



Impact of soil texture on soil moisture measurement accuracy by TDR in Sistan plain of Iran

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In the recent past, many researchers have developed various techniques for determining moisture content of soil. Among the various methods of estimating soil moisture, Time Domain Reflectometry (TDR) method is a relatively new method. TDR has been widely used in water system investigation in Agriculture, Geosciences, etc. The purpose of this study is determination of moisture measurement accuracy by TDR in various soil textures in Sistan plain. For this purpose, six textures and for each of them three Iteration were used. The studied textures were clay, loam, sandy loam, sandy clay loam, clay loam and sandy. The experiments were carried out at the laboratory of water engineering department of Zabol University in Iran. The provided textures were laid in the PVC cylinder with 50 cm height and 30 cm diameter. After 24 h of saturation, the soil water content of the samples was measured by oven-dry gravimetric and TDR methods. In each day the moisture measurement of each texture was carried out by these two methods until a moisture range was determined. For comparison between measured moisture values by TDR and gravimetric method, two statistical parameters include coefficient of determination (R^2) and root mean square error (RMSE) were applied here. The results showed that by using SPSS, statistically significant at probably level of 1% indicated no difference between the measured value of moisture by TDR device and gravimetric method. For heavy textures consist of sandy clay loam, clay loam, and clay with increasing clay content when the moisture was low, TDR measured the moisture values less than the gravimetric method. Furthermore for light textures consist of sandy loam and sand, the TDR device measured the moisture values more than the gravimetric method. Also for clay loam and sandy clay at high moisture values, data measured by TDR was close to the gravimetric method. For all studied textures with increasing of clay content, the fitted lines slope and RMSE values increased, it indicated the effect of clay content on the accuracy of TDR device. Finally, for the all soil textures the fitted regression lines had high regression coefficient and by evaluation of R^2 and RMSE values, results showed that TDR had highest accuracy in light soil texture (for sand, $R^2 = 0.97$ and $RMSE = 0.047$) and lowest accuracy in heavy soil texture (for clay, $R^2 = 0.89$ and $RMSE = 0.07$).