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New facilities

The new 900 m² (8600 ft²) Controlled Environment Systems Research Facility located within the Bovey Building complex at the University of Guelph has been completed. The first prototype variable pressure hypobaric plant growth chamber is now online and in the initial phase of testing. The control system, provided by Argus Controls (White Rock, British Columbia) is currently being configured, and preliminary results demonstrate the capability to depressurize to 5 KPa with a control bandwidth of 0.1 KPa. Nine additional smaller cylindrical hypobaric chambers (~ 1 m³) are currently being designed, with an initial prototype expected early in 2002. The new microbiological, analytical, calibration, and system control laboratories are now fully equipped and occupied by numerous CES faculty, technicians, and students.

Sensors and instruments

Recent acquisitions include LC/MS and GC/MS/MS systems which will provide improved analytical capabilities for inline analysis of air and water streams from the hypobaric chambers and other controlled environments.

Current Projects

- Management and measurement techniques for greenhouse nutrient recycling
- Research and technology transfer in the floriculture industry, advanced technology and management for greenhouse nutrient recycling
- Applications for modular biofiltration in the mining industry
- Development of integrated control systems for nutrient management in controlled environment systems
- Investigating the effect of light to enhance the shelf life of cut flowers and green vegetables
- Preliminary testing of fibre optic horticultural lighting system
- Modular biofilter beta testing
- Tomatosphere - an educational outreach science project - [http:// www.tomatosphere.org](http://www.tomatosphere.org)
- Integrated control systems for root and aerial environments of greenhouse crops: management of allelochemicals and micro-organisms in closed-cycle hydroponic systems
- Genetic and physiological analyses of low light tolerance in natural ecotypes and selected greenhouse ornamentals
- Integrated biological and physical remediation technologies for recirculating hydroponic systems
- Improved plant productivity in closed environments: selection for enhanced photosynthesis and carbon partitioning in plants growing in dense plant canopies
- Biological and physical remediation in hydroponic ornamentals; cost effective technologies to promote crop productivity while avoiding environmental contamination
- Feasibility of producing high value *Allium* species in soilless culture, a first step in selecting native *Allium* species for commercial food production and the manned space program
- Identification of major allelochemicals found in closed-cycle, hydroponic systems
- Rhizofiltration of salts and excess nutrients in controlled environments
- Effects of environmental factors and antibiotics on bacterial membranes when grown in simulated microgravity

Publications/Presentations

Edwards, D.R. and M.A. Dixon. 2000. Plant growth and nutrient flux in a closed loop nutrient system using top irrigation for potted Asiatic lily, poinsettia and chrysanthemum. J. Amer. Soc. Hort. Sci. (In Press)

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Cloutier, G.R. and M.A. Dixon., 2000. Modeling Plant Canopy Photosynthetic Capacity: A Comparison of Non-Linear, Parametric and Non-Parametric Approaches, Society of Automotive Engineers, Technical Paper Series (In Press)

Edwards, D., N. McKay and M. Dixon. 1999. Alstroemeria and *Gerbera* production in a closed fertigation system. Greenhouse Canada. September. pp. 101-107.

Zheng, Y., Cloutier, Dutton, R., G.R. and M.A. Dixon, 2000. Open Gas Exchange System for the Long-term Continuous Measurement of Whole Plant CO² Exchange. Life Support and Biosphere Science. (In Press).

Richard, S., R. Tschanz, and M. Dixon. 2000. Individual Ion Control - New Sensor Technology for Nutrient Solutions. Flowers Canada Ontario Annual General Meeting, RBG, Hamilton, ON.

R., Graham, T., R. Côté, M.. Dixon. 2000. Remediation Potential of Ozone in the Hydroponic Units of Advanced Life Support Systems. Canadian Society of Plant Physiologists Annual Conference, London, ON.

Website

<http://www.ces.uoguelph.ca>