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A. Tavili

University of Tehran, Iran

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Study of environmental factors effects on vegetation , case study : Iran

A . Tavili

The University of Tehran , Natural Resources Faculty , P .O .Box :31585 -4314 ,Karaj , Iran
atavil@ut.ac.ir

Abstract The distribution of plant species under environmental factors effects was examined in Veresk rangelands of Iran . Six vegetation types were recognized in the study area . Canopy cover percentage of plants in different types was estimated based on randomized-systematic vegetation sampling procedure within 1 m² quadrates . Soil sampling was performed from 0-30 and 30-60 cm depths . The characteristics of soil samples in addition to slope , aspect and elevation of quadrates locations were considered to test their relations with distribution of vegetation using multivariate analysis . The results showed that separation of understudy types was mainly affected by texture , gravel percentage , N , OM , pH , and Ec .

Key words : Vegetation , Environmental factors , Soil , Multivariate analysis

Introduction Interest in how various landscape components affect biotic and abiotic resources has grown over the past 2-3 decades (Brosofske *et al* , 2001) . The distribution and abundance of range species has been correlated with a variety of complex environmental gradients . Environmental factors affect range plant growth and need to be understood and considered by rangeland managers . Plant growth and development are controlled by internal regulators , which are modified according to environmental conditions . Of the most ecologically important environmental factors affecting rangeland plants growth and distribution are topography (slope , aspect , and elevation) and soil properties . Various studies have been done in this case (El-Sheikh and Yousef ,1981 ; de Blois *et al* , 2002) .

Materials and methods Based on field surveys , six vegetation types were identified at the study area . Fifteen 1 m² quadrats with 50 m distance from each other were established along each of four 200 m transects . Vegetative sampling method was randomized-systematic . Floristic composition and canopy cover percentage related to each quadrat was recorded . To examine the relationship of topography to vegetation , aspect , slope , and elevation of quadrats was recorded , too . Soil samples were taken from 0-30 and 30-60 cm depths . Texture , gravel percentage , pH , Ec , OM , N , CO₃²⁻ , and HCO₃²⁻ of soil samples in addition to slope , aspect and elevation of quadrates locations were considered to test their relations with distribution of vegetation using multivariate analysis (PCA technique) .

Results and discussion Results from PCA showed that PC1 and PC2 together accounted for approximately 73% of the total variance in data set . It was shown that the overriding factors of PC1 are gravel percentage , Ec , N , and OC in the first soil layer (0-30 cm) and gravel percentage , clay , silt , N , and OC in the second layer (30-60 cm) . It can be noted that PC2 is correlated to pH , sand and clay at depth 0-30 cm and sand at depth 30-60 cm . According to the correlations between site factors and components , it seems that PC1 represents soil characteristics of salinity and nutrient while PC2 is related to texture and pH properties . Results showed that different vegetation types show different relationships with understudy soil characteristics while no relationship was recognized between topography and vegetation types . According to small area of the study region (2650 ha) , topography changes is very tiny (aspect is steady , elevation ranges between 2050 and 2850 m a .s .l . , and slope 21%) , therefore no strong relationship was considered between topography and vegetation . It seems that the most effective factors on the occurrence and separation of vegetation in Veresk rangeland could be soil characteristics including texture , N , and OC . Soil texture controls distribution of plants by affecting moisture availability , ventilation and distribution of plant roots (Jafari *et al* . 2004) . The role of soil moisture , as a key element in the distribution of plants is described by El-Sheikh and Yousef (1981) . Soil organic carbon is an important determinant of soil fertility because of its impact on ion exchange capacities and its near-stoichiometric relationship to nitrogen . According to high cover percentage of different types and existence of livestock during grazing season , N and OC of study area soil is large which in turn , causes a noticeable positive correlation between most vegetation types and mentioned soil characteristics .

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