

NCERA-101 Station Report University of Wisconsin Biotron

1. New Facilities and Equipment.

University of Wisconsin-Biotron has started replacing the old control cards (1970's made in-house) for the environmental control rooms with new Johnson Controls architecture. We are using the new NAE building automation hubs, MS-FEC 2620 field controllers, coupled with ACI(Middleton, WI) RH3-1K-2W-D temperature/RH sensor, 1K-3W-BP backup temperature/anticipation sensors and LLS light sensors for simple alarming if lights are on or off. The new Johnson Controls architecture require us to install new EPT's(electro-pneumatic transducers) Kele, (Bartlett, TN) EPT-UCP-422-F, power supplies (Johnson Controls) PAN-PWRSP-0, extension modules (Johnson Controls) MS-10M2710-0.

The control system will be replaced over 3 years. Biotron is at 100% occupancy, rooms will be converted to the new control system when projects end to not disrupt research experiments and spread out the cost over 3 fiscal years.

2. Unique Plant Responses.

The plantlets were grown at the University of Wisconsin-Biotron in Magenta cubes on two different media: one consisting of MS salts/gellan gum and the other MS salts in a sterile vermiculite/animal bedding strata. The plantlets were grown in a CO₂ atmosphere of 1500 ppm; they seemed to grow normally verses control growth on sucrose. The pertinent reference is Kozai T., Kubota C. "Photoautotrophic micropropagation as a new propagation and transplant production system. "

Studies were conducted at the University of Wisconsin on the influence of root zone calcium and GA on tuberization signal in potatoes. The results show that root zone calcium can modulate the influence of the plant hormone gibberelic acid (GA) in tuberization signal.

3. Accomplishment Summaries.

Controlled environment facilities at the University of Wisconsin were used to precisely monitor the concentration of calcium and GA in the root zone. Using a continuous drip irrigation system and pure silica sand as a growth medium it was possible to study the influence of GA and calcium in the tuberization signal.

To best characterize the genomes of plants being used for biofuels research, a model plant species is being adapted for this purpose; the model plant species is *Brachypodium distachyo*. University of Wisconsin Biotron has conducted growth trails of *Brachypodium* and found that this species of grass grows well using the

standard greenhouse or growth chamber conditions used to grow Arabidopsis, a model plant for molecular biology.

4. Impact Statements

Our research shows that the number of tubers developed on a potato plant can be dramatically influenced by calcium nutrition. This implies that the size and the number of tuber can be manipulated by calcium nutrition. This could have commercial implications. For example, larger size potatoes are desired for the French fry industry, whereas smaller size potatoes (specially red skin potatoes) are desired for fresh market consumption.

Environmental control of University of Wisconsin greenhouse space can be accomplished using standard Johnson Controls architecture. Johnson Controls hardware and software can be readily adapted to provide adequate environmental for plant research. Data logging, environmental alarming for a call out pager system and high and low temperature work can be easily provided.

5. Published Written Works.

Biotron does not compile a list of publications generated from research experiments conducted by the users of the facility. Below are two publications that found my desk:

Chung, S.M., V. S. Gordon, and J. E. Staub. 2007. Sequencing of cucumber (*Cucumis sativus* L.) chloroplast genomes identifies differences between chilling tolerant and susceptible cucumber lines. *Genome* 50:215-225

Robert M. Stupar, Pudota B. Bhaskar, Brian S. Yandell, Willem A. Rensink, Amy L. Hart, Shu Ouyang, Richard E. Veilleux, James S. Busse, Robert J. Erhardt, C. Robin Buell and Jiming Jiang. 2007. Phenotypic and Transcriptomic Changes Associated With Potato Autopolyploidization. *Genetics*, Vol. 176, 2055-2067

6. Scientific and Outreach Oral Presentations.

None