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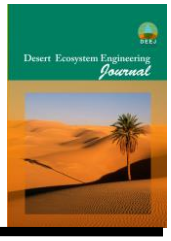

Investigation of acrylate polymer in sand area stabilization (case study: sand dunes of Siyazgeh of Abuzeidabad)

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Extended Abstract

Introduction: More than 40% of the global lands are covered by arid and semi-arid areas, a quarter of which is covered with dunes, On the hand, wind erosion contributes by approximately 60% to desertification. therefore, additives or stabilizers are used to control wind erosion and decrease its adverse consequences.

Soil stabilization refers to process whereby a product is added to the soil to improve its properties. stabilizing agents are typically classified into traditional and non-traditional types.

Hydrogel as a non- traditional stabilizer is a hydrophilic polymer with a three-dimensional network. In recent years, researchers have developed a series of polymers to be used for various purposes, including the enhancement of soil properties.

In this regard, this study sought to investigate the applicability and effectiveness of co-acrylamide acrylic acid hydrogel and determine its optimal concentration as a stabilizer of sand surfaces. To achieve the optimal concentration, a completely random experiment design was performed in the SPSS environment with three repetitions for all three concentrations of 0.5, 1, and 2%.

Material and methods: Collected from the Siyazgeh desert in northern Isfahan province, Iran, the samples of sand dunes used in this study. To investigate the efficiency of the chemical additives used in this study on the sandy soil's properties, the polymer was used at three levels (0.5, 1, and 2%) with 3 replications. Accordingly, metal trays with 100 × 30 × 2 cm dimensions were used to administer the wind erosion test and determine the threshold of friction velocity. Then, the control tray and the treatments were tested under different wind velocities (the comparison of the samples' weight before and after the wind tunnel test showed a weight loss). Finally, the effect of polymers on anti-wind erosion ability was studied in terms of compressive strength, abrasion resistance, impact resistance, and crust diameter.

Results:

Determination of wind friction velocity

The effect of three different concentration solutions on the shear strength suggested that all three treatments were resistant to maximum wind velocity (15 m/s, duration time was 20 min) and they didn't lose weight. On the other hand, the control treatment showed 5 m/s for the threshold of friction velocity.

Treatments Resistance

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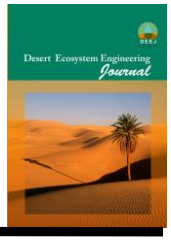

The results of variance analysis showed that there was a significant difference between the treatments (sig <0.05) and compressive strength in different concentrations, and that increased compared to the control sample. While treatment 3 had the highest resistance (1.61±0.18), no significant difference was found between treatments 1 and 2 (Figure 1).
As shown in Figure 2, treatments 3 and 1 had the highest and lower resistance against the sanding (46.67±5.19 and 8.67±0.96), respectively.
The samples treated with 2% polymer revealed the highest sheer resistance (5±0.56) (Figure 3).
As shown in Figure 4, only treatment 3 was impact resistant.
As shown in Figure 5 most crust diameter revealed in the sample treated with 2% polymer (15.63±1.74).

Conclusion and Discussion: Considering the results of this study, it could be argued that composite concentration plays a key role in the influence of polymer adsorption on the soil's particles. on the other hand, it was found that the sand's strength and stiffness increased with an increase in the concentration of the polymer solutions, which could be justified by an increase occurred in the interaction between sand particles and additive.

Keywords: Wind Erosion, Resistance, Mulch, Polymer, Acrylic Acid, Acrylamide.