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Soil Type Influence on Calibration of Soil Moisture Detection

Cornelius Jantschke, Irene Arnold, Karlheinz Köller

University of Hohenheim, Process Engineering in Plant Production, Germany

Abstract

As the detection of soil moisture plays an increasing role in tropical and subtropical farming systems, the reference tool is demanded to be an easy and reliable technique. TRIME (Time Domain Reflectometry with Intelligent Microelements), a further evolutionary stage of the Time Domain Reflectometry provides a display reading, expressing soil moisture in vol. % units. Therefore the moisture gauge becomes an key factor of sustainable irrigation farming and resource protection.

In contrast to conventional TDR (Time Domain Reflectometry) it is superfluous, to read the characteristic TDR curve and derive the signal length, which represents the runtime of the electromagnetic wave within the surrounding soil. Moreover the bulk density of the regarding soil has to been known, in order to translate the TDR reading into a value of volumetric water content.

TRIME is providing a basic calibration, which enables the system to read convenient values on most soils. The system is limited at locations with a higher content of organic matter and therefore a higher salinity of the substrate. For this case, a fresh calibration has to be saved within the handheld device, in order to guarantee a satisfactory test value.

Without any information of the prevailing soil characteristics, it seems impossible, to gain a satisfactory reading of a pre-calibrated system. For homogeneous sites, one calibration fulfils the demand. Heterogeneous sites appear to be the systems final limitation. A research approach of agricultural engineering at the University of Hohenheim is analysing the influences of different soil types on the accuracy of the TRIME reading. For the soil types, to be calibrated per one site, calibration switches are intended to be implemented in the existing gauge. The high tech variation is to contain a GPS (Global Positioning System), which is planned to give access to a soil characteristics database and relate the detected values of the site to the issued data for calibration purposes. The innovative method is expected to improve site specific data and therefore gives a great potential to save valuable and irreplaceable water.

Keywords: Calibration, GPS (Global Positioning System), soil type dependency, Time Domain Reflectometry (TDR)

Contact Address: Cornelius Jantschke, University of Hohenheim, Process Engineering in Plant Production, Garbenstraße 9, 70593 Stuttgart, Germany, e-mail: cornelius.jantschke@uni-hohenheim.de