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STUDYING ENVIRONMENTAL FACTORS ON HALOPHYTE AND XEROPHYTE PLANTS ESTABLISHMENT IN DESERT REGION (CASE STUDY: SEMNAN, IRAN)

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Abstract:-
It is necessary to investigate the relationship between the vegetation each area with the soil because with this method determines the relationship between the condition and different factors in nature with the area vegetation. Therefore, was investigated the relationship in Delazian, Semnan. To study the vegetation, we identified vegetation types by aerial photography and determination of work units and using field survey and GPS. Typing based on physical appearance, canopy cover percentage, density, and distribution range of dominant plant species was carried out by plot and transect. 5 vegetation types were diagnosed (respectively, from upland to the saline lake are including Tamarix Sp. (1), Seidlitzia rosmarinus (2), Nitraria Schubert (3), Salsola rigida (4) and Haloxylon persicum (5)). Then, the soil samples were taken from within the types. Physicalchemical soil factors such as salinity, Gypsum, soluble cations, and anions, organic matter, lime, etc. were taken from depths of 0-30 and 30-60 cm. In order to investigate the relationship between vegetation types and environmental factors (soil factors such as salinity, SAR, cations and anions and other environmental factors such as groundwater depth, rainfall, temperature, relative humidity, altitude) was used of software PC-ORD and principal component analysis (PCA). The results showed that soil factors are effective in the establishment and distribution of vegetative tape and factors affecting on the differentiation of plant communities are including salinity, SAR, cation exchange capacity, OM, clay, silt, sand, K^+, Cl^-, calcium, magnesium, sodium, gypsum and limestone, carbonate and bicarbonate, sulfate and water table level.

Keywords:- *Multivariate analysis, plants and soil, Delazian, Semnan, Iran.*

INTRODUCTION

Dry ecosystems management and planning for sustainable development is very important due to the fragility of these environments and requires exact knowledge of the prevailing ecological characteristics and their constituent elements (Jafari, 1989). To maintain soil national resource, is necessary to know consistency mechanisms of halophyte plants and by completing this knowledge, the main objective is determined that is understanding the causal relationships of the communities and introduced plant species tolerant to salinity to amend these regions)Ahmadi Zia Tabar, 2002). Therefore, it is necessary to study the relationship between plants with soil factors for each region, although the investigation and finding ecological relationships in natural conditions is very difficult and requires careful statistics (Heshmati, Gh. A., 2003).

Salinity means there are the high concentration of salts, which seriously change root environment, osmotic potential of the soil solution and normal balance the dissolved ions and inhibit the growth of plants. Numerous studies have shown that there are the interactions between vegetation and soil characteristics in non-saline lands. In this connection, Comin et al (2003) evaluated the relationships between vegetation types and environmental factors and concluded that soil moisture, water table depth and salinity (mainly Cl and So_4) have the most important role in the distribution of plants. The same researchers showed that vegetation cover changes by salinity, rainfall and soil texture and there is a significant correlation with physiographic factors. Moreno (2006) showed that groundwater depth and salinity are of the factors affecting on the vegetation that has an important role in the establishment and expansion of vegetative types. Sokou (1994) in a study entitled relationship vegetation types with soil and micro-topography in Valanadoy concluded that tolerant degrees of plant species to soil alkalinity are as follows: *suaeda SP.> cloris SP.> cloris SP. Artemisia SP.> Aneurolepidium SP.> Arudinella SP.* According to them, the distribution of plant species depends on soil pH and these relationships can introduce a phenomenon known as isolated habitats. Leonard et al (1994) showed that vegetation has the highest correlation with soil temperature and moisture, and other features also, directly and indirectly, affect these two factors. Billing (1998) stated that vegetation, in addition, to be representing the overall property of the soil and its productivity is an important factor in change the characteristics of the soil. Wood and Muldavin (2006) in a study entitled "Evaluation of the playa wetlands in New Mexico" had a comparative study of plant diversity and zone ecological and concluded that the wetlands in different parts have different textures and vegetation with indicator plants such as *Distichlis spicata*, *Sporobolus airoides*, and *Suaeda spp.* Bernalds and Benayas (2005) were studied the relationship of groundwater hydro-chemical and soils in wetlands and their effects on the vegetation of central Spain. They concluded that the chemical characteristics of groundwater and soil topography are considered of the key factors of wetlands and vegetation semi-arid areas of Spain.

Jafari (1989) concluded from of the relationship between salinity and vegetation and salinity effects on dominant plant composition Damghan playa, as we move from high altitudes in the desert, on the amount of salt added. He earns the relationship between the dominant chemical composition of the area with soil salinity and the most halophyte species introduced *Halocnemum strobilaceum*. Ahmadi (1990) showed that defect in the process of forming soil, leading to slowness in the process of soil formation and eventually vegetation diversity and form are affected by environmental factors. Jafari and et al (2002) reviewed the Poshtkouh Yazd and concluded that there is the specific relationship between the distribution of different vegetation types and soil properties, so that separation of vegetation types are affected by EC, soil texture, potassium salts, gypsum and lime and each plant species depending on growth area, ecological needs and range of resistance is associated with some soil properties. Also, Moghimi (1989) investigated the relationship between vegetation, soil salinity and water table depth around the Qom Hoze- Soltan and concluded whatever we are moving of the highlands to the playa floor with less height, water ground depth decreases and salinity increases. Heshmati (2003) in a study titled reviews the effects of environmental factors on the establishment and expansion of rangeland plants using multivariate analysis, stated the most important factors affecting the distribution of plant communities in Golestan plain are water ground depth, direction, and salinity. Zare Chahouki (2006) based on ordination achieved to the pattern of species distribution and environmental factors in Yazd Poshtkuh in plain areas and according to soil properties isolated plant ecological groups in the area. Sanadgol (1991) argues that there is much evidence that shows salinity in natural conditions is an important factor in determining the distribution of halophytes in the soils. Anvari et al (1388) showed that the ability of plant species in arid and desert areas Iran to the soil salinity is different. Mohtasham Nia. et al. (1989) ordinated the Fars steppe rangeland plant communities in plains and mountainous areas. The results showed that soil physical and chemical characteristics have a greater impact on the vegetation in the plains and topography has a greater impact on vegetation in the highlands. Beno (1996), in his studies along the coast of Saudi Arabia and the Persian Gulf, studied plants as an indicator of soil properties and showed that some plants are representative soil characteristics and different vegetation types have been formed according to the soil types in the area. Standhal et al (2002) studied the effects of soil chemical properties on the quality of habitat in areas of Sweden. Their studies have shown that higher layers of soil are strongly associated with habitat index. Jin- Tum (2002), in studying the relationships vegetation to environmental factors, found that the distribution of vegetation is a function of climate and soil.

Cantero (2003) carried out studies concerning the effects of climate, soil, and topography on central rangelands vegetation Argentina. They showed that in addition to variable height, soil nutrients play an important role in the distribution of plants. Ungar et al. (2005) examined the vegetation in desert areas and relationship between environment and vegetation in national park Kartar in Pakistan. They identified nine natural plant communities by classification method using two-way indicator species analysis and ordination method, and they showed that in the determination of species, groundwater depth and chemicals in the soil had a major role. 38. Quevedo & Frances (2008) with a model of the relationship between soil and vegetation in arid and semiarid areas showed that the vegetation changes in the ecosystems will form as a result of the complicated relations between elements of soil and climate and change in soil moisture. White and Hood (2004) in a study titled relationships between species composition and environmental indicators (soil and topography) in northern Mexico, the use of non- directional comparative analysis concluded that there was no significant difference between canopy cover and soil factors including soil depth, surface gravel percentage, pH and total soil living matter in habitat.

Materials and methods:

The study area

Delazian is located on the geographical position 53º 28' E and latitude 35º 22' N in Semnan province and in north Iran's central desert (Kavir Desert) and south of the village Delazian (Figure 1). Delazian village is located at 8 km south of Semnan on the other side of the railway line Tehran - Mashhad and after Kheirabad villages and Roknabad. In the majority of the desert, xerophyte and halophyte vegetation is visible. The desert is intersection Shourab River of Semnan and Ginab River that come together in this area after across of the Semnan plain. Because of these two seasonal rivers, wetlands are abundant in the desert that is located on the edge the salt domes wetlands.

Figure1. Location of the study area in the country division's map

Continue figure 1. The location of the case study on satellite images Google earth 2014.
(Scale 1: 2207)

The average height above sea level is 910 meters. The case study is located between the isohyet lines 100 to 150 mm (135 mm), according to the isohyet map of the country, and by considering the annual isothermal map of the country, the temperature in the study area is located between curves 17.5 to 25℃. The mean annual evaporation was measured 2300 mm. The area has a very low slope (one meter per thousand m) (Figure 1). To study the vegetation, we determined vegetation types from aerial photography and determination of work units as well as field survey (as chess move on the edge of the lake, and using GPS) (Figure 2). Determining the types carried out on the basis of physical appearance, canopy cover percent, density and distribution range of the dominant plant species using transects and plot (plot size to consider twice the diameter of canopy cover for all plant species, except *Tamarix SP.* which was used tape plot for it) and types were named based on one or two dominant species with the most share in species composition. Map of vegetation types along with their area is given below (Figure 3). Then, soil samples were taken from inside type using GPS. Soil samples were taken from depths of 0- 30 and 30- 60 cm.

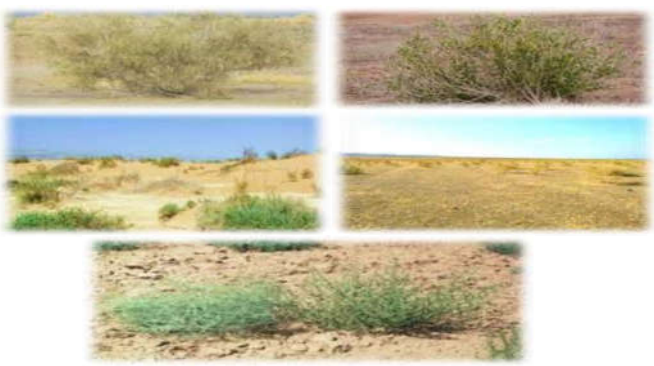

Figure2. Vegetation types of the area

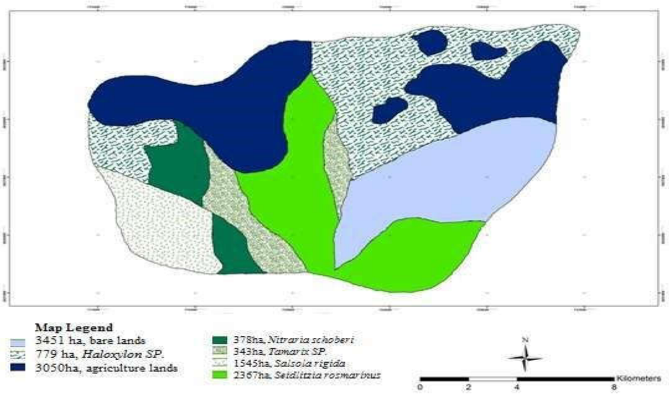

Figure3. Map of vegetation types along with their area.

4 profiles were drilled in each type. Of course, soil samples with the same depth in four profiles are mixed together and were obtained a composite sample from that depth. Then, the samples were transferred to the laboratory and were dried, crushed and passed through a 2 mm sieve to performed physicochemical tests on them. For testing physicochemical were used of the standard method of Soil and Water Research Institute of the US Department of Agriculture. Soil texture by hydrometer, soil salinity was determined by Conduct meter, pH using digital pH meter, soil organic matter content by Walkly-Black method (Walkly-Blak, 1962), calcium carbonate equivalent by calcimeter method, sodium, and potassium (flame photometer), calcium and magnesium by complexometric, acetone method to determine the amount of sulfate, carbonate, and bicarbonate by carbonation method. Chlorine was determined using silver nitrate or Mohr's method. The depth of the groundwater level was very low (about 60 cm). In order to find out the relationship between physicochemical properties of soil and the vegetation was used of the software PC- ORD and PCA or principal component analysis method. The application principal components, give us graphs and tables as well as environmental factors (edaphic) and plant types available on these components. Then, the highest correlation between vegetation types and soil factors specified (See results).

Results

Five vegetation types were recognized based on the field survey conducted and soil factors (in the depths 0- 30 and 30-60 which were marked with numbers 1 and 2 in Table 1, respectively) of plant types were measured, as was stated earlier (table 1).

Table1. Vegetation types and soil factors in the study area

Factors		Depth(cm)		Depth(cm)		Depth(cm)		Depth(cm)		Depth(cm)	
Vegetation types	code	Ec-1 (ds/m)	Ec-2	SAR-2	SAR- 1	pH- 2	pH-1	CEC- 2	CEC-1	% Clay-2	% Clay-1
Tamarix sp.	TA	35.6	32	42.0	43.1	7.32	7.25	12.5	14.1	32.5	31.2
Seidlitzia rosmarinus	SE	27.5	25.1	38.2	39.5	7.45	7.65	4.2	3.9	29.5	32.1
Salsola rigida	Sa	28	27.5	28.5	33.5	7,65	7.55	4.7	6.1	17.2	20.5
Nitraria schoberi	NI	18.2	18.3	25.6	28.4	7.3	7.4	3.9	4.2	18.7	18.6
Haloxylon persicum	Ha	7.9	7.6	13.6	14.5	7.28	7.21	2.5	2.5	20.8	17.1

	% Silt-1	Silt- 2	%Sand-1	Sand- 2	OM-1	OM-2	Gypsum - 1	% Gypsum - 2	Co3-1 (MEq per L)	Co3- 2	Relative humidity (%)
Tamarix sp.	38	37.5	30.8	30	0.65	0.89	10.3	11.1	1.94	2.35	22.5
Seidlitzia rosmarinus	35.8	35.1	32.1	35.4	0.71	0.42	13.5	12.1	3.15	3.1	22.5
Salsola rigida	33,5	31,2	46	51.6	1.31	0.84	11.2	11.4	2.4	3.1	22.5
Nitraria schoberi	28.5	30.2	52.9	51.1	1.45	1.52	13.5	11.8	1.58	0.31	22.5
Haloxylon persicum	26.4	26.8	56.5	52.4	1.35	0.75	12.9	11.8	0.31	0.5	22.5

	Watertable (cm-level)	Hco3-1	Hco3- 2	Cl- 1 (MEq per L)	Cl-2	So4-1 (MEq per L)	So4- 2	Ca- 1 (MEq per L)	Ca- 2	Mg-1(MEq per L)	Mg- 2
Tamarix sp.	81	2.35	3.6	765	685	33.9	33.1	95.6	86.4	148	162.5
Seidlitzia rosmarinus	84	1.55	3.2	489	752	31.6	33.5	138.4	115.6	175.2	195
Salsola rigida	86.5	3.1	1.35	385	295	35.9	41.5	158	149	160	175
Nitraria schoberi	87	3.1	2.9	289	398	35	33.2	158	135	139	139.5
Haloxylon persicum	300	3.1	2.1	351	298	23.5	29.5	198	221	141	198

	Na-1(MEq per L)	Na-2	k-1(MEq per L)	k-2	Caco3 -1	Caco3 - 2					
Tamarix sp.	789	856	61	58	35.4	33.5					
Seidlitzia rosmarinus	698	687	61.2	48	41	30.2					
Salsola rigida	604	458	39.4	39.5	27	25.6					
Nitraria schoberi	401	278	39.5	11.8	25.2	20.1					
Haloxylon persicum	189	178	40.1	39.5	17.6	17.5					

Prior to the preparation of matrix environmental factors- vegetative types, to determine the most important soil factors affecting on the separation of vegetative types, principal component analysis (PCA) was performed on the data (Table 2).

Salinity or electrical conductivity (depth first and second), sodium adsorption ratio (depth first and second), cation exchange capacity (depth first and second), clay, silt and sand (depth first and second), organic matter percentage (depth-first), K, Cl and Ca (depth first and second), bicarbonate (depth first and second), carbonate (depth first and second), gypsum percent (depth first and second), sodium (depth first and second), magnesium (depth first and second), the percentage of lime (depth first and second) and water table level with the first and second components and sulfate (depth first and second), magnesium (second depth) were highly correlated with the second component (table 3). According to the results of the principal component analysis (Table 3), 78.012% of changes in vegetation cover to be justified by the first and second components, the contribution of each component are 62.072 and 15.940 respectively. As a result, soil factors on these two components (ie, salinity, sodium adsorption ratio, cation exchange capacity, organic matter, clay, silt and sand, potassium, Cl, calcium, magnesium, sodium, gypsum and limestone, carbonate and bicarbonate, sulfate and water table) had a major contribution to the establishment and distribution of plant types.

Table2. The correlation between the types of vegetation and soil characteristics using principal component analysis (PCA)

Environmental characteristics	The first principal component	The second principal component	The three principal component	The four principal component	The five principal component	The six principal component
EC 1	0.9534	0.2691	0.1086	-0.0830	0.0000	0.0000
EC 2	0.9201	0.3712	0.1032	-0.0709	0.0000	0.0000
Acidity 1	0.3465	0.4653	-0.7780	0.2410	0.0000	0.0000
Acidity 2	0.2596	0.7182	-0.5094	-0.3965	0.0000	0.0000
SAR 1	0.9732	0.1912	0.0127	0.1220	0.0000	0.0000
SAR 2	0.9884	0.0400	0.0277	0.1439	0.0000	0.0000
CEC 1	0.7293	-0.0057	0.6399	-0.2421	0.0000	0.0000
CEC 2	0.7593	-0.1081	0.6167	-0.1776	0.0000	0.0000
Clay 1	0.9343	-0.3111	-0.1593	0.0702	0.0000	0.0000
Clay 2	0.7877	-0.615	0.0683	0.0305	0.0000	0.0000
Silt 1	0.9877	0.0515	-0.0311	-0.1441	0.0000	0.0000
Silt 2	0.9892	-0.0723	0.0962	0.0832	0.0000	0.0000
Sand 1	-0.9714	0.1468	0.1100	0.0169	0.0000	0.0000
Sand 2	-0.9007	0.4232	-0.0822	-0.0529	0.0000	0.0000
OM %	-0.8910	0.4413	0.0887	0.0595	0.0000	0.0000
OM %	-0.3506	0.4178	0.6675	0.5069	0.0000	0.0000
% Gypsum 1	-0.5025	-0.2110	-0.5241	0.6544	0.0000	0.0000
% Gypsum 2	-0.3723	-0.2614	-0.7254	0.5166	0.0000	0.0000
Caco3- 1	0.7733	0.3511	-0.4898	0.1973	0.0000	0.0000
Caco3- 2	0.7677	0.2613	-0.4561	-0.3664	0.0000	0.0000
Hco3- 1	-0.7423	0.4290	0.7402	-0.2096	0.0000	0.0000
Hco3- 2	0.5803	-0.5437	0.2779	0.5389	0.0000	0.0000
Cl- 1	0.8321	-0.3434	0.3434	-0.2679	0.0000	0.0000
Cl- 2	0.8418	-0.4319	-0.1332	0.2952	0.0000	0.0000
So4- 1	0.5545	0.7933	0.1740	0.2823	0.0000	0.0000
So4- 2	0.2754	0.8947	-0.1951	-0.2926	0.0000	0.0000
Ca- 1	-0.9384	0.003	-0.3294	-0.1041	0.0000	0.0000
Ca – 2	-0.9109	-0.1629	-0.1923	-0.3271	0.0000	0.0000
Mg- 1	0.5850	0.0869	-0.8024	-0.0798	0.0000	0.0000
Mg- 2	-0.0457	-0.5116	-0.6509	-0.5590	0.0000	0.0000
Na – 1	0.9843	0.1733	-0.0201	-0.0276	0.0000	0.0000
Na- 2	0.9886	-0.1161	0.0510	-0.0809	0.0000	0.0000
K – 1	0.8666	-0.4820	-0.1018	0.0789	0.0000	0.0000
K – 2	0.6537	-0.4196	-0.0894	-0.6234	0.0000	0.0000
% Lime 1	0.9246	-0,0817	-0.2892	0.2331	0.0000	0.0000
% Lime 2	0.9935	-0.0419	-0.0009	-0.1062	0.0000	0.0000
Water table level	-0.7627	-0.5283	-0.0307	-0.3718	0.0000	0.0000

Table3. Eigenvalues, variance explained by edaphic variables using principal component analysis (PCA)

components	Eigenvalues	% Of the variance	cumulative percentage of variance
1	24.208	60.072	62.072
2	6.217	15.940	78.012
3	5.268	13.507	91.520
4	3.307	8.480	100
5	0	0	100
6	0	0	100
7	0	0	100
8	0	0	100
9	0	0	100
10	0	0	100

This Software in addition to finding the correlations, these relationships also gives in graphical form. Figure 4 shows ordination graph of types associated with 18 of the soil factors. To analyze the graph above, it is necessary to note the following points:

1. The points distance represents the vegetation types in graphs, showing the degree of similarity or difference between the types in terms of environmental characteristics (soil).
2. The distance represents the types of coordinate axes indicate strength or weakness relationship and whatever the length of the vector (represents the plant type) be larger and the angle between them and axes be smaller, the correlation between type of plant and axis is greater and their relation to the characteristics of the axles reagent is stronger:

Due to the location this types on the graph, there is a more correlation in type *Salsola rigida* on the second component with factors such as sulfate (direct relation) and magnesium (an inverse relation with the second depth). *Nitraria schoberi* type is affected by features both axes with more inclined to the first axis such as salinity or EC (inverse relationship with the first and second depth), sodium adsorption ratio (inverse related to the depth of the first and second), cation exchange capacity (inversely related to the depth of the first and second), clay and silt (inversely related to the depth of the first and second) and sand (direct relationship with the first and second depth), organic matter (Direct relationship with the first depth and inverse relationship with the second depth) K (inversely related to the depth of the first and second) Cl (inversely related to the depth of the first and second) and calcium (proportional to the depth of the first and second), bicarbonate (inversely proportional to the depth of the first and second depth), carbonate (inverse relationship with depth first and second), gypsum (direct relationship with the first and second depth), water table level (direct relation), sodium (inversely related to the depth of the first and second), magnesium (inverse relationship with the first depth and direct with the second depth), sulfate (inversely related to the depth of the first and second) and lime (inversely related to the depth of the first and second).

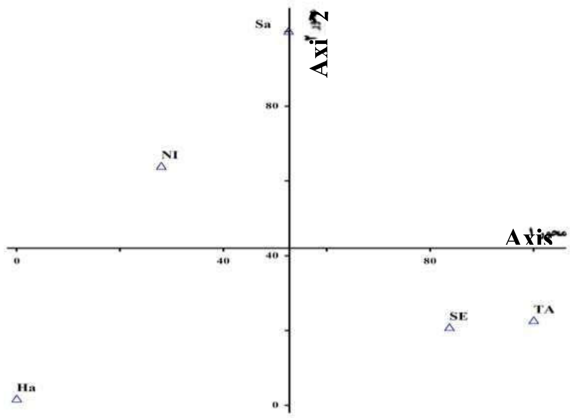

Figure4. The distribution of plant types in relation to soil factors using principal component analysis

Haloxylon persicum type is affected by the first axis such as salinity or EC such as (inversely related to the depth of the first and second), sodium adsorption ratio (inversely related to the depth of the first and second), cation exchange capacity (inversely related to the depth of the first and second), clay and silt (inversely related to the depth of the first and second) and sand (direct relationship with the first and second depth), organic matter (direct relationship with the first depth and inverse with the second depth), potassium (inversely related to the depth of the first and second) Cl (inversely related to the depth of the first and second) and calcium (direct relationship to the depth of the first and second), bicarbonate (direct relationship to the depth of the first and inverse to the second depth), carbonate (inversely related to the depth of the first and second), gypsum (direct relationship with the first and second depth), sodium (inverse relationship with the first and second depth), water table level (direct relation), magnesium (inversely related to the depth of the first and direct with second depth) and lime percentage (inversely related to depthfirst and second). SE and TA types are more affected by the first axis properties such as salinity or EC (direct relationship to the depth of the first and second), sodium adsorption ratio (direct relationship to the depth of the first and second), cation exchange capacity (direct relationship with the first and second depth), clay and silt (direct relationship with the first and second depth) and sand (inversely related to the depth of the first and second), organic matter (inversely related with the first and second depth), P (direct relationship with the depth of the first and second), Cl (direct relationship with the first and second depth) and Ca (inversely related to the depth of the first and second), bicarbonate (inversely related to the depth of the first and second), carbonate (direct relationship with the first and second depth), gypsum (inversely related to the depth of the first and second), Na (proportional to the depth of the first and second), Mg (directly proportional to the depth of the first and second depth), the percentage of lime (direct relationship with the first and second depth). In the first quarter, there were not any plant species and there are only bare lands.

Discussion and Conclusion

In the study area, there is specific relationship between soil factors and plant species' distribution (*Seidlitzia rosmarinus, Tamarix sp., Haloxylon persicum, Nitraria schoberi and Salsola rigida*), and of the characteristics of the soil, salinity, sodium adsorption ratio, cation exchange capacity, organic matter, clay, silt and sand, K, Cl, Ca, Mg, Na, gypsum and limestone, carbonate and bicarbonate, sulfate and water table level play a major role in the classification of plant types.

Due to high impact groundwater depth (water table) on the types' distribution *Tamarix SP.*, *Seidlitzia rosmarinus* and *Nitraria schoberi* in the area can be attributed to its effect on the absorption of nutrients, wash salts and dilute solution of soil the around of plant roots and be hygroscopic of plants (such as high groundwater levels in major area), this indicates that these plants have good compatibility with high humidity (for example, type *Seidlitzia rosmarinus*, groundwater depth was 60 cm). Jafari and et al (2001), Comin (2003), Sokou (1994), Bernalds (2005) and Wood (2006) in similar conditions, has cited moisture as a key factor in the establishment of plants. It should be mentioned that high groundwater level in saline soils can also be the rather limiting factor and as a contributor to the distribution of the species that in this study is an effective and vital factor for the plant distribution *Seidlitzia rosmarinus, Tamarix sp., Salsola rigida and Nitraria schoberi.*

Clay effect on plant species distribution of the above is due to its effects on soil moisture content because the change in moisture content leads to change in shaping, aeration, soil salinity and sodium adsorption ratio. In this regard, the researchers such as Moreno (2006), Wood (2006), Jafari (1989) and Moghimi (1989) in the study area and similar plants stated soil texture and salinity are the most important factors on plants distribution. According to the results of PCA, there is a strong correlation between *Tamarix SP., Salsola rigida, Nitraria schoberi* and *Seidlitzia rosmarinus* to soil salinity and alkalinity and in soils with high clay content and high groundwater depth and high salinity and alkalinity show positive trends, in while *Haloxylon persicum* species show negative trends to salinity, alkalinity, sodium, lime, magnesium, potassium and Cl and high carbonate and high groundwater depth.

The reason of compatibility *Tamarix SP.* to the above conditions is the genetic structure and having a gene resistant to salinity and alkalinity and high humidity and even the leaves of the plant absorb and excrete of salts and after defoliation of plants, absorb to the plant's foot soil and salinity and alkalinity increase that in the measurements the rate of salinity and alkalinity of the soil around the plant was lower than plant foot soil. As well as its root structure in comparison with *Haloxylon persicum*, whether in appearance or by cross-cutting, was much more complicated and more advanced and looks with the complex structure can be tolerated to high roots pressure from the salts. In addition, this species, wax leaves change to form a tube in the heating season and even lower leaves shed to reduce evaporation level. The above adaptations show the strategies that plant with the high humidity and salinity, alkalinity adopts to preserve its survival. Because of *Haloxylon persicum* species show the negative trend to salinity, alkalinity, sodium and lime, magnesium, potassium and Cl and high carbonate and high groundwater depth, this is because that this species is psammophyte and it is located in the upper part of the study area and is close to the sandy strip. The groundwater level in this species was 3 meters from the surface. Soil this type of plant is mostly sandy that less is placed at risk salt, unlike clay soils, due to large pores, because of capillary rise of groundwater, along with salt, is much more in tiny pores and sands more easily weathered and leached and not leave salts in the soil surface. On the other hand, this species shows positive reaction to gypsum and calcium percent, according to the analysis PCA that in soil sampling results obtained in the upstream region and this type amount of calcium, sand, gypsum and organic matter was greater than the organic matter content greater is due to the density of greater vegetation cover due to lower salinity this part of the region, which it leads to increase biological activity of soil organisms and increase the litter of soil. Gypsum and calcium return to calcic horizons and calcium crystals in subsurface horizons, that the combinations of organic material are a cementation material or connectors for the sandy soils and prevent of wind erosion. The ratio of potassium to magnesium soil can also be used as an indicator to separate the habitats of shrubs and herbaceous because of shrub species for growing to prefer the high degree of the ration (Tabar Ahmadi, 2002). In general, species *Haloxylon persicum* is the index of soils with high sand and small amounts of gypsum and calcium salts and they are preferred soils with the light texture, while the species *Tamarix SP.* are index soils with high clay, salinity and alkalinity and high groundwater depth.

Species *Nitraria schoberi, Salsola rigida*, and *Seidlitzia rosmarinus* are the index of soils with high salinity and the gypsum percentage and clay relatively high content and groundwater level (60 cm).

The general, each plant species according to the area characteristics, ecological needs and tolerance are associated with some soil properties. Therefore, the result obtained in each area is only applicable to areas with similar conditions. With knowledge of soil properties represent each site can propose species adapted to soil conditions to modify areas with similar ecological conditions. Also can only choose soil characteristics affecting the distribution of plant species according to the type of plant species for further studies in order to save time and costs. The multivariate analysis can be used to analyze habitats and understanding the factors affecting it due to high accuracy and different abilities. As a result of this method of analysis, understanding the relationships between plants and the environment become simpler and avoid of data complexity and variables ineffective. As was shown in this study, among 18 factors, factors salinity, sodium adsorption ratio, cation exchange capacity, organic matter, clay, silt, sand, K, Cl, Ca, Mg, Na, lime, gypsum, carbonate and bicarbonate, sulfate and water table had a major impact on the distribution of vegetation types.

References

[1]. Abd El-Ghani M.M. & Amer, W.M. (2003). Soil-vegetation relationships in a coastal desert plain of southern Sinai, Egypt, Journal of Arid Environments, 55:607–628.

[2]. Abd El- Ghani M.M & El- Sawaf, N.A (2005). The coastal roadside vegetation and environmental gradients in the arid lands of Egypt. Community Ecology, 6: 143-154.

[3]. Adams, D. A. (1963). Factors influencing vascular plant zonation in North Carolina salt marshes. Ecology, 44: 445–456.

[4]. Ahmadi, A., Zahedi Amiri, Gh., Mahmoodi, Sh., Moghiseh, E., (2007). Investigation of the relationship between physicochemical properties of soil and vegetation in saline soils, Eshtehard winter rangelands. Jour. Faculty of Natural Resources, 60 (3): 1049-1058.

[5]. Ahmadi, H., 1990. Natural environment properties of Iran in relation to morpho-pedologic and vegetation. Iranian Journal of Natural Resources, Volume 44, p. 1- 18.

[6]. Anvari, S. & et al, 2009. The effect of salinity stress on germination of 7 species of range plants, Iranian Journal of Range and Desert Research, No. 2, Vol. 16, p. 262 to 273.

[7]. Billing, L. 1998, determination of plant and soil relations and feature indicators on shrublands of southern Australia, Vol.9, p: 25- 46.

[8]. Beno, B. 1996. Plant as soil indicators along the Saudi coast of the Gulf, Journal of Arid Environment, 199: 261-266

[9]. Bernalds F. and R. Benayas, 2005, High-Density Groundwater Flow, Major-ion Chemistry and Field Experiments in a Closed, Basin: Fuente de Piedra Playa Lake (Spain),1Department of Environmental Sciences, Pablo de Olavide University, Seville, Spain.

[10]. Bouyoucos, G.J. (1962). Hydrometer method improved for making particle size analyses of soils. Agron, 54,464-465.PP

[11]. Bravodela, P. R. & Poggiale, J. C. (2005). Theoretical ecology and mathematical modeling: problems and methods. Ecology, 188: 1–2.
[12]. Bui, E.N. &. Henderson, B.L. (2003). Vegetation indicators of salinity in northern Queensland. Austral Ecology, 28: 539-552.
[13]. Cañadas, E.M., Jiménez, M.N., Valle, F., Fernández-Ondoño., E., Martin-Peinado., F, & Navarro, F.B. (2010). Soil-Vegetation relationships in semi-arid Mediterranean old fields (SE Spain): implications for management. Journal of Arid Environments, 74: 1525-1533.
[14]. Cantero, J., et al. 2003. Species richness, alien species and plant traits in central Argentine mountain grasslands, Vegetation Science, 14: 129-136
[15]. Carnival, N.J. & Torres, P.S (1990). The relevance of physical factors on species distribution in inland salt marshes (Argentina). Coenoses 5(2): 113-120.
[16]. Comin, F. (2003). Assessment of relationship of plant types and environmental factors of the southern plain of Spain. Geology, 18:35-50.
[17]. Eftekhari, T, 2002. Analyses of the flora, vegetation, and plants propagation relationship with soil elements in some regions with plaster soils in Iran, doctoral dissertation plant science, plant ecology, Azad University, Science and Research, page 178.
[18]. Enright, N., J., Miller, R., Akhtar .2005. Desert vegetation-environment relationships in Kithara national park, Snide, Pakistan, Arid Environments, 61: 397-418.
[19]. Flowers T. J., Troke P. F. & Yeo A. R. (1977). The mechanism of salt tolerance in halophytes. Plant Physiology, 28:89–121
[20]. Jafari, M., 1989. Investigate the relationship between vegetation and salinity factors and salinity effects in mineral composition of dominant plants in Damghan, MSc Thesis Range Management, Faculty of Natural Resources, Tehran University.
[21]. Jafari, M., Zare Chahoki, M. A., Azarnivand. H., Baghestani Meibodi, N., 2002. Investigate the relationship vegetation with soil physicochemical properties using multivariate analysis in Poshtkouh rangeland of Yazd province. Iranian Journal of Natural Resources, No 3, Vol 55.
[22]. Jin- Tum, Z. 2002. A study on the relation of vegetation, climate, and soil in Shanxi province, Plant Ecology, 162:23-31.
[23]. Heshmati, Gh. A., 2003. Investigate the effects of environmental factors on the establishment and expansion of range plants using multivariate analysis, Journal of Natural Resources, Vol 56, and No 3.
[24]. Lefor, M. W., Kennard, W. C. & Civco, D. L. (1987). Relationships of saltmarsh plant distributions to tidal levels in Connecticut. Environmental Management, 1: 61–68.
[25]. Leonard S.G.; R.L. Miles & J.W. B. Burkhardt, 1994. Comparison of soil properties associated with basin wild rye and black greasewood in the Great Basin region.
[26]. Li, X.D. (1993). Canonical analysis and the principal components analysis of plant community with its environmental factors in the Yellow River Delta. Acta Botanica Sinica 35(Suppl.): 139143.
[27]. Li, W.Q., Liu, X., Ajmal-Khan, M., & Gul, B. (2008). Relationship between soil characteristics and halophytic vegetation in coastal region of North China. Pakistan Journal of Botany 40 (3):1081-1090.
[28]. Lieth, H., Moschenko, M., Lohmann, M., Koyro, H.W. & Hamdy, A. (1999). Halophyte uses in different climates. Backhuys Publishers, Leiden.
[29]. Mahmoodi, S. & Hakymian, M. (2007). Fundamentals of Soil Science. Tehran University Press.
[30]. Miller, R.W., & Donahue, R.L. (1990). Soils an Introduction to Soil and Plant Growth. Practice- Hall International Editions: London.
[31]. Moghimi, J. 1989. Determine the relationship between vegetation and soil salinity with water table depth around Hoze-e Soltan, Qom, MSc Thesis Range Management, Faculty of Natural Resources, and Tehran University.
[32]. Mohtasham Nia, S., Zahedi, Gh. Arzani. H, 2007. Vegetation ordination of Steppic Rangeland in relation to edaphical and topographic factors (Case study: Abadeh rangelands, Fars), Journal of Rangeland, 1 (2). 142 - 158.
[33]. Mokhtari ASL, A. Mesdaghi., M, Akbarlou, M., and Rang Avaran, R. (2008). Investigate the interaction between soil characteristics and distribution of range species in Gherkhlar rangeland, Marand, East Azarbaijan province. Journal of Agricultural Sciences and Natural Resources, 15 (1): 1-10.
[34]. Moreno, D, 2006. Efficient factors on expansion and foundation of plants. CSIC. Press, Pp. 202-217.
[35]. Pazira, E. & Sadeghzadeh, K. (1998). National review document on optimizing soil and water use in Iran, Work shop of ICISAT, Sahelian center. Niamy, Niger, 13-18 April.
[36]. Plaster EJ. (1992). Soil Science and Management. Delmar Publishers Inc.: Albany, New
[37]. Quevedo, D.I., F., Frances .2008. A conceptual dynamic vegetation-soil model for arid and semiarid zones, Hydrology and Earth System Sciences, 12, 1175–1187.
[38]. Rogel, J.A., Silla, R.O. & Ariza, F.A. (2001). Edaphic characterization and soil ionic composition influencing plant zonation in a semiarid Mediterranean salt marsh. Geoderma. 99: 8198.
[39]. Sanadgol. A. A., 1994. The establishment of shrubs in saline soils. Forests and Rangeland Research Institute Press.
[40]. Sokou, G., 1994, Soil, plant and climate relationships Revegetation, Murdoch University, Perth Western Australia.
[41]. Tabar Ahmadi, Zia, Mir Khalegh, A., Babaian Jelodar, N. A. (2002). Translation: K. Gark and I, C. Gupta. Plant growing in saline and arid lands. Mazandaran University Publication.
[42]. Stendhal, J., et al .2002. Influence of soil mineralogy and chemistry on-site quality within geological regions in Sweden. Forest Ecology and Management, 170: 75-88.

[43]. Taghipour, A., Mesdaghi, M., Heshmati, GA and Rastegar, Sh, 2008. The effect of environmental factors on the distribution of plant species in Hezar Jerib of Behshahr (Case Study: Sorkh Gariveh rangeland). Journal of Agricultural Sciences and Natural Resources, 15 (4): 1-12.
[44]. Toranj Zar, H., Jafari, M., Azarnivand, H., and Ghanadha, M (2005). Investigate the relationship between soil characteristics with vegetation cover in Vashnouh rangelands, Qom province. Desert, 10 (2): 349-360.
[45]. Toth, T., S. Matsumoto, R. Mao & Yin, Y. (1995). Precision of predicting soil salinity based on vegetation categories of abandoned lands. Soil Science, 160: 218-231.
[46]. Ungar I. A. (1976). Vegetation-soil relationships on saline soils in North Kansas, American Midland Naturalist, 78: 98-120.
[47]. Ungar, I. A., Benner, D. K. & Mcgraw, D. C. (1979). The distribution and growth of *Salicornia europea* on an inland salt pan. Ecology, 60, 327–36
[48]. White, D.A., C.S., Hood .2004. Vegetation patterns and environmental gradients in tropical dry forests of the northern Yucatan peninsula, Vegetation Science, 15: 151-160
[49]. Wood, S. and E. Muldavin, 2006, Playa Wetlands in Northeast New Mexico, A Comparative Study of Vegetation Diversity and Ecology 1, New Mexico Natural Heritage Program, University of New Mexico,Albuquerque, NM 87131.
[50]. York, NY. Qadir, M. & Oster, J.D. (2004). Crop and irrigation management strategies for saline-sodic soils and waters aimed at environmentally sustainable agriculture. Environment, 323: 1-19.
[51]. Zahran, M.A. & Willis, A.J. (1992). The vegetation of Egypt. Chapman & Hal, London.
[52]. Zare Chahuoki, M. A., 2006. Modeling the plant species distribution in arid and semi-arid areas (Case study: Poshtkouh rangelands of Yazd province), PhD thesis Range Management, Department of Natural Resources, Tehran University, 180 p.