

## Evaluation of pedotransfer functions for predicting soil bulk density for U.S. soils

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### **ABSTRACT**

In this article, the predictive accuracy of 48 published pedotransfer functions (PTFs) for predicting soil bulk density (BD) was evaluated using soil database from the United States. In addition, new PTF for predicting BD using inputs of organic carbon content (OC) was proposed and validated. The results showed that 8 of the evaluated PTFs showed high performances ( $EF > 0.50$ ,  $RMSE < 0.18 \text{ Mg m}^{-3}$ ), 7 PTFs showed moderate performances ( $0.20 < EF < 0.50$ ,  $0.17 < RMSE < 0.20$ ), 9 PTFs showed low performances ( $0 < EF < 0.20$ ), while the rest of PTFs showed poor performances ( $EF < 0$ ,  $RMSE > 0.24$ ). New PTF has been developed using the entire database. The proposed PTF ( $BD = 1.449e_{-0.03OC}$ ,  $R^2 = 0.6802$ ) requires only the organic carbon content as input. The developed PTF was compared to the best 10 performing PTFs evaluated in the study using dataset of 45,195 samples. The results showed that the new PTF had the best performance ( $EF = 0.59$ ,  $RMSE = 0.13 \text{ Mg m}^{-3}$ ).