Journal of Water and Soil Science
Vol. 27, No. 4, Winter 2024, Isfahan University of Technology, Isfahan, Iran.

Assessment of Some of Wind Erosion Control Methods in Desert Areas (Case Study: Kashan Desert)

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(Received: June 29-2022 ; Accepted: January 28-2023)

Abstract

Biological operations to combat wind erosion must be carried out in the calm bed of dunes, which is often challenging due to high-velocity winds. Therefore, the necessary precondition for stopping the movement of sand is to create obstacles in the path of their movement, protecting newly planted vegetation from wind damage and ensuring stability during the initial years. In this project, various methods of preventing wind erosion, including creating a windbreak to reduce wind speed below the erosion threshold and sand spraying to increase the wind threshold, were evaluated in the dunes of Abuzidabad, Kashan, under severe wind erosion. The windbreaks used include mesh with a percentage of 50% porosity in a checkerboard with dimensions of 2.5 * 2.5 m, and cottonwood harvested from cotton fields in a grid of 5 * 5 meters. The height and distance of the windbreaks were calculated using the wind threshold speed and the maximum wind speed of the region. Sand spraying was tested on dunes and clay-salt panes with 50% and 30% density. To compare the rate of soil displacement in the above and control treatments, graded wooden indicators up to a height of one meter of sediment traps were used. In addition, the effect of net windbreak on the percentage of successful establishment of the *Holoxylon sp.* plant compared to the control was investigated. In this study, the cost of each method was calculated separately and compared with the cost of spraying oil mulch. The results showed that 50% sand spraying, in addition to having the best performance in stabilizing sands and preventing the formation of dust, as well as stability, also has a lower implementation cost than other methods. Therefore, the 50% sand spraying method is introduced as the best method to stabilize and prevent erosion at the lowest cost and also environmental compatibility.

Keywords: Wind erosion, Windbreak, Sand spraying, Threshold speed, Kashan

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