in south-west of Iran (E 51°, 39', 55''-51°, 41', 10'' , N 30°, 30', 35''-30°, 32', 0'')). In this study, 122 flora species belong to 102 genera and 32 families were surveyed from April 2010 to August 2011. The life form spectrum was determined using Raunkier' s system and compared with his normal spectrum. The herbaceous/woody species ratio was 7.13. The families with the greatest number of species were Compositae (17), Umblliferae (13), Labiatae (12), Caryophyllaceae (10) and Cruciferae (10). The observed life-form spectrum was: Therophytes (45.9%), Hemicryptophytes (32%), cryptophytes (9.8%), Phanerophytes (9.01%) and Chamaephytes (3.27%). In geographical distribution, the most frequency was 72.95% (89 species) that belongs to Irano-Turanian zone. Results showed that therophytes and hemicryptophytes were more than and phanerophytes and chamaephytes were less than the normal spectrum. Our findings are in agreement with data obtained in arid and semi-arid climates.

***Keywords*:** Plant diversity, Raunkier's system , Vezg, Yasouj, Zagros forests

INTRODUCTION

Iran is one of the most important centers of plant diversity in the old world, is that nearly 22 percent of the 8000 plant species of flora are the endemic (Ghahraman, 1990). Study of the flora of each region is useful in ecological issues like biological protection and natural resources management, determining of the potentials and growth capacities of the region, identification of the resistant and medicinal species and finally, to determine the plant species of the country (Esmailzade et al., 2004; Amiri et al., 2008; Karimi et al., 2009). The biological forms of plants are dependent on genetic feature as well as environmental factors, because environment can have undeniable effects on the formation of different critical forms of plants. Accordingly, plants can have different life forms in different communities and different regions. The dominant life form of a region represents the way plants have conciliated with the particular region (Zarezade et al., 2007). Some techniques have been developed to categorize the life forms of plants so far, which among them, Raunkiaer' s system is more practical (Asri, 2003). This system is developed according to the position and degree of protection of the renewing buds, which were responsible for the renewal of the aerial plant body after the unfavorable season. According to Raunkiaer' s system, plant species can be classified into five main groups: phanerophytes, chamaephytes, hemicryptophytes,

cryptophytes and therophytes. This system has been widely used in many regions to classify plant species in life-forms, such as tundra (Raunkiaer, 1934), temperate forest (Buell et al., 1948; Gao and Chen, 1998), tropical rain forest (Cain et al., 1956), and thorn wood lands (Carvalho de costa et al., 2007). Every plant species has a unique biological scope and endures a specific amount of environmental changes. To have a better understanding the transmittal areas, some scientists like (akhtejan, 1986 and Zohri ,1963) have been classified the world into different growing territories. Iran has special geo-botanic position in the Middle East, in way that connects four important regional phytogeographies, i.e. Irano Turanian, European-Siberian, sahara-Saudi Arabia and Sudan, like a bridge (Zohari, 1963). Various classifications of Iranian forests have been done (Jazireyi, 1962; Tregubov and Mobayen, 1991; Mosadegh, 2005; Marvi Mohadger, 2005). Iranian forests have been classified by (Marvi Mohadjer ,2005), based on ecological and geographical zones. In geographical classification, Iranian forests are divided as follow: Iranian north forests, Iranian west and west-south forests, Iranian central flat forests and south forests of Iran (Khalig-Omani sub region). Iranian west and west-south forest (Zagros forests) belongs to vegetation zone of Irano-Touranian (Sabeti, 2002). This region has semi arid climate with cold winter. Most rainfall in winter with annual range of 400 to 900 mm (Mosadegh, 2005). In most area of this zone, the soil is calcareous (Marvi Mohadjer, 2005). The elevation of the most parts of the area is 1000 meter above the sea level (Majnounian, 1999). There are little investigations on plant life-forms and geographical distribution in Zagros forests (Abrari and Karami, 2004; Pourrezaei et al., 2010; Taghipour et al., 2011). Analysis of the geographical distribution and floristic of a region is one of the most important methods for management and protection of the existing inherited stocks and species (Vaseghi et al., 2008). By identifying the flora of a region, it is possible to access the specific characteristics of the species, such as increasing or decreasing invasive and endangered species density in the region (Moradi et al., 2010). Vezg region is located in forests of Kohgiluyeh and Boyer Ahmad province, at 15 km south-east of Yasouj with dominant species *Quercus brantii* Lindl., which is considered as an indicator plant of Iranian west and west-south forests (Marvi Mohadjer, 2005). The specific climate condition, drought, over-grazing, reduction in drug and endemic species in Vezg forest, provided enough reason to study the flora of the region. The objectives of this research were to determine the plant species, life forms, and chorology of plants in part of the Zagros forests of Iran in Vezg region. According to (Sabeti ,2002), Zagros forests are located in the semi arid region, we expected a high percentage of species related to Irano-Turanian growth zone, and therophytes species.

MATERIALS AND METHODS

THE STUDIED AREA

The studied area (Vezg region) in 355.7ha, located in 15 km of south-east of Yasouj in Kohgiloyeh and Boyerahmad province, at west-south forests of Iran (E 51°, 39', 55"-51°, 41', 10" , N 30°, 30', 35"-30°, 32', 0"). The altitude of the region varies from 2100 m to 2600 m above sea level. The average annual rainfall and temperature are 895 mm and 13.8 °c, respectively. Most rainfall (65%) scattered in winter. A drought period of 5 to 8 months from early May to November which sometimes continued to December. The studied region preposition of geo-morphologically, is located in folded belt of Zagros and its component formations are Servak and Ilam formations.

RESEARCH METHOD

The flora was surveyed and identified during April 2010 to August 2011. The samples were pressed and transferred to the herbarium of Yasouj University and recognized according to the (Rechinger ,1963-1998), (Ghahraman ,1975-2005), (Massoumi, 1995), (Townsend and Guest, 1966-1985), (Nasir et al., 1970-2001) and (Ghahraman ,1990). The identifications then were confirmed by the expert scientists of the Institute of Forest and Rangeland Research, Tehran, Iran. The distribution of plant species was determined according to the mentioned literatures and also (Mobayen ,1980-1996), (Al-Rawi ,1987), and (Davis ,1965-1988). The chorology of plants were determined according to (Zohari ,1963), (Takhtjan ,1986) and (White and Leonard ,1991).

RESULTS AND DISCUSSION

In our study, 122 species from 102 genera and 32 families were identified (Table 1). The families Compositae (17 species-13.93%), Umblliferae (13 species-10.65%), Labiatae (12 species-9.83%), Caryophyllaceae (10 species-8.19%), Cruciferae (10 species-8.19%) and Papilionaceae (8 species-6.55%) that were most abundant with 57.37% frequency (Fig. 1). Seventeen families were represented by only a single species. The herbaceous flora (hemicryptophytes, cryptophytes, and therophytes) comprised of 107 species (87.7%), whereas the woody flora was represented by 15 species (12.3%) (Table 2), yielding a ratio of 7.13 between them.

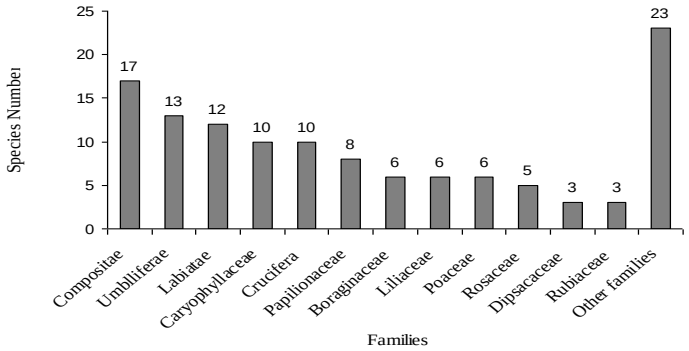

Figure 1. Frequency of plants families in Vezg region

The Vezg region is located in Kohgiloyeh and Boyerahmad province in west-south forests (Zagros forests) of Iran. The average annual rainfall is 895 mm. Despite of the good amount of rainfall, due to unequal distribution in winter and early spring, the climate is dry and semi-arid. Long term drought which starts in mid-spring and continues to late summer and fall, results in a limited favorable growth period of plants from spring to early summer. Compositae, Umbellifera and Labiatae which mainly presented by herbaceous species (hemicryptophytes, cryptophytes and therophytes), were among the richest families in the present study. Due to the high compatibility of these families with the arid and semiarid climatic conditions, they were more common compare to other plant families.

Table 1. List of the species, families, their life-forms and geographical distribution in the Vezk region, Yasouj, Kohgiloye and Boyerahmad province

Families / Species	Life Forms	Geographical Distribution
Compositae		
Acroptilon repens (L.) DC.	T	IT
Carthamus glaucus M.Bieb	T	IT
Carthamus oxyacantha M.Bieb	T	IT
Chardinia orientalis Desf.	T	IT
Cichorium intybus L.	H	Cosm
Cichorium pumilum Jacq.	H	IT
Cirsium Mill.	T	IT
crepis sancta (L.) Babc.	T	IT,M
Echinops orientalis Trautv	H	IT
Echinops ritrodes Bunge	H	IT
Gundelia tournefortii L.	H	IT
Lactuca serriola L.	H	IT,M
Sonchus asper Hill.	H	IT
Sonchus maritimus L.	H	IT
Tanacetum polycephalum Sch.Bip.	H	IT
Taraxacum baltistanicum V.Soest	H	IT
Anthemis cotula L.	T	IT
Umblliferae		
Dorema aucheri Boiss.	H	IT
Eryngium billardieri F. Delaroche	H	IT,M
Falcaria vulgaris Bernh.	H	IT
Ferula assafoutida Spreng.	H	IT
Grammosciadium scabridum Boiss.	T	IT
Physospermun cornubiense DC.	H	IT,M
Prangos uloptera DC.	H	IT
Prangos ferulacea Lindl.	H	IT
Scandix stellata Soland.	T	IT-ES.M
Torilis leptophyla Reichenb	T	IT,M
Turgenia latifolia hoffm.	T	IT

Bunium sp	G	IT
Chaerophyllum macropodum Boiss.	H	IT
Labiatae		
Acinos graveolens Link	T	IT,M
Ajuga chamaecistus Ging ex Benth.	T	IT,M
Hymenocrater incanus Bunge	T	IT
Lamium amplexicaule L.	T	IT
Nepta oxyodonta Boiss.	T	IT
Nepta persica Boiss.	H	IT
Phlomis olivieri Benth.	H	IT
Salvia atropatana Bunge	H	IT
Salvia reuterana Boiss.	H	IT
Stachys benthamiana Boiss.	H	IT
Stachys pilifera Benth.	H	IT
Teucrium polium L.	H	IT,M
Caryophyllaceae		
Acanthophyllum caespitosum Boiss.	C	IT
Cerastium dichotomum L.	T	IT,M
Gypsophila persica Barkoudah	T	IT
Gypsophila polyclada Fenzl ex Boiss.	C	IT
Scleranthus orientalis Rossler	T	IT,M
Sclerocephalus arabicus Boiss.	T	IT
Silene ampullata Boiss	T	IT
Silene conoidea L.	H	IT
Silene dichotoma Ehrh.	H	IT
Vaccaria grandiflora Jaub & Spach	T	IT
Cruciferae		
Alyssum maritimum (L.) Lam.	T	ES-IT
Alyssum stapfi L.	T	IT
Clypeola aspera Turrill	T	IT,M
Conringia Orientalis (L.) Andrz	T	IT
Erysimum oliifolium J.Gay	T	IT
Fibigia umbellate Boiss.	H	IT
Hirschfeldia incana (L.) Lagr. Fross.	T	IT,ES.M
Malcolmia Africana (L.) W.T.Aiton	T	IT,SS.M
Peltaria angustifolia DC.	T	IT
Sisymbrium altissimum L.	T	IT
Papilionaceae		
Astragalus jasdianus L.	H	IT
Astragalus kahiricus DC.	H	IT
Astragalus ovinus Boiss.	T	IT
Astragalus squarrosus Bunge	T	IT
Medicago sativa L.	T	Cosm
Onosma bodeanum Boiss.	H	IT
Vicia ciceroidea Boiss.	T	IT
Vicia villosa Roth	H	IT
Boraginaceae		
Anchusa italic Retz.	T	IT
Anchusa ovate Lehm.	T	Cosm
Asperugo procumbens L.	T	IT,M
Lithospermum arvense L.	T	IT,M
Rochelia macrocalyx Bge.	T	IT
Solenanthus circinnatus Ledeb.	G	IT
Liliaceae		
Allium ampeloprasum L.	G	IT
Allium haemanthoides Boiss. ex Regel	G	IT
Bellevalia olivieri (Baker) Wendelbo	G	IT
Belevaia heweri Wendelbo	G	IT
Eremurus spectabilis M.B.	G	IT
Fritillaria imperialis L.	G	IT

Poaceae		
Avena clauda Durieu	T	IT,M
Bromus tectorum L.	T	Cosm
Eremopogon foveolatus (Del.) Stapf	T	ss
Heteranthelium piliferum Hochst. Ex Jaub. & Spach	T	IT
Hordeum bulbosum L.	G	IT-M
Hordeum murinum L.	T	IT
Rosaceae		
Amygdalus scoparia Spach.	P	IT
Cotoneaster morulus Pojark.	P	IT
crataegus azarolus L.	P	Cosm
Prunus avium L.	P	IT
Pyrus glabra Boiss.	P	IT
Dipsacaceae		
Cephalaria procera Fisch & Ave-Lall.	G	IT
Cephalaria syriaca Schard.	G	IT,M
Pterocephalus persicus Boiss.	H	IT
Rubiaceae		
Crucianella glauca A.Rich	T	IT-M
Cruciata laevipes Opiz	T	IT
Galium tricorne Stokes	H	IT,M
Euphorbiaceae		
Euphorbia helioscopia L.	H	IT
Euphorbia aucheri Boiss.	H	IT
Fumariaceae		
Fumaria parviflora Lam.	T	IT,ES.M
Fumaria vaillantii Loisel.	T	IT,SS,ES.M
Ranunculaceae		
Adonis aestivalis L.	T	IT
Thalictrum minus L.	H	IT
Aceraceae		
Acer cinerascens Boiss.	P	IT
Amaryllidaceae		
Ixiolirion tataricum (Pall.) Herb	G	Cosm
Anacardiaceae		
Pistacia atlantica Desf	P	IT
Brasicaceae		
Aethionema Arabicum (L.) Andrz ex DC	T	IT
Caprifoliaceae		
Lonicera nummulariifolia Jaub & Spach	P	IT
Chenopodiaceae		
Bienertia cycloptera Bunge	T	IT
Clusiaceae		
Hypericum perforatum L.	H	IT
Fagaceae		
Quercus brantii Lindl	P	IT
Geraniaceae		
Biebersteinia multifida DC	T	IT
Malvaceae		
Malva nicaeensis All	H	IT
Oleaceae		
Fraxinus rotundifolia Mill.	P	IT
Orobanchaceae		
Orobanche sp	T	IT
Papaveraceae		
Hypecoum pendulum L.	T	IT-M
Plumbaginaceae		
Acantholimon flexuosum Boiss ex Bung	C	IT
Thymelaceae		
Daphne mucronata Royle	P	ES-IT

Valerianaceae		
Valerianella echinata DC.	T	IT
Violaceae		
viola modesta Fenzl.	T	IT

Note 1: Life Forms: T is Therophytes, H is Hemicryptophytes, P is Phanerophytes, G is Geophytes and C is Chamaephytes

Note 2: Geographical Distribution: IT is Irano-Turanian, M is Mediteranian, ES is Euro-Siberian, SS is Sahara-Sendiananan and Cosm is Cosmopolitan.

Grouping of the species on the basis of Raunkiaer' s life form categorization showed that Therophytes (with 56 species, 45.9%), Hemicryptophytes (with 39 species, 32%), Cryptophytes (with 12 species, 9.8%), Phanerophytes (with 11 species, 9.01%), and Chmaephytes (with 4 species, 3.27%) were the most salient life forms of the plants in the region (Fig. 2).

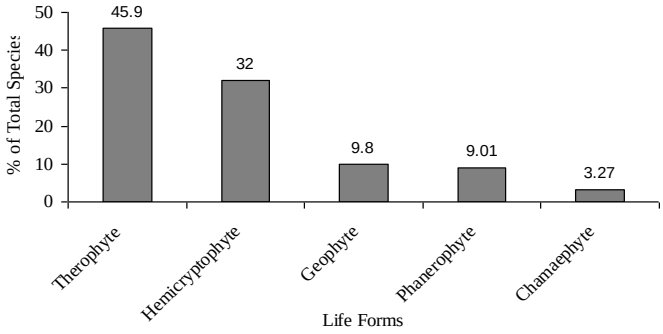

Figure 2. Life form percentage of plants in Vezg region

The life form spectrum of the Vezg region with a more proportion of therophytes and hemicryptophytes plants, indicates the possibility of adaptation of plants to environmental factors, especially to the climate factors. High frequency of the species of Therophytes and Hemicryptophytes showed the compatibility of these species with dry environmental condition of the region (Asri, 2003).The high proportion of therophytes in the Vezg region indicated the arid condition of summer and the cold winter (Memariani et al., 2009). This point is an effective strategy for their survive. In most studies in Irano-Turanian region, therophytes are the most abundant life-forms (Table 3). According to(Raunkiaer ,1934 and Kovacs-Lang et al., 2000), therophytes are abundant in arid and semi-arid climates and disturbed regions. The destruction factors in dominant of therophytes are over-grazing and agricultures in the Vezg region. Because of over-grazing, the percentage of therophytes was increased through the introduction and spread of weedy grasses and forbs of this life form (Cain, 1950). Therophytes integrate their life cycle during appropriate season and survive as seed due to shortage of humidity and water (Rooyen et al., 1990). The frequency of Hemicryptophyte species in the region, is due to cold and mountainous weather (Archibold ,1995). Generally, they endure the periods of water shortage through standing the dryness or by physiologic, morphologic and anatomic compatibility which leads to the reduction of water loss.

Results of geographical distribution of the species showed that 89 species (72.95%) had a high proportion on Irano-Turanian zone (Fig. 3). Nineteen species (15.57%) belong to Mediterranean and Irano-Turanian regions. A ratio of 2.45% (3 species out of total) are dominated in the Irano-Turanian, European Siberia and Mediterranean regions, 1.63% (2 species) to Irano-Turanian and Europe-Siberia and only 6 species (4.91%) are Cosmopolitan.

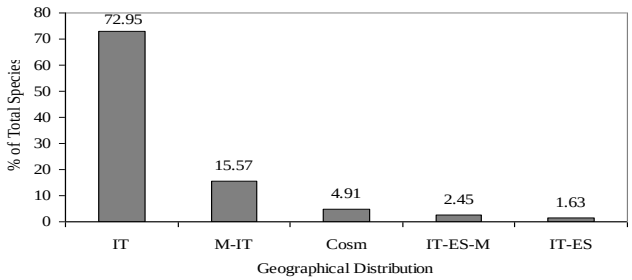

Figure 3. Geographical distribution of plants in Vezg region

The geographical distribution of plant species depend on the life condition of the environment and adaption of plants to the area (Asri, 2003) and it reflects the climate condition (Mobayen, 1991). Generally, geographical distribution of the plant species in a region indicates that the regions or different vegetative areas are susceptible and under influence (Asri and Eftekhari, 2002).

The x^2 test demonstrated significant differences between the flora of Vezg region and Raunkiaer' s normal spectra (N=100, P<0.05, d.f.=4) (Table 2). Therophytes had the highest individual value obtained from x^2 followed by phanerophytes (Table 2).

Table 2. Results of x^2 tests of the vezg region and Raunkiaer' s normal spectra

	Ph	Ch	H	Cr	Th	Total
Vezg region,Yasouj,Iran (No. of species)	11	4	39	12	56	122
Vezg region,Yasouj,Iran (% of species)	9.01	3.27	32	9.8	45.9	100
Raunkiaer' s normal spectrum (% of species)	46	9	26	6	13	100
x^2	29.7	3.6	1.4	2.4	83.2	120.3

Ph= Phanerophytes, Ch=Chamaephytes, H=Hemicryptophytes, Cr=Cryptophytes, Th=Therophytes.

Total number of Phanerophyte and Chamaephyte in this study were less than that of Raunkiaer normal spectrum, which may be related to the dryness of region. Difference in numbers of therophytes, hemicryptophytes and phanerophytes in this region with Raunkiaer normal spectrum is very high that may be a result of the semi-arid climate of the region.

Table 3. Comparison of different items in the study area and other region

References	Location	Dominant Geographical Distribution	Annual Rainfall (mm)	Annual Temperature (˚C)	Dominant Life Form	Woody Species	Herbaceous Species	Ratio of Herb/Woody
Abrari and Karami (2004)	Lorestan province (Hashtad Pahlu region)	Irano-Touranian	400-500	14.8	crypthophytes	25.36	74.64	2.94
Pourrezaei et al. (2010)	Tang Ban (Behbahan)	Irano-Touranian	350	24.5	therophytes	13.9	86.1	6.19
Basiri et al. 2011	River Forest (Behbahan)	Irano-Touranian	350	24.5	therophytes	9.7	90.3	9.3
Taghipour et al. (2011)	Alla and Rudzard	Irano-Touranian	500-600	21.39	therophytes	18.84	81.16	4.30
This study	Vezg region (Yasouj)	Irano-Touranian	850	13.8	therophytes	12.3	87.7	7.1

CONCLUSION

Comparing the species richness in different studies (Table 3), it is obvious that the ratios between herbaceous and woody species are quite variable. With respect to the irregular distribution of rainfall and long term drought period in the region, it is expected that the proportion of the herbaceous species would be more than that of woody ones. The same results were also obtained in Hashtad Pahlou (Abrari and Karami, 2005); Tang Ban region (Pourrezaei et al., 2010); Alla and Rudzard region (Taghipour et al., 2011) and River forest of Behbahan (Basiri et al., 2011) (Table 3). Our findings showed that the high percentage (72.95%) of the identified plants in the Vezg region, belongs to Irano-Turanian Zone. This result supports by other studies (Table 3). Because Iranian west and west-south forest (Zagros forests) belong to vegetation zone of Irano-Touranian (Sabeti, 2002), high percentage of these elements in this region is not unexpected. According to the results of this study, it can be concluded that the research area is located in Irano-Turanian region.

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