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Developing Pedotransfer Functions for Saline and Saline-Alkali Soils

Meysam Ramezani, Behzad Ghanbarian-Alavijeh, and Abdolmajid Liaghat

Department of Irrigation and Reclamation Eng., University of Tehran, Karaj 31587-77871 Iran (me.ramezani@ut.ac.ir, +98 261 2241119)

Soil moisture curve is one of the soil hydraulic properities which its direct measurement is time consuming and expensive. Therefore, indirect methods such as developing pedotransfer functions have been used to predict this characteristic from soil readily available or easily measurable data. In this study, multiple linear regression method was used to develop point pedotransfer functions (PTFs) for saline and saline-alkali soils of Iran. For this purpose, 68 soil samples which their EC values were greater than 4 ds/m, and more than half of them had ESP values greater than 15% were selected. Using Jackknife method, the random splitting of data into the development and validation subsets was repeated 10 times. A ratio of 3:1 was used to split data into development and validation sets in each replication. In the SPSS software, parameters such as geometric standard deviation (g), geometric mean diameter (dg), sodium adsorption ratio (SAR), electrical conductivity (EC), carbonate calcium (CaCO3), bulk density (BD), organic matter (OM), and clay and silt content were applied as the independent variables, and volumetric water content was determined at matric potentials of -10, -33, -100 , -300, -500, -1000, -1500 kPa. The derived PTFs were compared with the H3 model of Rosetta software for 10 splits of validation data set. Comparison of the mean RMSE and R2 values showed that the developed PTFs resulted in more accurate estimation than the Rosetta software at matric potentials of -100 , -300, -500, -1000, -1500 kPa. Whereas, Rosetta model resulted in slightly better estimation than derived PTFs at matric potentials of -10, -33 kPa. For the PTFs developed in this study, the RMSE and R2 values ranged from 0.12 to 0.35 (cm3.cm-3) and 0.64 to 0.83, respectively. While for the Rosetta model, RMSE and R2 values ranged from 0.22 to 0.33 (cm3.cm-3) and 0.37 to 0.74, respectively.