FloriBytes

Digital newsletter for
the floriculture industry

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Beth Fausey
Charles Behnke
Claudio Pasian
Dave Dyke
Dean Krauskopf
Denise Ellsworth
Dennis Lewandowski
Hal Kneen
Luis Cañas
Jonathan Frantz
Jim Locke
Michelle Jones
Nancy Taylor
Peter Ling
Ray Cloyd
Roberto Lopez
Steve Carver
Tim Malinich

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TOPICS IN THIS ISSUE:

I) MARKET OPPORTUNITIES

Hamilton County Extension storm water management programs – designed to provide Opportunities to the green industry

By Dave Dyke
OSU Extension, Hamilton Co.
dyke.15@cfaes.osu.edu

A federal court order resulting from a law suite filed by the U. S. EPA and the Sierra Club has necessitated an effort to reduce storm water runoff in the Cincinnati area. That suite was brought, in large part, because combined sewer systems overflows (CSO's) result in an

average of 14 billion gallons of CSO water being discharged into the Ohio River annually from the Metropolitan Sewer District of Greater Cincinnati (MSDGC) service area.

There are 2 potential solutions to reducing the discharges; “gray” – pipes and tunnels – and “green” – landscape plantings, rain barrels, vegetated roofs, etc. Many other areas under similar court orders, such as Cleveland, have responded largely with a gray approach. In the case of Cleveland that has been the construction of miles long tunnels to store water during heavy rain events. That effort will ultimately cost billions of dollars.

The leaders of the Cincinnati area, including the county commissioners and others, have had the option of building a similar tunnel here, which would be over 5 miles long and costing well over a billion dollars. Instead, they have opted support a strategy that relies, as much as possible, on a green approach. That would have many advantages, including: Saving local residents and businesses a very large amount of money; beautifying the city, making it more attractive to residents and new businesses; reducing the resources needed to treat water entering the sewer system; reducing air pollution; sequestering carbon dioxide that has been implicated in global warming; and creating and sustaining green collar jobs in the area.

The Ohio State University Extension – Hamilton County, has responded to the challenge of making the “green approach” to storm water management a viable alternative to the “gray approach” in two ways: 1) Producing publications and 2) spearheading an effort to organize and sponsor an organization designed to foster and facilitate cooperation between all businesses, non-profit organizations, and agencies involved in “green” storm water management efforts in the Metropolitan Sewer District of Greater Cincinnati (MSDGC) service area.

The publications were produced in collaboration with the U.S. EPA, the Metropolitan Sewer District of Greater Cincinnati, the Cincinnati Zoo and Botanical Garden, the Hamilton County Soil & Water Conservation District, the Hamilton County Storm Water District, and others. These publications, *Rain Garden Guidelines for Southwest Ohio – a Practical Handbook for Home Gardeners* and *GUIDELINES FOR UTILIZING RAIN GARDENS AS A STORM WATER MANAGEMENT TOOL IN THE METROPOLITAN SEWER DISTRICT OF GREATER CINCINNATI (MSD) - STEPS TO GETTING OFF THE STORMWATER "GRID"* (targeted to professionals) can be viewed at http://hamilton.osu.edu/ in the near future. The working edition of the latter publication was accepted by the U.S. EPA in the fall of 2008, which is tantamount to its endorsement.

The Hamilton County Storm Water District provided funding to print 10,000 hard copies of the home gardener handbook. They are available free of charge for Hamilton County residents at the offices of OSU Extension, Hamilton County, and the Hamilton County Soil and Water Conservation District. They can be purchased by non-county residents through OSU Extension, Hamilton County, for $7.50 each, which includes tax and postage. Contact Kim Martini at (513) 946-8989 or martini.1@cfaes.osu.edu.

The new organization, the Cincinnati Area Professional Green Infrastructure Network (CAPGIN), was established in collaboration with, and sponsored by, the MSDGC, Cincinnati Zoo and Botanical Garden, the Hamilton County Storm Water District, and the Hamilton County Soil and Water Conservation District.

Green storm water management systems which will be promoted and facilitated by CAPGIN include: rain gardens, vegetated roofs, permeable parking and walking areas, contour

plantings, rain barrels, turf, and trees and shrubs. CAPGIN membership is open to all professionals involved in the green infrastructure industry (landscapers, designers, growers, turfgrass managers, tree care professionals, consulting firms, NGO's, developers and construction companies, governmental entities, etc.).

The core of the network will be a web site (CAPGIN@osu.edu), which will be established and maintained by OSU Extension, Hamilton County. The site will contain listings of:

- Organizational resources – information on and links to other organizations and entities with relevant information (MSD, Storm water District, etc.)
- Installation resources – directory of: Design, installation, and maintenance companies
- Plant suppliers
- Hard goods suppliers – rain barrels, permeable surfaces, mulches, etc. (all businesses listed must be properly licensed)
- Research – Listed by type as above
- Area projects – Listed by type as above - documented (with photos)
- Educational opportunities
- Membership
- BMP's (best management practices) – Listings by type – vegetative roofs, rain gardens, pervious surfaces, contour plantings, swales and terraces, turf, trees, other

For further information on rain gardens or CAPGIN please contact Dave Dyke at dyke.15@cfaes.osu or Joe Boggs at boggs.47@cfaes.osu.edu.

II) GREENHOUSE MANAGEMENT

Propagating Poinsettia Cuttings

By Roberto G. Lopez
Purdue University
rglopez@purdue.edu

Successful poinsettia propagation begins with high-quality cuttings and an ideal rooting environment. In this article, we will discuss how to maintain optimal greenhouse conditions for rooting and management practices for improving propagation success and minimizing losses.

Preparation of Your Propagation House

Poinsettia rooting requires a properly functioning greenhouse environment. Before harvesting or receiving non-rooted cuttings from your supplier, make sure that your mist or fog systems are functioning properly and not clogged, and thoroughly clean your propagation area to ensure it is free of pathogens, insects, algae, weeds, debris, freestanding water and pet plants!

High-quality water is important for propagation, so measure your water pH, electrical conductivity and alkalinity and make necessary adjustments.

Start with High Quality Cuttings

There are generally two sources of cuttings: your own stock plants or plants purchased from a supplier. Depending on growing conditions, you can generally harvest cuttings of most cultivars from stock plants approximately five to seven weeks after the last pinch. However, cutting quality and maturity at harvest are often determined by the time since the last pinch. For most cultivars, rooting quality is highest when cuttings are harvested five to six weeks after the last pinch.

Industry specifications call for terminal stem cuttings with short internodes that are 2 to 3 inches long (5 to 8 cm) and have two or three mature leaves. A stem diameter (caliper) of 0.16 to 0.24 inches (4 to 6 mm) is desirable, but can vary by cultivar (Figure 1).

Figure 1. High quality and uniform cuttings being removed from shipping boxes.

When harvesting cuttings, disinfect tools with 10 percent bleach or trisodium phosphate (TSP) solution between stock plants. Avoid damaging leaves or stems as it can lead to greater disease incidence or uneven plant development. Take care to prevent exuded latex from cut stems from contacting adjacent cuttings or leaves as this can cause leaf distortions. Keep cuttings in a shaded area and quickly transfer them to a cool location after harvest.

If you purchase non-rooted cuttings from a supplier, they most likely come from offshore production facilities in Guatemala, Kenya, Ethiopia or Mexico. The cuttings are often wrapped in moistened paper and packaged in boxes with ice packs.

Upon receiving them, unpack the cuttings, inspect them, and immediately place them in propagation. If immediate propagation is not possible, place the opened boxes overnight in a humid cooler at 50 to 55 °F (10 to 13 °C) and stick the following morning. Do not allow cuttings to dehydrate at any point during storage or propagation.

Whether you harvest or purchase cuttings, before rooting you should visually inspect them to make sure they are vegetative, disease- and insect-free, and uniform in length, caliper, and maturity. Non-vegetative or non-uniform cuttings root and develop unevenly, which can lead to a delayed and non-uniform finished crop.

Rooting Medium

You can root poinsettia cuttings directly into the finished container (direct stick). You also can root them in a range of propagation trays, strips or liners filled with a high porosity media such as a peat and perlite mix, foam and Rockwool (ex. Ellepots, Oasis or Agrifoam).

Regardless of technique, the optimal pH for the rooting medium is 5.8 to 6.3. The medium must support the cuttings, have good porosity, and adequate water holding capacity. When rooting, insert approximately 1 inch of the cutting into the rooting medium. At this time,

remove only lower leaves that would be in the rooting medium. Only remove large leaves if they will cover the stem apices of adjacent cuttings.

Rooting Hormone

Poinsettia cuttings generally root well without rooting hormone. However, you can improve rooting uniformity by dipping the lower ¾-inch of the stem into a rooting hormone solution or powder. Suggested rooting hormone concentrations are:

- Indole-3-butyric acid (IBA) at 1,500 to 2,000 ppm
- IBA at 1,000 ppm plus naphthaleneacetic acid (NAA) at 500 ppm

Avoid any contact of the rooting hormone with the leaves or petiole as this can lead to twisted or distorted leaves (epinasty).

After sticking the cuttings there are two development stages before toning:

- Callus formation
- Root initiation and development

Stage 1: Callus Formation

Seven to ten days after placing the cuttings in propagation, they will begin forming callus tissue around the stem base. This is the most critical stage of poinsettia propagation and you must avoid any stress from wilting or desiccation. To minimize this stress, maintain a thin layer of moisture around the leaf surfaces at all times by:

- Keeping air circulation low (turn off all horizontal air flow fans and minimize air exchanges)
- Keeping humidity high (90 to 100 percent)

The frequency of misting depends on specific system and greenhouse conditions such as light intensity, temperature, humidity, and air movement (Figure 2). Mist most frequently between 10 a.m. and 6 p.m. Nighttime misting is only required the first three to four nights.

Figure 2. Mist frequency is dependent upon your system and greenhouse conditions such as light intensity, temperature, humidity, and air movement.

After the cuttings have callused, reduce misting frequency but avoid wilting. Applying a spreader-sticker (ex. CapSil®) to the cuttings can reduce surface tension and water beading (Figure 3) and promote uniform coverage of moisture across the leaf surface (Figure 4). Apply CapSil® until run-off at a rate of 300 ppm (4 fluid ounces per 100 gallons of water).

Figure 3. Without a spreader-sticker, moisture can bead on leaf surfaces.

Figure 4. Incorporating a spreader-sticker into the misting system can promote uniform coverage of moisture on leaf surfaces.

Light and Temperature

Light transmission in the propagation house should be indirect or diffuse. Whitewash or a combination of exterior shade on the glazing with retractable internal shade curtains will provide a good system for light modulation, especially during the summer.

During stage 1, the maximum light intensity should be 1,000 to 1,250 foot-candles (200 to 250 $\mu mol \cdot m^{-2} \cdot s^{-1}$) or a daily light integral (DLI) of 4 to 5 $mol \cdot m^{-2} \cdot d^{-1}$.

Optimal rooting occurs when media temperatures are maintained (usually with bottom heating) at 79 to 83 °F (26 to 28 °C). Maintain air temperatures between 76 to 82 °F (24 to 28 °C) during the day and 70 to 74 °F (21 to 23 °C) at night. For the first three nights after rooting, maintain air temperatures at 68 to 70 °F (20 to 21°C) to help reduce moisture loss and desiccation.

Growth Regulators

Growth retardant sprays such as chlormequat chloride (Cycocel® or Citadel®) or chlormequat chloride plus daminozide (B-Nine® or Dazide®) will help prevent stretch in propagation. Apply growth regulators early in the morning or in the evening when shutting off the greenhouse's mist system for approximately 30 minutes will not stress the cuttings. Make the first application six to seven days after placing the cuttings in propagation.

Stage 2: Root Initiation and Development

Root growth generally initiates 10 to 14 days after the propagation process starts (Figure 5). At that time, you can increase light intensity to 1,250 to 1,500 foot-candles (250 to 300 $\mu mol \cdot m^{-2} \cdot s^{-1}$) or a DLI of 5 to 6 $mol \cdot m^{-2} \cdot d^{-1}$. But the light should remain diffuse. You also can reduce media temperatures to 72 to 79 °F (22 to 26 °C). Air temperatures can be reduced to 75 to 80 °F (24 to 27 °C) during the day and 68 to 70 °F (20 to 21 °C) at night.

Figure 5. Roots after 10 days in propagation.

Fertilization

Media leaching from misting can lead to nutrient deficiencies. Prevent deficiencies by incorporating a fertilizer into the mist system ten days after initiating propagation (50 to 75 ppm nitrogen and potassium, plus micronutrients). Alternatively, water cuttings every four or five days with a solution containing 150 to 200 ppm nitrogen and potassium, plus micronutrients. Do not use phosphorus fertilizers because foliar applications can distort leaves.

Toning for Finishing Environment

Seventeen to 21 days after initiating propagation, your cuttings should have developed a root system, so they can grow under drier and brighter conditions. At this time, you can make a second growth regulator application.

Restoring air circulation now will help tone the cuttings and get them acclimated to the finishing environment. You can increase maximum light levels to 2,000 to 3,000 foot-candles (400 to 600 $\mu mol \cdot m^{-2} \cdot s^{-1}$) or a DLI of 7 to 8 $mol \cdot m^{-2} \cdot d^{-1}$, and reduce air temperatures to 72 to 75 °F (22 to 24 °C).

Minimize misting to about every 30 to 40 minutes from 8 a.m. to 6 p.m. Between 21 and 28 days after initial sticking, the cuttings are ready to be removed from the propagation.

Insect and Diseases Management

The warm, wet, and humid propagation environment make poinsettia cuttings susceptible to several diseases such as *Botrytis*, bacterial soft rot (*Erwinia*), *Rhizoctonia* and insects such as fungus gnats, shore flies, and whiteflies.

Fungus gnat larvae damage poinsettia cuttings by feeding on young roots and callus tissue. They also transmit diseases. Avoid saturating the rooting medium as this will delay rooting and increase the risk of fungus gnats and disease.

By carefully following the above protocols you will minimize cutting losses and provide an ideal propagation environment for your poinsettia cuttings.

To download a Spanish Purdue Extension publication on the propagation of poinsettia cuttings, visit: http://www.ces.purdue.edu/extmedia/HO/HO-235-SW.pdf

Reference to products in this publication is not intended to be an endorsement to the exclusion of others which may be similar. Persons using such products assume responsibility for their use in accordance with current directions of the manufacturer.

III) PEST MANAGEMENT

Kontos™: The First Systemic Miticide

By Dr. Raymond A. Cloyd
Kansas State University
rcloyd@ksu.edu

Twospotted spider mite, *Tetranychus urticae* is one of the most destructive mite pests of greenhouse-grown crops, and can become resistant to commercially-available miticides within a short period of time if miticides are not rotated properly based on mode of action. The miticides used by greenhouse producers to deal with twospotted spider mite populations have either contact or translaminar activity. Contact miticides include acequinocyl (Shuttle),

fenbutatin-oxide (ProMite), clofentezine (Ovation), hexythiazox (Hexygon), pyridaben (Sanmite), bifenazate (Floramite), and fenpyroximate (Akari).

Those miticides with translaminar activity are abamectin (Avid), chlorfenapyr (Pylon), spiromesifen (Judo), and etoxazole (TetraSan). However, there has never been available a truly systemic miticide. Well, this has changed with the introduction of Kontos™, which is registered for use in greenhouses, nurseries, and interiorscapes. The product is labeled for "control" of ***spider mites***, aphids, leafhoppers, mealybugs, and whiteflies. The active ingredient is spirotetramat (22.4% AI) and the mode of action is a lipid biosynthesis inhibitor (Mode of Action Group No. 23). The restricted entry interval (REI) is 24 hours.

Kontos™ is formulated as a soluble concentrate (SC) and is labeled for use on vegetable transplants. Kontos™ is a fully-systemic miticide and according to the label, the active ingredient moves through the xylem (water-conducting) and phloem (food-conducting) tissues with the active ingredient residing in new shoots and leaves. It is primarily active via ingestion and may potentially reduce the fecundity (the rate at which a female produces ovaries) of certain insect and mite females.

Kontos™ may be applied as a foliar spray or drench to the growing medium. In our studies, Kontos™ provided between 81% to 98% mortality of twospotted spider mite 7 to 14 days after application when applied as a drench to the growing medium. Based on the results, the active ingredient appeared to be more active on nymphs than adults. This may be due to the differential feeding behavior of nymphs and adults. For example, young adult females tend to spend more time moving than feeding whereas nymphs or larvae remain stationary, which may affect the amount of active ingredient ingested from plant tissues.

It is important to avoid using Kontos™ on a number of greenhouse-grown crops including geraniums, orchids, and ferns. Be sure to consult the product label for a complete listing of additional crops that Kontos™ should not be used on. For management of twospotted spider mite it is important to apply the product preventatively or when populations are first detected since Kontos™ will not "control" or reduce heavy populations of twospotted spider mite. Furthermore, for "control" of mealybugs, it is recommended to make two foliar applications at 14 to 21 day intervals so as to kill nymphs that emerge from eggs.