

NCERA-101 Station Report 2010
University of Wisconsin Biotron

1. Impact Nugget.

University of Wisconsin Biotron continues to incorporate the expanding Deluca research program for the duration (2-3 year) of the renovation of the Biochemistry building. This commitment has stretched our resources, staffing and slowed the conversion to the new control system. The patents held by this research program are the top royalty (~15mil/year) generator for WARF (Wisconsin Alumni Research Foundation).

2. New Facilities and Equipment.

University of Wisconsin-Biotron is continuing to replace 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 and extension modules (Johnson Controls) MS-10M2710- 0.

We have found with the new control system and EPT'S that we require pilot positioners for the hot and cold control valves to get the performance that we desire.

The challenge is trying to schedule the installation of the new control system and not disrupt research projects. First floor has been completed. We will continue to convert control environment rooms as rooms turn over. We do not expect all the rooms on second floor to turn over for at least two years, when the renovation of the Biochemistry building is completed and those projects can move back to that building.

3. Unique Plant Responses.

We have started to work with *Brachypodium* (genome has been sequence) and have run some test seeding in the greenhouse to determine the best soil mixes and growing conditions. We have found that in general it is not a difficult plant to grow. Direct seeding of vernalized seeds into flats of SunGro MetroMix 360, 16/8 photoperiod in the greenhouse, 20C and quarter strength Hoagland's solution using flooding ebb and flow benches.

4. Accomplishment Summaries.

Environmental stresses, such as drought and high temperatures, can reduce the quality of stored potatoes. Sugar end defect is a serious quality concern for growers and processors of russet potatoes that is initiated by drought or heat stress. French fries and other fried products made from sugar end defect potatoes

are excessively dark on one end, and may have an unpleasant, bitter taste. This darkening is caused by an accumulation of the sugar glucose on the stem end of the tuber. To gain a better understanding of how environmental stresses bring about the sugar end defect, we exposed Russet Burbank potatoes to two-week long periods of heat, drought, or heat and drought stress, and measured changes in tuber water status and tuber composition. Our data show that stress during early tuber growth causes larger perturbations to several of the measured parameters, especially the contents of sucrose and glucose in the tuber. These changes at the end of the stress period were reflected in tuber composition at harvest. Stem end glucose content was higher in tubers from plants that had been stressed early compared to those that had been stressed later. (Paul Bethke)

5. Impact Statements

The University of Wisconsin Biotron greenhouses are now being used by the Wisconsin Fast Plant® Program (Paul Williams and Dan Lauffer) to development and bulk up seed lines. The Wisconsin Fast Plants® Program is a science education program located on the University of Wisconsin – Madison campus in the College of Agriculture and Life Science. This non-profit organization is an integral piece of a network of private companies and public institutions supporting educators, students, and scientist around the world in the use of a plant model organism for research and education purposes. The organization is primarily funded through grants and donations. The program mission is to work with educators and scientists to improve science teaching, learning, and research using a model organism.

6. Published Written Works.

Biotron does not compile a list of publications generated from research experiments conducted by the users of the facility.

7. Scientific and Outreach Oral Presentations.

February 17 and 24, 2009: Presentations on hibernation to preschoolers at Pre School of the Arts (Madison, WI) followed by visit to see hibernating squirrels (in Carey Lab, squirrels came over from Biotron). our laboratory.

November 7, 2009: “Expanding Your Horizons”: two sessions with 7th and 8th grade girls talking about careers in science and research in the Carey Lab, including viewing of hibernating squirrels.

December 18, 2009: “The Leonard Lopate Show” on WNYC (New York public radio): Dr. Carey participated in a live radio call-in show, discussing hibernation.

March 10, 2010: Presentation on hibernation to Madison Cub Scout troop 15 including viewing of hibernating squirrels in Carey laboratory.