Controlled Environment Systems Research Facility

Department of Environmental Biology, University of Guelph
Guelph, Ontario, Canada. Website: www.ces.uoguelph.ca

2006 Station Report to the NCR-101 Committee

Mike Dixon, Director (mdixon@ces.uoguelph.ca)
Bernie Grodzinski, Co-director (bgrodzinski@uoguelph.ca)
Theresa Rondeau Vuk, Program Manager (trondeau@ces.uoguelph.ca)
Youbin Zheng, Scientist, Manager, Technical Operations (yzheng@uoguelph.ca)

New facilities planned or installed

- Construction of MELiSSA Pilot Plant Higher Plant Chamber Prototype
- Installed 12 bench-scale biofiltration units in a poultry facility.
- Suite of post harvest CA and walk-in cold rooms.
- Six Enconair growth chambers and two ultra low temperature chambers.

Sensors and instruments

- Accumet Ammonia Ion-Specific Electrode (ISE) probe
- 3 Onset HOBO temperature, humidity and light intensity dataloggers
- Eight oxygen sensors can measure air, water and soil oxygen levels continuously.

Workshops / colloquia / symposia

- Planetary and Terrestrial Mining Sciences Symposium, Northern Centre for Advanced Research and Technology, Ontario, Canada.
- Autonomous Robotic Greenhouse Workshop I & II, Guelph. On.

Committees and sub-committees served

- NASA Systems Integration Modeling and Analysis Panel
- Ontario Floriculture Sub-committee

Current Research Projects

- Commercialization of a recyclable synthetic plant growth medium
- The application of ozonation and chlorination technologies for control of *Phythium* and *Phytophthora* in greenhouse and nursery irrigation systems
- Improving productivity and pathogen resistance of greenhouse crops by enhancing root zone oxygen
- Ion Specific Nutrient Management
- Moving lighting and greenhouse crop production
- Development of ozone based technologies and applications for the greenhouse and space industries.
- Empirical validation of a non-linear rectangular hyperbola model for HPC model driven control within the MELiSSA Pilot Plant
- Design and construction of the HPC prototype for the MELiSSA Pilot Plant
- Wet scrubbing and biodegradation of ammonia, dust and bioaerosols from an animal-holding environment
- Hybridization of membrane and botanical biofiltration technologies for the removal of gaseous contaminants in space cabins and terrestrial occupied spaces.
- Assessment of photocatalytic oxidation technology in air cleaners for the destruction of volatile organic compounds and bioaerosols in occupied spaces

Publications

Robinson, S., Dixon, M. and Zheng, Y. (2006). The Site of Vascular Blockage That Leads to Reduced Shelf-life in Cut Roses. Plant Phsiol. Biochem. (Submitted).

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Zheng, Y., Dixon, M. and Saxena, P.S. (2006). Growing environment and nutrient availability effect photochemical content of *Echinacea purpurea* (L.) and *Echinacea angustifolia Planta Medica* (Submitted)

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Zheng, Y., Blom, T. and Dixon, M. (2006). Fluctuating supplement lighting increases leaf photosynthetic capacity, but reduces growth of pot gerbera. Sci. Hort. 107(4): 380-385.

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Favreau M., Rodriguez A., Ordóñez L., Waters G.C.R., 2005. Application of the Non-Rectangular Hyperbola Model to Lettuce and Beet Crop, Society of Automotive Engineers (SAE) Technical Paper, 2005-01-2823.

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Wehkamp, C., Stasiak, M, Zheng, Y. and Dixon, M. (2005). Sweet pepper water status under low atmospheric pressure. In: Closed Habitation Experiments and Material Circulation Technology – Proceeding of the International Symposium on Closed Habitation Experiments and Material Circulation Technology. Ed. Tako, Y., Institute for Environmental Science, Japan. 164-175.

Zheng, Y., Wang, L. and Mike Dixon (2005). Greenhouse pepper growth and yield response to copper application. HortScience 40(7): 2132-2134.

Zheng, Y., Zhang, P. and Dixon, M. (2005). Evaluation of four different lamp types for the Production of Tomato Plants in Controlled Environment. HortTechnology 15(3): 646-652.

Zheng, Y., Graham, T., Richard, S., Dixon, M. (2005). Can low nutrient strategies be used for pot gerbera production in closed-loop subirrigation? Act. Hort. 691: 365-372.

Zheng, Y., Graham, T and Dixon, M. (2005). Potted gerbera profits from low nutrient treatment. *FlowerTech* 8(4):18-19.