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

The Thesis Submitted for the Degree of M.Sc
(in the field of Soil Science)

Assesment of spatial variability of phosphorous and potassium in Sistan Plain using geostatical and artificial intelligence methods

Supervisors:
Dr. A. Gholamalizadeh

Advisors:
A. Bameri
A. Shabani

By:
H. Mir

December 2014

Abstract

The current study was an attempt to delve into the spatial variability of phosphorus and potassium using artificial intelligence and geostatistics methods in Sistan plain, southeast of Iran. Firstly, 300 soil samples were taken from 0-30 cm depth with 1.5×1.5 km distances. For this, networks with mentioned distances were considered on topographic maps of the region and the coordinates were determined based on UTM. Then, coordinates exported to GPS and the sampling procedures performed. Having been transferred to laboratory, samples were dried, passed through a 2-mm sieve, and their physicochemical properties were measured. The results of geostatistics method suggested that simple Co-Kriging with circular model is the best model predicting phosphorus and potassium. Resulted maps of geostatistics illustrated that the highest amounts of available phosphorus and potassium were located in the north and northwest of the plain and their values were decreased moving across west to east. The lowest values were found on the southeastern part of the region which might be due to low amounts of organic matter and coarse texture soils. The resulted structures for predicting available phosphorus and potassium by artificial neural network, the best model including 10 nodes in input and 1 in output layer. The hidden layer composed of 15 and 13 neurons for phosphorus and potassium, respectively. Moreover, optimum iteration was 1000 and the most efficient transfer function was Tansig. Comparing the best geostatistics and perceptron neural networks method suggested that having been allocated less RMSE and MAE values, the latter model which used all soil properties as input data, enjoys higher accuracy for predicting available phosphorus and potassium.

Keywords: **Sistan plain, Geostatistics, Neural network, Available phosphorus, Available potassium**