

WHEN TO IRRIGATE? RESEARCH BASED ON MONITORING SOIL MOISTURE

August 14, 2007

PROJECT OBJECTIVES

- One of the principal irrigation questions from growers is, “How much water to apply and when to start irrigation?” Once irrigation has started, the question becomes one of how often to irrigate and how much.
- This COWSEP funded project is being led by McGill University, in partnership with AAFC, OMAFRA, and WIN. The primary goal is to improve water use efficiency through a better understanding and use of irrigation scheduling techniques.
- One of the goals of this project is to evaluate a variety of soil moisture monitoring techniques for on farm use by growers and agribusiness personnel. The second goal is to provide training in instrument installation and interpretation.

MONITORING SITE AT JOHN COOPER

Location: Simcoe

Crop: Strawberries planted in 2006, outside and inside high tunnels

Irrigation: surface drip irrigation (emitter capacity 0.24 gpm, 12” spacing)

- 2 acres outside (normally starts irrigation May 15 - irrigates 1 hr every 5th day, now every 2nd day)
- 2 acres under tunnels (normally starts irrigation May 1 - irrigates 1 hr every day)

Irrigation Water: well / reservoir

Soil type: sandy loam

Soil volumetric field capacity: 17% outside; 20% inside tunnels

This project is determining irrigation needs for berries, based on soil moisture levels. Several pieces of equipment for measuring soil moisture are installed at Cooper's farm. For comparison purposes, portable and permanent instrumented techniques for monitoring soil moisture have been installed at this site (see table). Furthermore, the site has comparison trials of outside (field) conditions, and inside the high tunnels, with the same equipment installed at each. Both sites have strawberries planted in raised beds. Each bed is 40 inches wide, 650 feet long and has 4 rows of strawberries.

Four satellite farm sites have also been chosen in the region for gravimetric and portable time domain reflectometer (TDR) soil moisture measurements. Each of the growers involved in the project will be supplied with their data and given some training on the use and interpretation of the instruments and the data to allow them to evaluate the possible equipment choices.

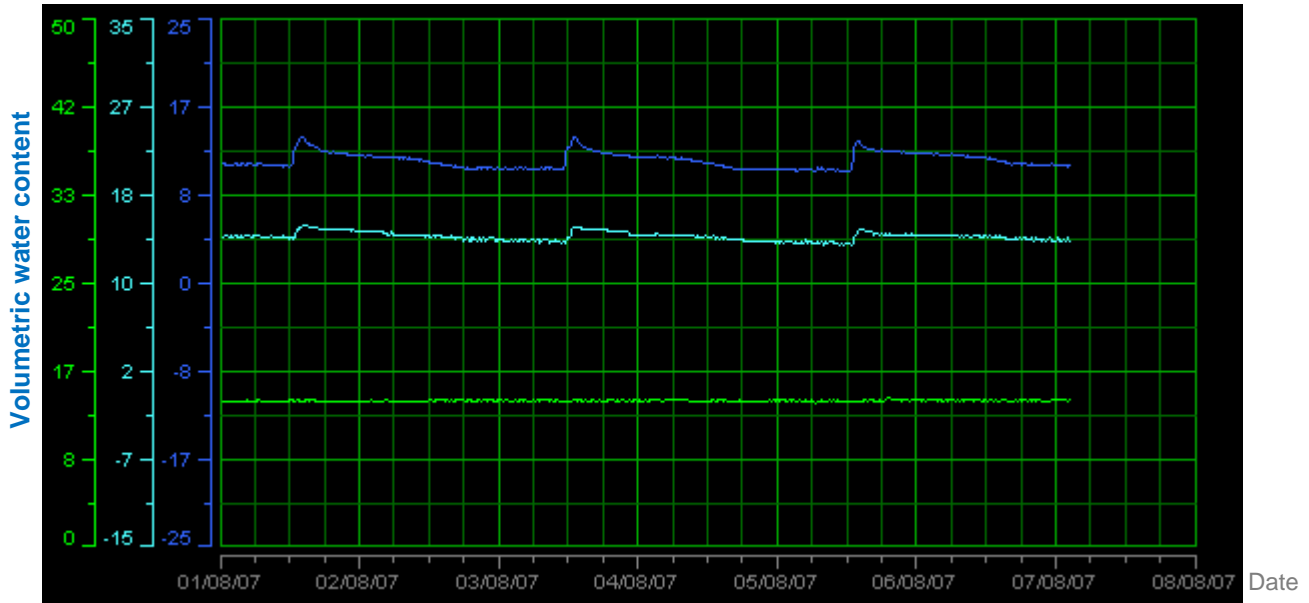
Soil Moisture Monitoring Equipment installed outside and inside the high tunnels

Soil Moisture Sensor	Depths installed (in)	#Sensors	Access to soil moisture information
Portable TDR	0 - 8”	1	Data is viewed & recorded
Tensiometers	8”, 18”	2	Read directly in the field
GrowPoints	6 - 8”	1	Data is downloaded
Permanent TDR	0 - 6”, 0 - 12”	2	Data is downloaded
WaterMarks	6”, 12”, 18”	3	Data is downloaded
Echo probe	0 - 8” (avg. 4”)	1	Real-time viewable on web
Capacitance probe	4”, 8”, 16”	3 sensors	Real-time viewable on web

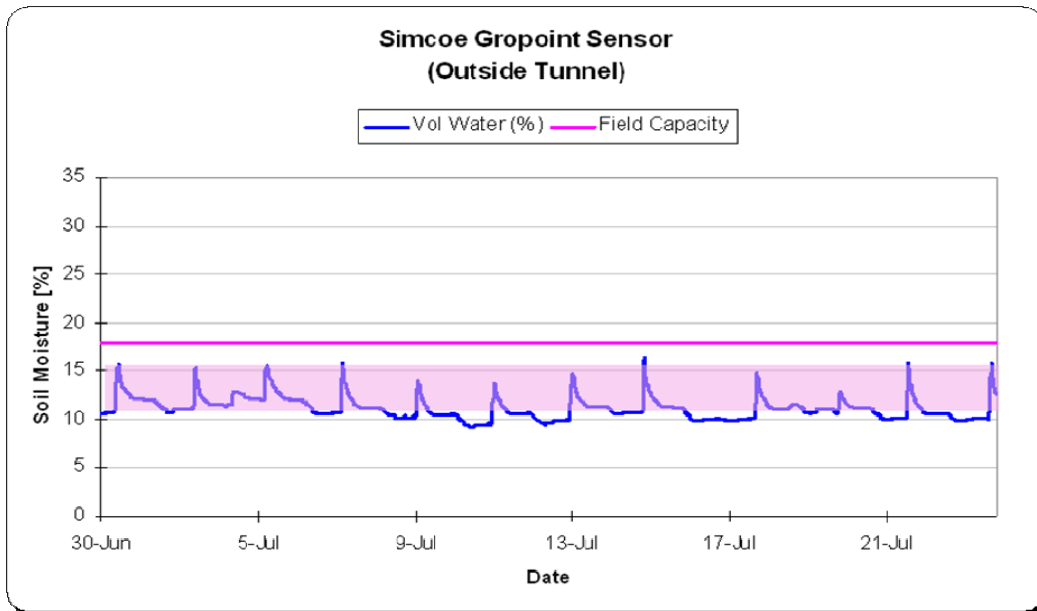
EXAMPLE DATA OUTPUTS for outside the tunnels

■	C-Probe 10 cm (vol%)
■	C-Probe 20 cm (vol%)
■	C-Probe 40 cm (vol%)

Capacitance Probe at depths: 4" (10 cm), 8" (20 cm), 16" (40 cm)



Gro-Points average of 4-8" (0-20 cm) depth



The soil **volumetric field capacity** is 17% outside the tunnel. Irrigation should be targeted between 65% and 85% of the field capacity, at the root zone depth, which is the pink shaded area. More types of equipment and their outputs will be discussed during the tour.

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