Use of the Intelligent Models to Estimate the Soil Cation Exchange Capacity in North and North West of Iran

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Abstract

CEC of the soil is the exchange sites of organic and inorganic soil colloids. Modeling and Estimation of CEC is a useful indicator for fertility. The new alternative approaches for estimating CEC are indirect methods based on intelligent models. In this research in order to estimate CEC, 485 soil samples were prepared from two regions, chaparsar (Mazandaran in northern Iran) and Bostanabad (North of West Azarbaijan, Iran).In this paper introduces the application of genetic programming. Input parameters that are percent Clay, Organic Carbon and Silt, evaluate using genetic programming, neural network and Neural Inference Systems-Fuzzy models. The results indicate a good ability to intelligent models for CEC Estimation According to indices used in this study. Genetic programming model with a root mean square error of 1.78 and coefficient of determination 0.95 compared to other models have been more efficient and is able to provide satisfactory results, Also are the explicit solutions that reflect the relationship between input an output variable, was presented based on genetic programming. This preferred the genetic programming model adds the other models. Stepwise regression analysis to determine the contribution of each of the parameters indicated in the CEC that organic materials having Most coefficient of variation of 84% is justified CEC and clay and silt, respectively, with a correlation coefficient of 10% and 6% respectively.

Keywords: Artificial Intelligence Models, CEC, Genetic programming, Soils in the North and North West Iran.

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