Iowa State University NCERA-101 Station Report
Christopher J. Currey

1. New Facilities and Equipment.

The Greenhouse and Controlled Environment Research Greenhouses at Iowa State University were outfitted with sensors and data loggers for environmental monitoring. A weather-resistant enclosure with a data logger (CR1000; Campbell Scientific, Logan, UT) and two multiplexers (AM16/32; Campbell Scientific) with eight quantum sensors (LI-190; LI-COR Biosciences, Lincoln, NE) and four temperature probes (1K RTD; R.M. Young Company, Traverse City, MI) in actively aspirated solar shields (Compact Aspirated Shield; R.M. Young Company). Additionally eight 1000-watt high-pressure sodium (HPS) lamps (PLX; PL Lights, Beamsville, Ontario, Canada) were installed in each greenhouse.

Additionally, 10 nutrient film technique (NFT) and 10 deep-flow technique (DFT) hydroponic systems were installed in two of the greenhouses. Each NFT system consisted of four troughs that are 10 cm wide, 5 cm tall, and 2 m long (GT50-612, FarmTek, Dyersville, IA) with a 3% slope. Nutrient solution is held in a 151-gal reservoir (Premium Reservoir; Botanicare, Chandler, AZ) and was delivered to troughs with a submersible water pump (Active Aqua 33 Watt pump, Hydrofarm, Grand Prairie, TX) resulting in a flow of ~1 $L \cdot min^{-1}$ per trough. Plants are placed in 3.5 cm diameter holes cut into the top of the NFT troughs allowing the base of seedlings to contact the nutrient solution. The DFT systems consist of a 0.9 m wide, 15 cm tall, and 1.8 m long tank with a 227-L capacity (3×6 ID Tray White; Botanicare, Chandler, AZ) and a 4 cm thick polystyrene foam sheet floating on the nutrient solution. Baskets are placed in 3.5 cm diameter holes in the polystyrene foam, and seedlings are placed in the baskets so the phenolic foam was in contacts with the nutrient solution.

2. Unique Plant Responses.

Foliar spray applications of solutions containing 0, 125, 250, 500, or 1000 ppm ethephon were applied to tissue culture-propagated streptocarpus either two weeks after planting (one application) or two and four weeks after planting (two applications). Applying 500 or 1000 ppm ethephon foliar sprays delayed flowering without reducing plant size to an unmarketable size. We conclude that ethephon may be used to delay the onset of flowering and reduce the amount of hand labor required to remove inflorescences that are formed prematurely.

Seed-propagated New Guinea impatiens were treated with deionized water or solutions containing ancymidol (15, 30, or 60 ppm), chlormequat chloride (750, 1500, or 3000 ppm), daminozide (1250, 2500, or 5000 ppm), ethephon (250, 500, or 1000 ppm), flurprimidol (10, 20, or 40 ppm), paclobutrazol (10, 20, or 40 ppm), or uniconazole (5, 10, or 20 ppm) 7 d after planting in 1801 packs. Flurprimidol, paclobutrazol, and uniconazole were identified as the most effective plant growth regulating chemical.

3. Accomplishment Summaries.

Research at Iowa State University has focused on improving chemical growth control of containerized greenhouse floriculture crops. Research has focused on expanding the potential uses and application methods for ethephon, a unique plant growth regulator. Additional research has focused on identifying new PGR strategies for new or increasingly popular floriculture crops.

Petroleum plastic is frequently used in greenhouse and controlled-environment crop production. Iowa State University has been developing biopolymers for use in manufacturing containers for crop production. Several different polymer and polymer blends have been identified and, through trials at Iowa State University, have shown to be suitable replacements for petroleum plastics.

The Iowa State University Greenhouse Short Course was offered for the first time last year. This event was a day-long educational event designed for greenhouse and controlled-environment producers and managers in the Upper Midwest. Several speakers were featured covering a range of topics relative to greenhouses and controlled environments, including pesticide application, pest control, plant growth regulation, and diagnostics for plant disorders. The ISU Greenhouse Short Course will be repeated in subsequent years.

4. Impact Statements.

The use of plant growth regulators (PGRs) to control plant growth and development can be a useful cultural practice for several reasons. Applying PGRs can increase the aesthetic appearance of containerized crops, increase post-harvest marketability, and reduce input costs of production. This results in increased plant quality and added value for consumers. Research at Iowa State University is increasing the potential PGR uses and application strategies for greenhouse growers by identifying chemicals and application methods that increase crop quality and reduce labor for production.

Petroleum is widely used in greenhouse crop production. However, many producers and consumers are interested in evaluating and identifying alternatives to petroleum. Iowa State University has developed materials made out of renewable, plant-based products. Some materials will be equally as durable as petroleum, yet last as long in the waste stream, while some products will breakdown relatively quickly after the crop has been produced and planted or otherwise disposed of. These containers will provide acceptable non-petroleum plastic container alternatives to traditional greenhouse crop containers.

5. Published Written Works.

<u>Poster Presentations</u>

Currey, C.J. and N.J. Flax. 2014. Ethephon applications delay and diminish flowering of streptocarpus. HortScience, 49:391.

Currey, C.J. and N.J. Flax. 2014. Foliar plant growth retardant applications suppress height of seed-propagated New Guinea impatiens. HortScience, 49:390.

<u>Popular Articles</u>

Currey, C., J. Schrader, K. McCabe, W. Graves, D. Grewell, G. Srinivasan, and S. Madbouly. 2014. Bioplastics for greenhouses− Soy what? GrowerTalks, 77(09):70−74.

Currey, C., J. Schrader, K. McCabe, W. Graves, D. Grewell, G. Srinivasan, and S. Madbouly. 2014. Soy containers: Growing promise, growing plants. GrowerTalks, 77(10):60−65.

Lopez, R.G. and C.J. Currey. 2014. Understanding light. GrowerTalks, 77(11):58−61.

Currey, C.J. and R.G. Lopez. 2014. Managing photoperiodic lighting. GrowerTalks, 77(12):72−73.

Currey, C.J. 2014. Hydroponic culinary herb production. Greenhouse Grower, 32(4):34−38.

Currey, C.J. and N.J. Flax. 2014. Keeping streptocarpus vegetative using ethephon. Greenhouse Grower, 32(10):84−86.

Currey, C.J. and J.E. Erwin. 2014. New kalanchoe for cultivation. Greenhouse Grower, 32(14):56−60.

6. Other relevant activities or information.

None to report.