

2008
NCERA-101 Report
Utah State University

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Research Projects Details are on our web page at www.usu.edu/cpl

MicroGravity Root-zone Research: We have initiated a project to improve the physical characteristics and nutritional status of the root-zone media for the closed environments of space. We have designed a modified Marriott bottle system to provide a constant water potential, and we are switching from Osmocote to Nutricote slow release fertilizer.

Effects of atmospheric ethylene and 1-MCP on growth and development. 1-MCP reduces the detrimental effects of ethylene, but the protective effect lasts only 4 days. MCP is much more effective when applied as a gas than as a spray. We are now examining the role of ethylene in reducing leaf elongation during heat and drought stress.

Super Dwarf crop research: We have continued to identify and characterize uniquely small genetic lines of crop plants. This past year we identified *Redskin and Mohawk* pepper as excellent substitutes for *Triton* pepper, which has poor seed quality. We also have preliminary evidence that the new dwarf soybean line "MiniMax" (Matthews et al. 2007. Registration of MiniMax soybean. *J. Pl. Registrations*) is not genetically uniform. Some plants are twice the height of others in a constant photoperiod and an optimal controlled-environment.

Phytoremediation: We are continuing studies of the uptake of compounds that contaminate soils. The uptake rate does not appear to be a constant function of transpiration rate as previously thought. It is also not constant over the life cycle, even in steady state conditions.

Plant Nutrition: We are refining procedures for precision nutrient stress of plants in specialized root-zone environments.

Publications – 2007-2008

- Chen, D. M. Liang, D. DeWald, B. Weimer, M. Peel, **B. Bugbee**, J. Michaelson, E. Davis, Y. Wu. 2008. Identification of dehydration responsive genes from two non-nodulated alfalfa cultivars using *Medicago truncatula* microarrays. *Acta Physiol. Plant* (in press).
- Frantz, J., N. Cometti, M. van Iersel, and **B. Bugbee**. 2007. Rethinking Acclimation of Growth and Maintenance Respiration of Tomato in Elevated CO₂: Effects of a Sudden Change in Light at Different Temperatures. *Jour. Plant Ecology* 31 (4)100-110.
- Henry, A., W. Doucette, J. Norton, and **B. Bugbee**. 2007. Changes in Crested Wheatgrass Root Exudation caused by Flood, Drought, and Nutrient Stress. *Jour. Environmental Quality* 36:904-912.