ffective ecological Factors in the Distribution and Diversity of Astragalus verus and Astragalus glaucops in West of Iran.

The objective of this research was to study the relationships between environmental factors and distribution of Astragalus verus and Astragalus glaucops in order to find the most effective factors in the distribution of Astragalus verus and Astragalus glaucops in west of Iran. Sampling of soil and Floristic composition were performed with Eco-phytosociology method. Floristic composition data including density and cover percentage were estimated quantitatively within each releve, and using Anaphyto (F.C.A, A.H.C and Boules optimmsees methods), and Floristic composition was classified into different groups. The topographic conditions were recorded in releve locations. Soil samples were taken in 0-30cm depth in each releve. The measured soil variables included texture, acidity (pH) and electrical conductivity (EC). Multivariate techniques including Factorielle Correspondence Analysis (F.C.A), Principles component Analysis (PCA) and Canonical Correspondence Analysis (CCA) were used to analyses the collected data. The results showed hat the Astragalus verus and Astragalus glaucops distribution pattern was mainly related to elevation. Totally, considering the habitat conditions, ecological needs and tolerance range each both species has a significant relation with elevation and soil properties. Keywords: Astragalus verus, Astragalus glaucops, Multivariate analysis, elevation, soil characteristics, Eco-phytosociology methodEffective ecological Factors in the Distribution and Diversity of Astragalus verus and Astragalus glaucops in West of Iran. 1Morteza Atri, 2Seyeed Mehdi Shahgolzari and 2Afagh. Yavari 1Department o Biology, Faculty of Science, Bu-Ali Sina University, Hamadan, Iran 2Department o Biology, Faculty of Science,Payane Noor University, Tuyserkan, Hamadan, Iran

Abstract The objective of this research was to study the relationships between environmental factors and distribution of Astragalus verus and Astragalus glaucops in order to find the most effective factors in the distribution of Astragalus verus and Astragalus glaucops in west of Iran. Sampling of soil and Floristic composition were performed with Eco-phytosociology method. Floristic composition data including density and cover percentage were estimated quantitatively within each releve, and using Anaphyto (F.C.A, A.H.C and Boules optimmsees methods), and Floristic composition was classified into different groups. The topographic conditions were recorded in releve locations. Soil samples were taken in 0-30cm depth in each releve. The measured soil variables included texture, acidity (pH) and electrical conductivity (EC). Multivariate techniques including Factorielle Correspondence Analysis (F.C.A), Principles component Analysis (PCA) and Canonical Correspondence Analysis (CCA) were used to analyses the collected data. The results showed hat the Astragalus verus and Astragalus glaucops distribution pattern was mainly related to elevation. Totally, considering the habitat conditions, ecological needs and tolerance range each both species has a significant relation with elevation and soil properties. Keywords: Astragalus verus, Astragalus glaucops, Multivariate analysis, elevation, soil characteristics, Eco-phytosociology method introduction The availability of suitable habitat is considered an important factor in determining species distribution patterns, and its importance relative to other factors such as competition often can be inferred if, for example, changes in a species distribution pattern coincide with demonstrable changes in habitat structure (THOMAS C. EDWARDS, JR.). Two forces, i.e. ecogenesis (adaptation to ecological conditions) and phylogenesis (historical events) interact in a complex manner to shape current species distributions (Thorpe et al. 1994). one of the main components of rangelands is vegetation, the absence and presence of which is controlled by environmental variables such as climate, soil, and topography (Leonard et al., 1984). Among different environmental factors, soil is of high importance in plant growth, and is a function of climate, organisms, topography, parent material and time (Hoveizeh, 1997). Topography (elevation, slope and aspect) affects soil and climate, in addition to affecting temperature and evapo-transpiration (as elements of climate), makes deeper soil and higher content of organic matter. Common plant species with wide distributions, my perform well in a wide range of environmental conditions. However, the costs of carrying adaptations to all possible environments could make it impossible for individual genotypes to perform well across the full range of conditions. Determining which factors control the present, number, identity, distribution and relative abundance of plant species remains a central goal in ecology. The main purpose of this research was to study the relationship between topographic and edaphic factors with plant species to determine the strongest factors affecting

the distribution of Astragalus verus and Astragalus glaucops. Materials and methods
Study area At the first phase, different stations of Astragalus verus and Astragalus glaucops were determined in the west of Iran by using the accessible references, Herbaria and existence information. Then we referred to the different stations in study area, along 2004-2006 years, for collecting floristic-ecologic data. Totally between studied stations, 31 stations selected for investigation in Hamadan, Kermanshah, Kurdistan and Markazi provinces from west of Iran (Table 1 and Fig 1). Table 1: the different studied stations for Astragalus verus and Astragalus glaucops from west Iran population Voucher No Place of collecting Altitude A. verus 7286 Hamadan 2425 A. verus 7287 Hamadan 2417 A. verus 7288 Hamadan 2408 A. verus 7289 Hamadan 2424 A. verus 7290 Hamadan 2416 A. verus 7291 Hamadan 2344 A. verus 7292 Hamadan 2563 A. verus 7293 Hamadan 1723 A. verus 7294 Hamadan 1898 A. verus 7295 Hamadan 1723 A. verus 7296 Hamadan 1898 A. verus 7298 Hamadan 2213 A. verus 7299 Hamadan 2220 A. verus 72300 Kermanshah 1840 A. verus 72301 Kermanshah 1850 A. verus 72302 Kermanshah 1800 A. verus 72303 Kordestan 1610 A. verus 72304 Markazi 1995 A. verus 72305 Markazi 1940 A. verus 72306 Markazi 2008 A. glaucops 7307 Hamadan 2563 A. glaucops 7308 Hamadan 2300 A. glaucops 7312 Hamadan 2540 A. glaucops 7310 Hamadan 2536 A. glaucops 7313 Hamadan 2547 A. glaucops 7309 Hamadan 2600 A. glaucops 7311 Hamadan 2650 A. glaucops 7314 Hamadan 2660 A. glaucops 7315 Hamadan 2723 A. glaucops 7316 Hamadan 2570 A. glaucops 7317 Hamadan 2598
Fig.1: The distribution map of Astragalus verus (A) and Astragalus glaucops (B) in Iran
Data collection Data collecting from 32 selected stations carried out by using the unit of study in Eco-phytosociology method (Atri, 1996, 1999, 2006, 2007) that is named Endogenous milieu (special station). In each station, location of establishment for each releve (stand) determined on base of presence of individual study species. Then for determination of special station of individual study species, minimal area determined by using the area-species method with area-species curve and Cain method (Cain et al., 1959). All ecologic-floristic data were collected of each special station. Plant specimen deposited in the Herbarium, of Bu-Ali Sina University in Hamadan, Iran. Studies ecological factors included: elevation, pH, EC, texture of soil slop direction and slop percent in each special station. Data analysis methods Data matrix of environmental factors and Floristic composition was mad. The Anaphyto, CAP (Community analysis package) and Mvsp packages were used for classification and ordination of Floristic composition in gradient of environmental factors. Data were analyzed by a series of multivariate techniques such as the Factorielle Correspondence Analysis (F.C.A), Ascendant Hierarchical Classification (A.H.C), Boules optimmsees, Principles component Analysis (PCA) and Canonical Correspondence Analysis (CCA). Results Floristic results: obtained results base on floristic composition analyses of 31 special station showed seven main groups by using F.C.A, A.H.C and Boules optimmsees methods (Fig.3). Ecological results: To determine the most effective variables on the distribution of Astragalus verus and Astragalus glaucops, ecological factors data that were collected by applied method analyzed by F.C.A, PCA, and CCA methods. The results of the F.C.A, PCA, and CCA ordinations are presented in Fig 2.
Fig 3: results of floristic composition data analysis by Anaphyto package: A) FCA method, B) AHC method, C) Boules optimmsees methods Altitude This factor has been effective as principal and determinant factor in distribution this both species. This factor has been able to divide the special stations of the region into 5 groups (Fig. 3. C). Group 1 has 1600-1750m, Group 2 has 1750-2300m, Group 3 has 2300-2450m, Group 4 has 2450-2600m, and Group 5 has 2600-2700m. Soil pH This factor has been able to divide the special stations of the region into 3 groups (Fig. 3. D). Group 1 has a pH 6.5- 7, Group 2 has a pH 7-7.9 and group 3 has a pH 7.9-8.3. Soil EC This factor has been able to divide the special stations of the region into 4 groups (Fig. 3. E). Group 1 with an EC of 38-70/m, Group 2 with an EC of 70-95 /m, Group 3 with an EC of 95-135 /m, and Group 4 with an EC of 135 to above. Soil texture This factor has been able to divide the special stations of the region into 6 groups (Fig. 3. F). group 1 with a sandy- clay soil texture, group 2 with a sandy-loam soil texture, Group 3 with a sandy-clay-loam soil texture, Group 4 with a loam-sandy soil texture, Group 5 with a sandy loam soil texture and Group 6 with a loam soil texture.
A B
C D
E F
E F Fig 4: results of ecological factors studies by Anaphyto and MVSP package: A) PCA method, B) CCA method, C) FCA method of elevation, D) FCA method of pH, E) FCA method of soil texture, F) FCA method of EC
Conclusion The results showed that in this study, among different environmental factors

(Topographic and edaphic variables), the distribution of Astragalus verus and Astragalus glaucops was strongly correlated with elevation. Our study provides strong evidence that between region variation in habitat of Astragalus verus and Astragalus glaucops in the west of Iran. Soil texture controls distribution of plant species by affecting moisture availability, ventilation and distribution of plant roots. The role of soil moisture, as a key element in the distribution of the plant species is described by Zohary and Orshan (1949). Changes in the nature and strength of plant interactions have long been recognized as important driving forces shaping species distribution along gradients (Whittaker 1967, Choler et al. 2001). Present results show that Astragalus verus has station high diversity in the west of Iran. According to our results of floristical analyses, there are 7 distinctive different groups of Astragalus verus and Astragalus glaucops individuals in study region. This study showed that different ecological factors do not have similar importance and effective in the distribution of this both species. In such a manner that, a number of ecological factors have been effective as principal factors that are elevation and soil texture. In regard to applied principles in eco-phytosociology method for data collecting, we can certainly declare that floristic markers led to correct and precision results because that is according to factors governing nature, also it is able to provide results which conform and agree to the rules the govern nature in the analysis and results interpretation stage.

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Zohary, M., Orshan, G., 1949. Structyre and ecology of the vegetation in the a dead Sea region of palestin. Palestine journal of botany 4, 177-206. Whittaker, R.H., 1967. Gradiant analysis of vegetation. Bio.Rev. 42: 207-264. Choler, P., Michalet, R. & Callaway, R.M., 2001. Facilitionand competition on gradients in alpine plan communities. Ecology 82: 3295-3308. Email authors Email: mehdi.shahgolzari@gmail.com