



Evaluating Ripping and Planting of *Haloxylon* and Its Impact on Vegetation and Soil Characteristics: A Case Studies of Ashniz Meybod

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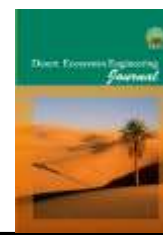
Extended Abstract

Introduction: With thirteen critical erosion hubs containing an area of roughly 532 thousand hectares, and 14 regions influenced by wind erosion with an area of 1144311 hectares, the Yazd province ranks fifth among the Iranian provinces in terms of the magnitude of crisis hub, and third in terms of the extent of affected areas. The history of desertification activities in the province dates back to 1970, based on which some 42,000 hectares of the Yazd-Ardakan plain has been afforested. As a phreatophyte member of the Chenopodiaceae family, *Haloxylon aphyllum* is mainly characterized by such features as xerophyteness, halophyteness, and psamophyteness, and is considered as the most compatible species among desert plants. On average, each mature *Haloxylon aphyllum* tree needs 2.4 m³ water annually for optimal growth. This study sought to evaluate and identify the strengths and weaknesses of the *Haloxylon* plantations carried out with ripping method in arid region in an attempt to fight against desertification. The annual precipitation rate in the Ashniz Meybod Desert rangeland was estimated to

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be 74 mm, and the vegetation was found to be less than 2% before *Haloxylon* plantations. The region's soil has a medium block structure up to a depth of 30 cm and is structureless from the depth of 30 to 120 cm, and its stability in a dry state is very tough. The soil texture in this horizon is clay-silty. The maximum depth of the area's ripper is 80 cm, and hardpan layer is not completely eliminated. Moreover, during the 1990s, ripping operations and *Haloxylon* plantations was carried in the study area where 250 *Haloxylon* trees were planted in each hectare within three years in the water distribution plain and irrigated 12 times.

Materials and methods: This study investigated the *Haloxylon aphyllum* plantations in the region mentioned. To this end, four transects (300 M) were randomly – systematically considered in each area, on each of which some fifteen plots (10 m²) were randomly collected. For each plot, the vegetation characteristics including the total percentage of vegetation, density, *Haloxylon* and *Artemisia* species' canopies, harmony, and richness and diversity of species, and soil characteristics including Permeability and carbon sequestration, were measured. Moreover, to study the harmoniousness, richness, and diversity of species, the Sympon, Hale, and Margolf methods were used respectively. In addition, to measure the soil's permeability and moisture, Double Cylinder and TDR methods were used, respectively.

The collected data were examined in terms of normality via Shapiro-Wilk test, and analyzed through one-way variance and Dunken tests. As for the inventory, the transect-plot method was performed systematically-randomly. Therefore, for preparing the inventory of the region's vegetation, eight transects and one-hundred and twenty 10 square meter-plots were used. Moreover, eight and sixteen measurements of the soil's water permeability and carbon sequestration were made in each site and the whole area, respectively. Furthermore, each season's soil's moisture was measured eight and sixteen times in each site and the whole area, respectively, leading to 24 and 48 measurements for the three seasons in total.

Results: The study's findings showed that the ripping operations and *Haloxylon* plantations with a density of two hundred trees per hectare increased total vegetation by 1.87 percent, *Haloxylon* canopy by 1.68 percent, and the *Haloxylon* density by 83 trees Per hectare. It was also found that ripening operations had no significant effects on the *Artemisia's* density and canopy as the region's dominant species, and the richness, diversity, and uniformity indices. The pits made following the ripping operations for seeding have led to the accumulation of the surrounding wastewater inside the pits, with the soil moisture in the ripping operations site being 4.25% greater than that of the control site in May. Moreover, the ripping operations have increased the soil's permeability and carbon sequestration by 0.75 cm per and 1.31 tons per hectare, respectively, which are not significant.

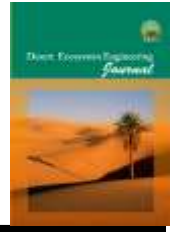
Discussion and Conclusion: As ripping operations up to a maximum one meter cannot eliminate the hardpan, the implanted seedlings cannot develop their roots in the soil not be able to take root and would only remain survived and fresh so long as they are irrigated. On the other hand, continuous irrigation to maintain the current situation would be very costly and economically unjustified. Therefore, due to low precipitation rate, inappropriate distribution, and frequent droughts in arid and desert regions, and the high costs of preparing the ground, provision of seedlings, plantation, and irrigation, the attempt to implement the *Haloxylon* plantation operations with high density for three consecutive years based



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merely on the region's precipitation whose maximum ecologic capacity comprised of 1.87% vegetation with regard to the climatic and adaptive conditions of the study area, seems really unusual and.

Keywords: Soil permeability, Carbon sequestration, Soil moisture, Ripping, vegetation, species diversity, Haloxylon Freshness.