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Presentation of Plant Communities in Razhan Region

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Abstract: The present research was carried out in order to figure out the plant communities of the Razhan region and ecological factors that affect them. Razhan region with an area of 1667 ha is located in northwest of Iran in west Azerbaijan province. In this manner, plant communities was determined by Floristic- Physiognomic method and the similarity between plant communities was calculated by use of Sorensen' s similarity index. In general 319 species belong to 195 Genera and 45 Families was determined during floristic study in the area and 15 plant communities, was determined. The main ecological factors that affect vegetation of the region are: Altitude and biological factors. And slope and aspect are in the next order.

Key words: Plant community, ecological factors, Razhan, Iran

INTRODUCTION

By knowing and taking good care of highland mountainous ecosystems, one can protect better, the natural habitats, biodiversity, soil and water of these susceptible areas. In this regard, it is necessary to understand and be aware of the effects of interaction between, ecological biotic and abiotic factors on plants, as efficient tools in planning and management. In this way, many researches, was carried out on different regions vegetation in Iran, from ecologic and sociologic viewpoint. Vakili *et al.* (1997) in investigation of vegetation cover of Shahre babak, recognized 6 plant communities in this region and determined the altitude as a most effective ecological factor on these communities distribution. Mohebbi (1998) in investigation of Sir mountain in Urmia, recognized 5 plant communities and determined that the most effective factors in separation of them, are: Topographical alterations (slope, aspect, altitude), soil texture and physical characteristics of soil and human activity. Masumi (1993), recognized 73 plant communities in east of Taphresh and set these communities in 6 formation. And altitude, slope, aspect, soil pH, soil texture, quantity of Na^+, P^+ and $CaCO_3$ and grazing was known as effective ecological factors. With regard to this fact that some portions of Razhan region have destruction because of overuse and some other portions is under protection plans, it was necessary to have an investigation in this region and study on its plant communities and effect of ecological factors on them. In this manner, this study was done in this region during 2006-2007.

MATERIALS AND METHODS

Razhan region with an area of 1667 ha is located in northwest of Iran in west Azerbaijan province between 44°, 48', 40" to 44°, 53', 07" east longitude and 37°, 21', 03" to 37°, 23', 39" north latitude. Maximum altitude of region is 3000 m and minimum is 1651 m. The mean annual rainfall is: 459.3 mm and mean annual temperature is 5.6°C.

In order to presentation of Flora, plant specimens were collected during growing seasons and recognized according to the Flora references (Rechinger, 1963-2000; Parsa, 1943-1950; Davis, 1965-1988; Ghahraman, 1975-2000; Masoumiramak, 1986-2000; Mobayen, 1980-1996; Assdi, 1988-2002).

We used the Floristic-Physiognomic method to separate plant communities. Then within each community, quadrates (2×2 m for grasses and forbs and 10×10 m for trees and shrubs) with randomly selected areas were defined. In each quadrates data as: altitude, aspect, slope, the name of species, abundance of species and soil properties were noted. The abundance of species was assessed by visual estimate. Dimension of the quadrates was measured by Nested plots method and species-area curves (Asri, 1995). Determining the life form of plants in each community was done by Raunckier's classification (Raunchier, 1934).

Denomination of plant communities was done based on 1 or 2 dominant species. Similarity index between plant communities was calculated by Sorensen's similarity index (Asri, 1995). In order to comparison of the soil of plant communities, soil samples (30 cm depth) were collected within communities. Soil samples were analyzed for pH in water and texture (Zarrinkafsh 1993).

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For explanation of ecological similarity between plant communities and factors that cause such figures, aspect, slope and hypsometry maps of region was drown by GIS aystem with Arc view 3.2a software (Fig. 1-3). And finally vegetation map of the region was provided (Fig.4).

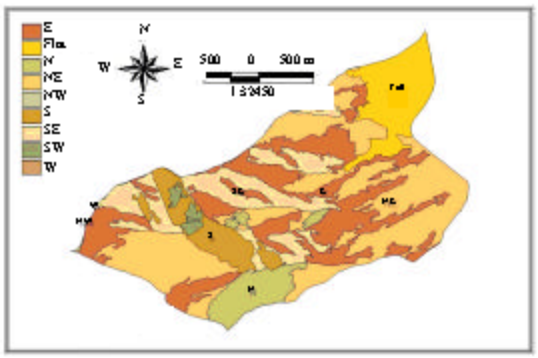

Fig. 1: Aspect map of Rhazhan region. E: East, N: North, NE: Northeast, NW: Northwest, S: South, SE: Southeast, SW: Southwest, W: West

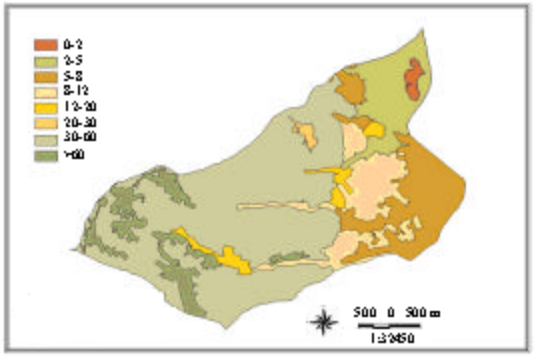

Fig. 2: Slope map of Razhan region

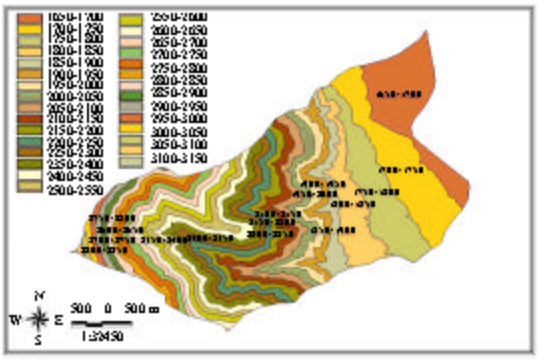

Fig. 3: Hypsometric map of Razhan region

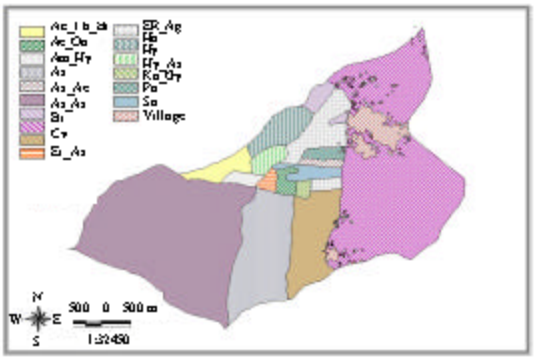

Fig. 4: Vegetation map of Razhan region

RESULTS AND DISCUSSION

In total, 319 species belong to 195 Genera and 45 Families was recorded in Razhan. *Asteraceae* with 47 species and *Astragalus* with 11 species are biggest Family and Genus in the region, respectively. The results show that there are 15 major communities in this region:

- ***Salicetum excelsae***

Dominant species: *Salix excelsa*

- ***Amygdaleto- Hypericetum scabrici***

D. sp. *Amygdalus elaegnifolia, Hypericum scabrum*

- ***Astragaleto-Aegilopsetum touschii***

D. sp. *Astragalus pycnocladus*, Aegilops touschii.

- ***Astragaleto-Astragaletum pycnocladi***

D. Sp. *Astragalus aureus, Astragalus pycnocladus*

- ***Astragaletum pycnocladi***

D. Sp. *Astragalus pycnocladus*

- ***Acantholeto-Thymeto-Brometum tomentelli***

D. Sp. *Acantholimon bracteatum, Thymus migricus, Thymus pubescens, Bromus tomentellus.*

- ***Hordetum bulbosici***

D. Sp. *Hordeum bulbosum*

- ***Brometum tomentelli***

D.Sp. *Bromus tomentellus*

- ***Poetum bulbosae***

D. Sp. *Poa bulbosa*

- ***Koelerieto-Gypsophilletum ruscifoliae***

D.Sp. *Koeleria criatata, Gypsophilla ruscifolia*

- ***Aegilopseto-onobrychetum megataphrosi***

D.Sp. *Aegilops touschii, Onobrychis megataphros.*

- ***Hypericeto-Astragaletum aureii***

D.Sp. *Hypericum scabrum, Astragalus aureus*

- ***Hypericetum lysimachioidis***

D.Sp. *Hypericum lysimachioides*

- ***Eryngieto-Astragaletum aureii***

D.Sp. *Eryngium billardierii, Astragalus aureus.*

- ***Eryngieto-Agropyretum trichophorici***

D.Sp. *Eryngium billardierii, Agropyron trichophorum*

Table 1: Characteristics of plant communities

Community type	Sign on map	Aspect	Slope (%)	Cover (%)	Soil texture	Altitude (m)
1	Sa	NE	0-10	70	LS	1750
2	Am-Hy	E	30-66	45	LFSY	2300-2600
3	As-Ae	S	30-60	60	SL	1800-2200
4	As-As	NE-NW-S-SE	30-60, >60	30	SL	2100-3000
5	As	E-NE-SE	30-60, >60	35	LS	2000-2380
6	Ac-Th-Br	E-SE	30-60	50	LFSY	2400-2700
7	Ho	NE-E	30-60	100	L	1760-2200
8	Br	NE-N	30-60	75	LFSY	1760-2000
9	Po	SE	20-30, 30-60	85	LFSY	1800-2100
10	Ko-Gy	E	30-60	50	FSL	2000-2100
11	Ae-On	E-NE	30-60	60	Sil	2100-2200
12	Hy-As	NE-E	30-60	60	LFSY	2200-2400
13	Hy	N-NE	30-60	60	L	2000-2300
14	Er-As	E-N-SE	30-60, > 60	40	S	1840-2100
15	Er-Ag	NE	30-60	50	Cl	2200-2300

N: North, NE: Northeast, NW: Northwest, E: East, S: South, SE: Southeast, LS: Loam sand, LFSY: Loam fine sandy, SL: Sandyloam, FSL: Fine sand loam, Sil: Silt, L: Loam, S: Sand, Cl: Clay

Table 2: Sorensen index of each community

Community type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Max similarity with	7	8	9	5	10	2	8	2	11	2	9	7	8	9	2,10
Min similarity with	4	4	4	1	13	4	4	4	4	4	4	4,15	4	15	4

Table 3: The life form spectrum in each community

Community type	He (%)	Th (%)	Ch (%)	Cr (%)	Ph (%)
1	52.63	34.22	5.26	2.63	5.26
2	48.89	28.89	11.12	4.44	6.66
3	40.90	36.37	13.64	9.09	-
4	34.88	46.88	9.37	9.37	-
5	38.24	44.12	11.76	2.94	2.94
6	45.45	18.18	15.15	12.12	9.09
7	45.83	35.42	10.42	8.33	-
8	54.06	21.62	13.51	10.81	-
9	52.18	34.78	4.35	8.69	-
10	40.90	29.54	11.36	9.09	9.09
11	50.00	31.82	9.09	9.09	-
12	44.00	32.00	20.00	4.00	-
13	38.10	33.34	19.04	9.52	-
14	39.28	42.86	10.72	3.57	3.57
15	58.06	12.9	19.36	6.46	3.22

He: Hemicryptophyte, Th: Therophyte, Ch: Chamephyte, Cr: Cryptophyte, Ph: Phanerophyte

In this region, most of the communities are in slope range 30-60% and most of the aspects in the region are northern and northeastern (Table 1). About soil properties, soil pH in the region is between 7-9 and soil texture, have some differences among communities. Sorensen's similarity index of each community was showm in Table 2, according this findings the majority of communities have min similarity with community type 4. The main biological forms in the communities are Hemicryptophyte and Therophyte (Table 3).

It was found from this study that altitude is most effective factor on plant community's structure and distribution. Increasing of altitude accompany with low temperature, light radiation increase and strong winds that restrict vegetation growth on high mountains, in which, above from certain extents, trees and shrubs replace with cushious plants. In this region, community type 1 (tree) is located in min altitude and cushious communities (4-5-6) are in highest altitude, in agreement with other works. (Jafarpur, 2004; Jafari Kukhdan, 2002).

The main biological factor that affected plant community type in this region is overgrazing and early grazing. With regard that this region, have 2, protected and unprotected portions, effects of grazing on plants is very obvious, in which, in unprotected region, only *Eryngium* and *Astragalus* that are unpleasant for grazing, can develop with cover of below 40%. According to this fact that palatable species such as *Poa bulbosa*, *Hordeum bulbosum*, *Aegilops touschii*, *Bromus tomentellus*, *Onobrychis megataphros*, have adapted to the region condition (edaphic, topographic and climatic condition), it is quite possible to use these species in the range management plans.

Slope extent affects the permeability of water in soils. In general, steep slops provide conditions that only vegetation that can tolerate water deficiency, can develop there. In this region *Salicetum excelsae* is located in flat area, grass and forbs community types are in flat to steep slopes and cushious community types are in steep slopes.This result have been recorded by others, too (Jafarpur, 2004; Jafari Kukhdan, 2002).

In addition to slope, aspect also affects plant community's separation. In this region, changing of aspect causes separation between *Hordetum bulbosici* with *Brometum tomentelli* and between *Poetum bulbosae* with *Astragaleto-Aegilopsetum toushii*.

Soil properties have no significant effect on community's distribution in this region.

It is concluded from the results of the study that the study area is very rich with refer to plant diversity. This conclusion is supported by the existence of 45 families, 195 genera and 319 species.

Astragalus diversity with its 11 species in the Razhan region which is mountainous shows that *Astragalus* has adapted to the mountainous conditions.

Classification the plants of region based on life form spectrum, shows that, Hemycryptophytes and Therophytes are dominant in the region. The life form of plants reflects their adaptation to the environmental conditions especially climatic conditions. In addition, different life forms are the base of plant community's structure. In other word, natural vegetation cover is resulted from the effects of all climatic factors and the plant communities are completely adjusted to climatic region. According to Mobayen (1982), the frequency of He is due to cold and temperate climate and the frequency of Th plants is due to Mediterranean climate. On the whole the frequency of He and Th among the plants of the region shows that the effect from two types of climate-Mediterranean and cold temperate-affected them.

The results of comparison between similarity indexes also showed that, altitude have a main role in similarity of plant communities, in which, communities with low altitude differences have more similarity with each other, in agreement with other works (Jafarpur, 2004; Malekmohammadi, 2006).

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