Document Title:		Part # and Rev.	
Description, AN, Response of ECH2O probe to var in WC, Soil type, and SEC		13429-00	
		Release Date:	
Rev.	Description	Revision By	Date

Production Filename: 13429 (In Product Library)

Path to Working Files: DecaDoc\Application Notes\Master

Dimensions: 8.5 inch wide, 11 inch tall

Material: Paper, 92 Bright White or better, 75g/m² or heavier

Colors: Color Print on White

Printer: HP Color LaserJet 8550-PS

Finish: None

Adhesive: None

Special Notes: Illustrations are Ref Only ** Not to Scale ** (Shown page 1 of 4)

DECAGON DEVICES Application Note

Response of the ECH_2O EC-10 and EC-20 Soil Moisture Probes to Variation in Water Content, Soil Type, and Solution Electrical Conductivity

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Introduction

Researchers familiar with commercial water content probes will often ask three questions when approached with a newly developed dielectric sensor: what is the accuracy of the instrument, how does it react to differing soil textures and electrical conductivity, and how much does it cost? In fact, the first two questions are closely related, as often the properties of a soil can determine the accuracy of volumetric water content reading from a dielectric probe. Poor results from probes that measure dielectric in soils with high electrical conductivity and salinity are well documented.

The third question has considerable importance as well because the cost of water content sensors can limit the number of sites where water content is monitored. The ECH_2O probe, a new, inexpensive dielectric sensor developed by Decagon Devices, Inc. uses specialized circuitry to measure the dielectric of media surrounding a thin, fiberglass-enclosed probe. The objective of the experiment was to determine the calibration of several dielectric probes with respect to soil water content and examine the effects of soil texture and salinity on the stability of that calibration.

Table 1 Textural and salinity analysis for soils used in soil water content analysis

Soil Type	Sand %	Silt %	Clay %	EC (mmho cm^{-1})
Loamy sand	87	3	10	0.04
Sandy loam	79	9	12	0.34
Loam	47	29	24	0.09
Silt Loam	*	*	*	0.20
Silt Loam	3	71	26	0.12
Silty Clay Loam	3	68	29	0.09
Silty Clay	17	41	42	1.48

Methods

Six soils with differing textures were collected and allowed to dry in air for several weeks. Soil textures included loamy sand, sandy loam, loam, silt loam, silty clay loam, and silty clay (artificially mixed) (Table 1). We manually crushed each sample to break up large peds and allow uniform packing. To test the dielectric probes response to changing water contents, tap water (electrical conductivity (EC) < -1 0.1 mmho cm^{-1}) was mixed with soil to make at least four different water contents for each soil type. Soil was then packed around the dielectric probe in a 30 cm x 15 cm x 15 cm container. Although bulk densities often increased with increased