Abstract

Sustainability of soil structure is considered as an exact index to evaluate quality of soil for planning the soil optimum usage. Available experimental methods for specifying Sustainability of soil structure are time-consuming and troublesome and are standardized hardly. So, indirect prediction of aggregate sustainability from easily-found data of the soil will be useful. Hence, the research aims to suggest models and relationships by which it can be estimated the aggregate sustainability as an index of quality of soil in the area of Muhammad Abad in Zabol city using easily-found features of soil and also according to kinds of various application of the area. Therefore, they were estimated the indexes of MWD and WSA using easily-found features of soil on 128 samples collected from the area of Muhammad Abad in Sistan helping the model of artificial intelligence and linear regression and it was used the techniques of mutual evaluation with root mean square error (RMSE) criteria and express coefficient (R^2) in order to evaluate the methods. The best model of regression along predicting the aggregate sustainability, in studying area in the section of MWD is related to pasture use with: MWD = 0.142+0.067Ca and values of R^2 and RMSE are 0.68 and 0.04, respectively and area in the section of WSA is related to agricultural use with: WSA=53.286 +10.501OC +0.843CCE-5.319pH +0.994Ca - 0.263Na$_{aq}$-0.698 sand + 0.133 EC and with values of R^2 and RMSE are 0.57 and 4.86, respectively. Also, in order to model the indexes of aggregate sustainability, it has been considered MLP model using artificial-neural networks utilizing easily-found features of soil, based on the usage type of lands of the area. The best results of neural network in the section of MWD was related to pasture usage with values of R^2 and RMSE are 0.96 and 0.12, respectively and area in the section of WSA was related to agricultural use with values of R^2 and RMSE are 0.89 and 2.52, respectively. The final results represent better function and ability of MLP networks than Regression models.

Key words:
Aggregate stability, Soil properties, Linear regression, Neural network

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