An Innovative Irrigation Scheduling System using Advanced Soil Water Sensors, Wireless Communications and Web Based Technologies

Implemented by the Brace Centre for Water Resources Management, McGill University

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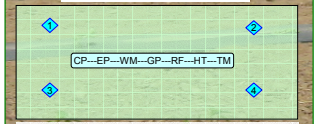
PROJECT SUMMARY

- One of the principal irrigation questions from growers is ***"How much water to apply and when to start irrigation?"*** Once started, the question becomes one of how often to irrigate and how much.
- This project, led by McGill University in partnership with AAFC, OMAFRA and WIN has a primary goal of improving water use efficiency through a better understanding 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.

MAP OF SOUTHERN ONTARIO

SITE MONITORING PLAN



Note: The layouts for both the surface and buried drip zones are identical.

Benchmarks (gravimetric, TDR readings: 4 per zone)

Installed Equipment

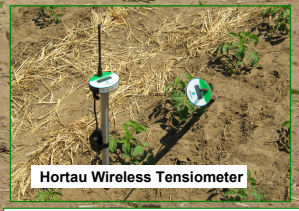
See codes in Table Below

MONITORING HUB

- **Region:** Leamington, ON
- **Crop**: Tomatoes
- **Producer**: Wayne Palichuk
- **Irrigation System**
  - Surface and buried drip (8" depth)
  - Emitter: 12" spacing, 15psi, 20 gpm/acre
  - Operating time: ~ 4 hrs/day
- **Water Source**: Pond (~ 15 MG)
- **Sensors** monitor soil moisture for both surface and buried drip. **Water use efficiency** and **crop yield** can thus be compared for both systems.
- Gravimetric and TDR samples are taken at 4 **Benchmarks** on each plot, to assess moisture variability due to different soil type, topography, etc.

SATELLITE SITES

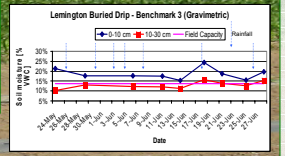
Gravimetric samples and portable **TDR measurements** were taken at four satellite sites. These sites were chosen to compare data from different sites, and to enable other growers to benefit from the project results

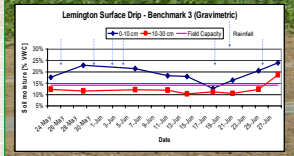


EXAMPLE DATA OUTPUTS

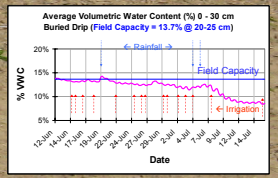
Buried Drip 13.7% ← **Field Capacity @ 20-25cm** → **Surface Drip** 14.2%

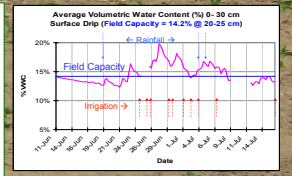
GRAVIMETRIC



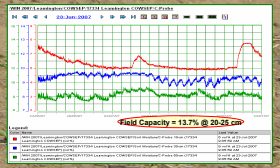


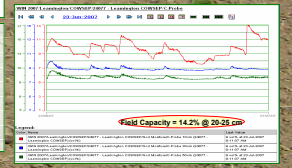
REFLECTOMETER



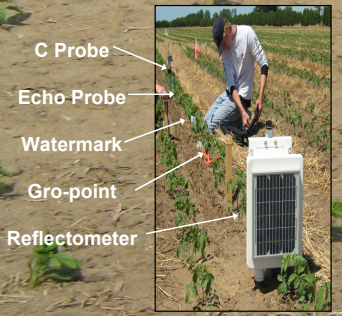


C-PROBE





SENSORS IN THE FIELD



Code	EQUIPMENT	Depths (inches)	Sensors per plot	Units	Data Collection	Data Viewing System
GS	Gravimetric samples	0-4", 4-12"	-	%VWC	Twice a week	Lab analysis
CP	Capacitance Probe	6", 12", 21"	3	%VWC	Continuous	Real time (web)
EP	Echo Probe	0 - 8" (avg.)	1	Volt	Continuous	Real time (web)
WM	Watermark	6", 12", 18"	3	kPa	Twice a week	Field download
GP	Gro-Point	0 - 8" (avg)	1	%VWC	Twice a week	Field download
RF	Permanent TDR	6", 12" (avg)	2	%VWC	Twice a week	Download / radio
TDR	Portable TDR	0-12" (avg)	1	%VWC	Twice a week	View and record
HT	Hortau	6", 12"	1 or 2	centibar	Continuous	Wireless radio link
TM	Tensiometers	8", 18"	2	centibar	Twice a week	View and record
WS	Weather Station	Rainfall, Humidity, Solar Radiation, Wind Speed				Real time (web)

* Notes: (1) %VWC = Percent Volumetric Water Content

(2) * C Probe and Echo Probe data can be converted into % VWC using calibration equations.

AUTOMATED IRRIGATION SCHEDULING

Soil moisture sensors can be equipped with a wireless communication system to transmit data from the field to the producers' computer. With the aid of such sensors, data can be input directly into computer based irrigation scheduling models, thereby making irrigation requirements readily available to growers via email or the web.