Abstract

Measurement of the soil cationic exchange capacity in large areas is very time consuming and costly. Therefore researchers look for the methods and relationships to estimate these types of soil properties (hardly available properties) from the easily found characteristics (readily available properties). The present research was conducted in order to estimate the cationic exchange capacity (CEC) using the soil readily available properties and utilizing the neural networks method. Sampling was performed at 143 points covering the Dorbon District of Khaash Township including the desert, garden and agricultural lands so that it might include distribution of the different soil properties. At each selected point a sample was taken from 0 - 30 cm of the soil depth and sent to the laboratory. The collected samples were air dried and rammed and passed through 2mm sieve. Then a number of soil physical and chemical properties including the soil texture, cationic exchange capacity, percentage of organic carbon, acidity of the saturated mud and percentage of calcium carbonate (lime) were measured in this stage. The used networks in the neural network model were multi-layer perceptron network together with generalized feed forward network of various effective transfer functions. The proper number of the layers and the hidden neurons were found by the trial and error method. Also sensitivity analysis was performed to identify the most effective entries (readily available properties) for estimating the cationic exchange capacity (hardly available property) using the Neurosolution 5 software. Finally the optimized neural network by genetic algorithm with a coefficient of determination of 85% and an error of 0.166 was the most appropriate method for determination of the soil cationic exchange capacity using the soil readily available parameters.

Keywords: Artificial Neural Network, Khash Township, Cationic exchange capacity

University of Zabol
Graduate school
Faculty of Soil and Water
Department of Soil Science

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CEC Prediction Using Artificial Neural Network in the Dorbon Area, Khash City

Supervisor:
Dr. A. G. Z. Ahangar

Advisors:
MR. Jarge

By:
Abdolkhalegh Shahnavazi

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