

Abstract

Due to the extent of saline and sodic soils in the country and the agricultural lands are getting saltier and the problem of shortage resources land suitable for agriculture occurred various methods to improve these soils is considered. The use of the statistical methods and artificial neural network to predict the characteristics of the soil are very common. ESP and SAR are two features of soil salinity and sodic. The present study was conducted to evaluate the characteristics of the sodium adsorption ratio and exchangeable sodium percentage using the statistical methods and artificial neural network in region Miankangi in the Sistan and Baluchistan province was conducted. For this purpose, number of 189 soil samples collected from the region as a regular lattice and their physicochemical properties were studied. For mapping soil salinity and sodic using the index RMSE the best model selected and then maps of ESP and SAR were prepared. For predict the this two characteristic using MLP neural network and using the features of EC and PH had the highest correlation with ESP and SAR the best network was selected by the R^2 and RMSE. The best model for ESP, spherical model was selected and for Zoning Simple co-kriging interpolation method with auxiliary variable electrical conductivity and RMSE= 6.686 the best method was selected for mapping. The best model for SAR, spherical model and for Zoning Simple co-kriging interpolation method with auxiliary variable electrical conductivity and RMSE= 6.662 the best method was selected. For ESP MLP neural network with 10 neurons in the hidden layer, the maximum value of $R^2 = 0.97$ and root mean square error 0.0453 provides a better estimate. and for SAR, MLP neural network with 7 neurons in the hidden layer the maximum value of $R^2 = 0.95$ and lowest root mean square error (RMSE= 0.0187) provides a better estimate. Comparing the results of the statistical methods and artificial neural networks showed that for ESP neural network with $R^2 = 0.86$ and RMSE=3.207 than simple co-kriging method with auxiliary variable and conductivity with $R^2 = 0.53$ and RMSE=6.899 have the better evaluation. and for SAR neural Network with $R^2 = 0.83$ and RMSE=2.859 than simple co-kriging method with auxiliary variable and conductivity with $R^2 = 0.52$ and RMSE=6.988 have the better evaluation. Due to the high cost and time consuming to measure the characteristics of SAR and ESP can be through the statistical methods and artificial neural network both for identification and critical points of salinity and sodic and also used for prediction and modeling.

Keywords: ESP, SAR, Land Statistics, Artificial Neural Networks, Miankangi



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