

EVALUATION OF USING NANOCCLAY FOR STABILIZING SANDY SOILS

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Introduction

Wind erosion is one of the main factors in soil and environment degradations, air pollution, suspended particles transports, etc. On the other hand, with regard to climate changes, wind erosion is one of the important issues in arid and semiarid areas. Wind erosion causes many damages to agricultural productions, buildings and structures. There are different methods to control wind erosion, biological methods, mechanical methods and surface layer reinforcement using soil stabilizers. Applications of mechanical and biological combinations are better especially to reduce the execution time and costs of the surface stabilization. In this study the effects of nanoclay for stabilizing sandy soils in Khara plain has been investigated.

MATERIALS AND METHODS

Khara plain is located in the Eastern of Isfahan province in the center of Iran and about 110 kms from Isfahan center (32° 23' N, 52° 40' E to 32° 00' N, 52° 47' E). The climate of the zone using the De Martonne and Gowsen methods is dry and semi-desert, respectively. To study the effects of nanoclay treatments in wind erosion, three speeds (13.5, 16.5, 19.5 m/s) and concentrations of 0, 1, 2 and 3 g/L of nanoclay were tested for four replications. Soil loss during each test was measured by the electronic balance. Weight loss in grams was converted to erosion modulus $g\ m^{-2}\ hr^{-1}$. The SPSS software was used to analyse and compared the statistics and averages.

RESULTS AND DISCUSSION

The studied soil was basic and classified as sandy. Soil is calcareous (Torri psaments) with high calcium carbonate content. Average comparison showed that with increasing wind speed, significantly intensified rates of soil erosion. Also, the comparison showed that with increasing nanoclay concentration, wind erosion is significantly reduced. Interactions mean concentration and wind speed indicated that the most amount of wind erosion was at water treated samples and the speed of 19.5 m/s. The results of experiments with a maximum 19.5 m/s wind velocity showed that there was a significant difference between the erosion of nanoclay treated and water treated soil samples.

Keywords: Wind erosion, Nanoclay, Sandy Soils

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