

## **NCERA - 101: Committee on Controlled Environment Technology and Use 2014 Station Report**

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### **1. New Facilities and Equipment**

A watering system has been installed inside six walk-in CG-72 growth chambers. Drip irrigation is triggered by growth media water content or alternatively scheduled by a timer (ORBIT timer). Two types of tensiometers (IRRIMETERS) were used to monitor media moisture - miniature low tension tensiometers with automated output option for direct gauge response, and a tensiometer with proportional water tension based voltage output processed by a Campbell Scientific data logger.

Eight JanCo Envirotron greenhouses are equipped with thermocouple temperature sensors connected to Campbell Scientific data loggers. Greenhouse and outdoor temperatures are measured simultaneously and displayed in real time at the central management computer, before being recorded and stored.

Rain-out shelters are being used for a multiyear turfgrass breeding and genetics research program, in which improved drought tolerance turfgrass cultivars for high-stress environments are being developed. Precise nozzle watering is installed at the rain-out shelters for accurate plant water supply control.

### **2. Unique Plant Responses**

The sensor-based automatic irrigation configuration demonstrated high-efficiency water use due to direct tensiometer-based response to plants' water needs. It's recommended for installation in controlled environment growth chambers for more accurate and efficient watering.

Multiyear turfgrass breeding and genetics research directed by Dr. Paul Raymer is expected to provide development of improved turfgrass cultivars.

### **3. Accomplishment Summaries**

Automatic water-tension-sensor based irrigation in controlled environment growth chambers improved watering efficiency due to direct response to plants' water needs. Integration with data logging systems enhanced data collection and improved irrigation control.

Due to Georgia's warm and humid climate, the commonly used cooling systems in greenhouses – especially evaporative cooling – are often ineffective. Simultaneous measurement of greenhouse and ambient temperature and multi-level manipulation of ridge vents and evaporative cooling supplies data which can be used to analyze greenhouse cooling effectiveness. This analysis will then be used to improve greenhouse temperature control.

#### **4. Impact Statements**

Development of an automatic watering system with logging of water applications provides data essential for experiment design development. Multiple configurations have improved experiment options to meet researchers' goals and requirements.

Improved greenhouse temperature control and cooling management are needed in warm and humid climatic zones. The low efficiency of the current evaporative cooling system shows the need to investigate more effective methods of greenhouse temperature control.