AUTOMATED MEASUREMENT OF CONTAINER TEMPERATURE AND MOISTURE FOR IMPROVEMENT OF IRRIGATION SCHEDULING IN NURSERIES

Progress Report

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Nature of Work

Water is one of the most critical inputs for nursery plants. We propose to monitor container temperature and moisture, as well as other environmental variables dynamically using automated sensors. This information will be then used to help develop improved irrigation scheduling systems.

Results and Discussion

During the summer of 1998 an automated weather station was installed at the Center for Applied Nursery Research (CANR) facility. This system monitors air temperature, relative humidity, wind speed and direction, solar radiation, and various other variables continuously. The data are stored in the data logger and on a daily basis the weather information is downloaded to a computer located at the Georgia Station in Griffin. After processing the data are made available via the Internet (*http://www.griffin.peachnet.edu/bae*). A monthly summary of the 1999 data can be found in this report.

In this project, we are planning to add additional sensors to monitor container moisture and temperature. With the existing weather variables measured by the station we can calculate potential demand for irrigation on a continuous basis. If we know the size of the canopy, we can also calculate water lost through transpiration. Given that moisture available from the container is limited, we can use this information to calculate how much water is lost from a container through uptake and actually measure this by monitoring container moisture and temperature.

During the first year of this project we are collecting basic weather information and evaluating different moisture sensors to determine which ones are the most suitable for small containers. In our evaluation we found that a time domain reflectometry sensor, developed by Campbell Scientific, Inc., (Model CS615) is the most promising. We obtained soil media from CANR and evaluated a sensor under controlled conditions in Griffin. We were able to develop a correlation between soil moisture content of the container media and soil moisture content measured by the sensor.

Additional sensors have been purchased as part of this research project. We expect to receive these sensors in January 2000, and develop calibration coefficients for each individual sensor. The sensors will then be installed at CANR during early Spring for local evaluation.

Significance to Industry

We are planning to develop a simple computer program that can help predict irrigation requirements on a near real-time basis as a function of current weather conditions, plant type and size, as well as container size and media.

1999
Monthly Weather Conditions
Center for Applied Nursery Research

	Max Air	Min Air	Avg Air	Avg Soil 2inch	Avg Soil 4inch	Avg Soil 8inch	Wind Speed	Total Rain
MONTH	^{o}F	^{o}F	^{o}F	^{o}F	^{o}F	^{o}F	m/hr	inches
JAN	62.10	37.69	49.50	50.85	51.05	51.40	3.23	5.38
FEB	63.41	38.64	50.54	52.64	52.84	53.21	3.37	3.54
MAR	66.21	39.74	52.66	53.33	53.60	54.00	3.70	2.86
APR	79.22	55.32	66.54	65.69	65.71	65.83	3.53	1.77
MAY	83.30	57.57	69.73	69.70	69.64	69.65	2.82	2.04
JUN	88.17	66.63	75.92	77.28	77.25	77.24	2.51	3.52
JUL	93.39	70.52	80.49	81.58	81.42	81.26	1.89	4.71
AUG	95.62	71.27	81.96	83.51	83.58	83.82	2.06	1.94
SEP	85.93	61.47	72.71	76.32	76.59	77.10	2.20	4.45
OCT	75.58	53.87	63.63	68.94	69.25	69.75	2.03	2.40
NOV	70.49	44.90	57.05	61.40	61.75	62.30	2.14	1.21
DEC	60.39	36.26	48.15	53.17	53.53	54.12	2.11	1.20