

Controlled Environment Systems Research Facility
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2011 Station Report to the NCERA-101 Committee

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1. Impact Nugget:

- File a patent for rapid production of plants for green roof installation and erosion control.
- Developed a green roof research website (<http://www.ces.uoguelph.ca/greenroof/>)
- Aqueous ozone can be applied directly to plants (tomato) in drip irrigation systems
- Evidence to suggest that liverwort control can be achieved using aqueous ozone in irrigation solution

2. New Facilities and Equipment.

Development and installation of a prototype multispectral LED array designed for photosynthesis research in our sealed environment chambers. Six chambers will be equipped with these systems before the end of the year. The LED arrays are capable of providing a full spectrum at $2000 \mu\text{mol m}^{-2} \text{s}^{-1}$ over a 0.5 m^2 area from a distance of 60cm. Individual wavelengths are fully addressable and dimmable and should provide up to $1000 \mu\text{mol m}^{-2} \text{s}^{-1}$ over the same 0.5 m^2 growing area.

3. Unique Plant Responses.

4. Accomplishment Summaries.

- While conducting research on green roof plant production and maintenance, we have transferred some of our research results directly to our industry partners. By using our results on growing substrates, fertilization, our green roof plant producers have improved both their plant production speed and quality.

5. Impact Statements

6. Published Written Works.

Scientific Publications

Tian X, Zheng Y and Dixon M. 2012. Susceptibility of various potted begonias to *Fusarium foetens*. *Can. J. Plant Pathol.* 34: 248-254.

Wehkamp, CA, M Stasiak, J Lawson, N Yorio, G Stutte, J Richards, RM Wheeler and M Dixon. 2012. Radish (*Raphanus sativa* L. cv. Cherry Bomb II) Growth, Net Carbon Exchange Rate, and Transpiration at Decreased Atmospheric Pressure and/or Oxygen. *Gravitational and Space Biology.* 26: 3-16

Stasiak, M, D Gidzinski, M Jordan, M Dixon. 2012. Crop selection for advanced life support systems in the ESA MELiSSA program: Durum wheat (*Triticum turgidum* var durum). *Advances in Space Research*. 49: 1684–1690

Graham, T., P. Zhang, and M.A. Dixon. 2012. Closing in on upper limits for root zone aqueous ozone application in mineral wool hydroponic tomato culture. *Sci Hortic-Amsterdam* 143: 151–156

Graham, T., P. Zhang, E. Woyzbun, and M. Dixon. 2011. Response of hydroponic tomato to daily applications of aqueous ozone via drip irrigation. *Sci. Hort.* 129:464-471

Graham, T., and M.A. Dixon. 2012. Liverwort Control: An Ancillary Role for Ozone-based Irrigation Water Treatment Systems? *HortScience* 47(3): 361–367

7. Scientific and Outreach Oral Presentations. Include workshops, colloquia, conferences, symposia, and industry meetings in which you presented and/or organized.

Zheng Y, Carmichael J, Vinson K, Thompson C, Wang L and Dixon M. 2012. Sensor-Based Automated Irrigation System Can Save Water in Pot-in-Pot Acer rubrum Caliper Tree Production. American Society for Horticultural Science Annual Conference. July 31-August 3, 2012. InterContinental Hotel, Miami, Florida, USA.

Zheng Y, Carmichael J, Thompson C, Vinson K, Wang L and Dixon M. 2012. Automated Irrigation for Acer rubrum Caliper Tree Production. Landscape Ontario Growers Group Short Course, Feb 8, 2012. Royal Canadian Legion, Guelph. (Invited).

Zheng Y, Vinson K, Wang K and Dixon M. 2012. Plants Responses to Irrigation Water Acidification. Landscape Ontario Growers Group Short Course, Feb 8, 2012. Royal Canadian Legion, Guelph. (Invited).

Zheng Y and Dixon M. 2011. Lessons Learned in Sustainable/Organic Production. Canadian Greenhouse Conference. Niagara Falls, Ontario, Canada, 4-6 October, 2011. (Invited).

Tian X, Zheng Y and Dixon M. 2011. Species susceptibility and biocontrol of Fusarium wilt of Rieger begonias. The Plant Canada Conference 2011. Halifax, Canada. 17-21 July, 2011.

Zheng Y and Dixon. 2011. Alternative Growing Substrate Research in Canada. International Symposium on Responsible Peatland Management and Growing Media Production. Québec City, Canada, 13-17 June, 2011.

8. Other relevant accomplishments and activities.

PhD Thesis defence – Thomas Graham, August 8th, 2012

MSc Thesis Defences:

- Lafereniere, CM. 2011. Development and assessment of organic growing substrates for tomato transplant production and disease suppression.
- Dombrowski, MP. 2012 Growing substrates comprised of composted materials and reduced peat moss for production of greenhouse potted gerbera (*Gerbera jamesonii*).
- Lomas, N. 2012. Comparison and selection of saprophagous diptera species for poultry manure conversion.