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Investigating the Effects of *Capparis spinosa* on Desert Areas' Soil Characteristics: A Case study of Eyne-Khosh, Dehloran

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Extended Abstract

Introduction: The complex relationship between soil and vegetation is difficult to be simulated by mathematic and statistical models. Since soil, vegetation, and atmosphere are interrelated, they cannot be separately compared. As an important basic factor with regard to soil, vegetation greatly affects ecosystems, especially in arid and semi-arid areas. Therefore, the restoration and recreation of this complex phenomenon is much more difficult in arid and desert regions. On the hand, considering the fact that plants generally affect the soil both physically and chemically, it is necessary to know how these parameters interact, the knowledge of which could significantly help restore the vegetation.

As a natural, resistant and desert-friendly plant, *Capparis spinosa* has been known as a multipurpose species in recent years. Because of its deep roots, this species is resistant to wind and its wide canopy can cover a wide range of the soil's surface and stabilize sand hills. Therefore, it could be an appropriate choice for preserving soil and water, and anti-desertification programs. It could also help control dust storms in different regions. This study, therefore, sought to investigate the effects *Capparis spinose* on soil characteristics of the Eyne-Khosh desert area

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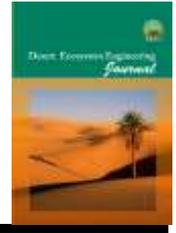
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in Dehloran, southern Ilam province, offering it to the relevant officials and decision makers as an effective plant for anti-desertification programs.

Materials and methods: As a part of desert areas in southwest Iran, the study area is located in Dehloran city, Ilam province. To investigate the effects of *Capparis spinosa* on soil characteristics, this field study used satellite images, GIS, laboratory analysis, and the data obtained from a statistical software. To this end, first the species' distribution map was prepared, using field observation and liner transect for calculation of coverage percentage in the growing season. Then, other characteristics including canopy percentage, soil preservation percentage, and other factors were measured, using sixty-nine species randomly selected for the study. As for investigating the effects of *Capparis spinosa* on soil's physical and chemical characteristics, a soil profile was dug, and the intended samples were collected from two layers (surface and subsurface) of fifteen points including the surface soil of the existing bushes (near the stem) and control areas (bush-less), which were then moved to the laboratory (totally 30 samples) where chemical factors including N, K, P, OC, ESP, CEC, Ca, Mg, CaSO_4 , CaCO_3 , Cl, HCO_3 , pH, EC, and SAR were measured.

Results: The study's findings showed that the highest values of all chemical factors (N, C, P, K, Na, Ca, C/N) belonged to the bushes' subsurface soil. On the other hand, there were statistical differences between land use (control areas, Nebka bushes, and natural bushes) and land depth for other seven parameters (OC, ESP, Ca, Na, EC, pH, SAR). There were 5% difference between EC and PH in terms of land use, and 5% difference between CA, OC, and CI in terms of land depth. For physical soil factors, actual soil moisture and saturated soil moisture show a strong relationship to depth and they are more in both depth, comparing to control part, although for the other parameters (clay, silt, sand, field capacity and wilting point) there were not statistical different. It was also found that the presence of the study bushes decreased salinity and increased alkalinity of the soil. Moreover, the highest number of variations of the organic matters of the control points' deep layers occurred in subsurface layer of under-bushes, indicating that this species had increased the organic carbon of its sub-soil compare to the surrounding areas. The findings also showed an increase of OC, Na, Cl, and HCO_3 in under-bushes soil.

Discussion and Conclusion: According to the study's results, *Capparis spinosa* has significant effects on soil characteristics and may change soil texture, increase the soil's organic matter, maintain the soil's moisture, and in general, preserve the soil and control its erosion. It could also positively affect chemical parameters such as decreasing the salinity, increasing the alkalinity, and increasing OC, Na, Cl, HCO_3 , and nutrients of the soil. Therefore, this species could be an appropriate choice for anti-desertification programs in this region and similar areas.

Keywords: *Capparis spinose*, Soil characteristics, Combat to desertification, Eyne-khosh, Dehloran.