A Publication of the UMass Extension Floriculture Program

Floral Notes Newsletter

Volume 21, No. 4 www.umass.edu/umext/floriculture January-February 2009

In This Issue

University of Connecticut Perennial Plant Conference

The University of Connecticut is sponsoring the annual *"Perennial Plant Conference – A Conference for the Professional Horticulturist.*" The conference will be held at the Lewis B. Rome Commons on the University of Connecticut Storrs campus on **Thursday, March 12, 2009**.

This all-day educational conference will address a wide range of topics focusing on herbaceous perennial production, sustainable landscape design and retail marketing. Topics were selected to appeal to nursery and greenhouse producers, retail garden centers, and professional landscapers and designers. Two concurrent educational sessions will feature nationally recognized speakers from both industry and academia.

A pre-registration fee of $80 per person is due by March 6th. If post marked after March 6th or paid at the door, the fee is $90 per person. Please make checks payable to the University of Connecticut and send to Donna Ellis, University of Connecticut, Department of Plant Science, 1390 Storrs Road, Unit 4163, Storrs, CT 06269-4163. Included with your registration: an information packet, lunch, morning & afternoon snacks, free-parking and an opportunity to meet speakers and purchase autographed books from the Perennial Plant Conference bookstore. **Two pesticide recertification credits** will be offered for attendees from CT, RI, MA, ME, NH, and VT (pending state approval). For more information contact Donna Ellis at 860-486-6448, email: donna.ellis@uconn.edu, or visit our web site at http://www.hort.uconn.edu/2009ppc/

Weed Management for Garden Retailers

March 26, 2009 8:30 AM – 12:30 PM
Doubletree Hotel Milford, MA

Customers commonly ask garden retailers questions about weed identification and the control of weeds in lawns, landscapes and gardens. This program will help retailers answer many of these common questions. A wide range of weed control strategies and retail products will be discussed in depth. Tips and resources for weed identification will be covered. There will be plenty of time for questions and discussion on topics that are important to the participants, so be sure to bring your questions. Cost is $50.

Four pesticide contact hours available for categories 29, 36, 37, and 00.

For a registration form or more information, go to www.umassgreeninfo.org or contact UMass Extension at (413) 545-0895, eweeks@umext.umass.edu .

Root Zone Heat: Installation Techniques

John W. Bartok, Jr.
Extension Professor Emeritus
NRME Dept., University of Connecticut
Storrs, CT

With fuel costs rising rapidly, root zone heating is becoming popular as an energy saving technique. Supplying the heat under the crop reduces the heat needs by allowing the air temperature to be maintained 5-15°F cooler. It also maintains a more uniform heat pattern than can be obtained with perimeter or unit air heaters. Root zone heat can be provided in the floor or under the crop on benches.

The basic floor system consists of pipe embedded in a layer of sand or concrete. Warm water, pumped through the pipes, conducts the heat to the plants placed on the floor. The sand or concrete distributes the heat evenly across the floor surface.

In the bench system, aluminum fin pipes or bare steel pipes placed under the bench radiates heat up to the root zone. Another system utilizes rubber tubing or mats placed on the bench top under the plants.

Depending on climate, the root zone heating system will provide 25-75% of the total heat needs of the greenhouse. The remaining is usually made up with perimeter radiation or air heaters. Research has shown that about 15-35 Btu/hr per square foot of floor or bench can be obtained from the root zone heating system.

To get good service from these systems, they have to be installed correctly. Cutting corners usually doesn't pay. Here are a few installation techniques that may help.

Heat source

For heating small areas, less than 3000 sq ft, a low-cost, domestic hot water heater is usually the best choice. These are available in natural gas, propane and electric models in sizes to about 45,000 Btu/hr. Commercial water heaters available with output to 300,000 Btu/hr can be used for larger areas. Select a heater with a glass lined tank. Gas-fired models frequently require only a plastic flue pipe rather than a metal or masonry chimney. The installation is simple in that besides the water heater all that is needed is an expansion tank, air eliminator, PTR valve, circulating pump and remote bulb thermostat. The thermostat on the water heater is usually set at 100-110°F and the circulator thermostat in the soil of a representative container is set at the desired soil temperature.

Hot water from an existing or new boiler can also be used. One or more circulators and tempering valves are needed to feed the root zone heat. Because the return water from the root zone is cool, a non-condensing boiler should not be used. Cool water, less than 135°F can cause condensation that is highly acidic and can damage the boiler. A tempering valve that protects the boiler could be installed to warm the return water. A better option is to have a condensing boiler that uses the heat from the flue gases to warm the return water.

Another installation that works well is to install a heat exchanger between the boiler and the root zone heat. A heat exchanger isolates the boiler water from the root zone tubing water. A circulating pump moves the hot boiler water on one side of the heat exchanger and a second pump passes the water through the other side. Heat exchangers are used if the root zone tubing is filled with glycol solution in a greenhouse that is shut down during cold weather. It is also common in a system that has been installed to deal with the problem of oxygen diffusion when the tubing does not have an oxygen barrier.

Heat distribution in the root zone

Oxygen diffusion can corrode heating systems.

Dissolved oxygen molecules are present in all fresh water. These molecules can attack ferrous components in the heating system causing rust. Plastic or rubber tubing that does not have a diffusion barrier will allow oxygen to enter the water and sludge and rust to accumulate restricting flow. It is best to use a material such as PEX, a cross-linked polyethylene tubing that has an oxygen diffusion barrier. PEX tubing is available is sizes from ⅜-2" and in roll lengths to 1000'. Typical size for floor systems is ½" for loops up to 200' and ¾" for loops up to 400'. Tube spacing is usually 9-12" on center. If you use a non-oxygen diffusion barrier tubing, and the water flows through the boiler, be sure that all the pipe and fittings are copper or brass. Also add a water treatment that balances the pH and removes the free oxygen from the water.

Some growers have installed low-cost, Schedule 80 polyethylene pipe in sand floor locations with good results. With a glass lined hot water heater and no ferrous components, the life has been good.

EPDM rubber tubing is common for on bench heat and low-output fin or bare steel pipe is used under benches. These systems provide uniform heat if the bench is kept full of plants or a weed barrier mat is placed on the bench to spread the heat. A gap in the plant canopy creates a chimney effect allowing heat to escape and can make control of the temperature difficult. Skirts placed around the side of the bench can be used to reduce the heat escaping from under the bench.

Circulating pumps

The circulating pump is the heart of the root zone system. Centrifugal pumps are used as a good flow is created without much energy. High pressure is not needed as the system is closed and the water is not lifted very high. Inline pumps are the most common. A wet rotor circulator having the advantages of no seals and low cost could also be used. Place a shut-off valve and a union on both sides of the pump so that it can be serviced or replaced easily.

When sizing the pump, remember that the flow should be about 2.5 feet/min for ½" or ¾" tubing. This keeps the temperature difference between the supply and return ends of the loop to between 5 and 10°F. The head or pressure loss is determined by the number and length of loops in the system and the tubing size. The pump is best located near the expansion tank to reduce pressure differences.

Control

A remote bulb thermostat is the most common control. Placed in a pot or flat it senses soil temperature and activates the circulating pump when heat is needed. When the water is supplied by a boiler, controls that modulate water temperature or a variable speed pump may be used.

Root zone heat makes sense as it provides a uniform temperature under all the plants. It is difficult to get the ideal root temperature of 70-75°F required for optimum growth by most plants with an air heat system.

Field Trials Assessing Sunscald and Flowering of Coleus Cultivars

Lois Berg Stack
Extension Specialist, Ornamental Horticulture
University of Maine Cooperative Extension
Orono

Coleus, familiar to some gardeners as Rainbow Plant and Flame Nettle, was long known to botanists as *Coleus blumei*. In recent years, taxonomists have variously assigned two new names to it: *Coleus scutellarioides* and *Solenostemon scutellarioides*. Whatever its botanical name, coleus is a member of the mint family, as evidenced by its opposite leaves, square stems, slight mint aroma and terminal spikes of small blue flowers. It is native to Asia and Africa, and was introduced to Europe by Karl Ludwig Blume following his travels to Java in the early 1800s. English gardeners, who learned about coleus just in time for the Victorian Era's gardening craze, highly prized coleus because it displayed tremendous variation in leaf color, shape and size; was easy to propagate from either seeds or stem cuttings; and was well adapted to the floral carpets, flower gardens and containers that were popular in Victorian times.

As this plant's popularity grew, gardeners found hundreds of variations among their coleus seedlings. They shared cuttings of those variations with other gardeners, thereby starting the confusing history of coleus. What is the botanical heritage of the coleus cultivars now on the market? Which modern cultivars perform well in sun, and which are prone to sunscald and therefore better suited to shade? Which cultivars flower early in the season, or later, or not at all? These questions continue as the current popularity of coleus supports the introduction of many new cultivars each year.

Many new cultivars are described as being highly self-branching, non-flowering and sun-tolerant. But, your customers will be quick to point out that not all coleus cultivars perform equally well in full sun. In an effort to address the challenge of selecting the right coleus for the right place, we conducted field trials of coleus cultivars in 2008, to assess their performance under northern New England conditions.

Project Description

In January 2008, I contacted suppliers of both seed- and vegetatively propagated coleus, to obtain 10-12 plants each of 79 cultivars. The 13 seed cultivars were seeded into 288-plug trays on March 20, 2008, and finished in 4-inch pots. Rooted cuttings of 53 vegetative cultivars were received in early May and potted into 4-inch pots as they arrived. The remaining 13 vegetative cultivars were received as unrooted cuttings in late May, rooted on a heat mat and finished in 606 packs. All 4-inch plants (66 cultivars) were planted at the University of Maine Ag Experiment Station's Rogers Farm, Stillwater ME, on June 11. The remaining 13 cultivars in 606 packs were planted on June 20. Before planting in the field, all plants were hardened off for approximately 14 days.

A pre-plant soil test reported a pH of 6.5, organic matter level of 8.9%, CEC of 12.9 me/100 g, optimum levels of P and Ca, and medium levels of K, Mg and S. This project was managed organically; a low rate of one pound per thousand square feet of Sul-Po-Mag (22% K, 22% S and 11% Mg) was rototilled into the field before planting. Blood meal (12-0-0) was used as an organic N supply, and was sidedressed at time of planting at a rate of two teaspoons per plant (low rate on product label).

A drip irrigation system was installed on 5 of the 10 plants of each cultivar, so that an assessment could be made of the impact of even water supply vs. ambient rainfall on plant growth and development. All plants were hand-watered as needed during establishment in the field. All plants were mulched with one inch of aged hemlock bark on July 2, at which time the drip irrigation system was set to irrigate for 30 minutes every three days. All flowers that developed were allowed to remain on the plants. No pesticides or

additional fertilizer were applied. Data were collected on July 3, 17 and 31, and Aug 14 and 28, from the middle three plants of drip-irrigated plants, and the middle three plants of non-irrigated plants, of each cultivar.

Results

The drip irrigation system kept plants evenly moist throughout the season. Although plants not on the drip irrigation system were not watered after they were established in the field, the mulch prevented excessive evaporation of water from the soil, and rainfall was regular and adequate during July and August. No water stress was observed on any plants, and no growth or development differences were observed between drip-irrigated and non-irrigated plants. Table 1 reports combined data on drip-irrigated and non-irrigated plants.

Sunscald was assessed visually five times. On each date, evidence of sunscald on newly developed foliage was recorded. This produced a record of whether coleus cultivars developed sunscald just once, or on a more continuous basis. Table 1 summarizes the data.

Table 1. Summary of field performance of 79 coleus cultivars.

Cultivar	**Program[1,2]**	**Sunscald rating**	**First date of flowering**	**Average height x width (cm)[3] on August 28**
Alabama Sunset	unbranded	Intermediate	None	30.1 x 40.4
Amora	Proven Selections	Intermediate	31 July	26.5 x 36.2
Aurora Black Cherry	Ball FloraPlant	Minor	None	25.2 x 41.3
Aurora Mocha	Ball FloraPlant	None	17 July	20.7 x 25.8
Aurora Peach	Ball FloraPlant	None	28 Aug	22.2 x 32.4
Aurora Raspberry	Ball FloraPlant	Major	None	16.9 x 19.3
Big Red Judy	Proven Selections	Early only	28 Aug	65.2 x 79.2
Black Dragon	PanAmerican Seed	Minor	3 July	34.3 x 38.5
Black Prince	Proven Selections	Intermediate	3 July	40.2 x 44.2
Burgundy Wedding Train	The Flower Fields	None	None	15.7 x 39.4
Chocolate Drop	Proven Selections	None	None	23.5 x 49.7
Chocolate Mint	PanAmerican Seed	Intermediate	3 July	31.8 x 27.5
Copper	The Flower Fields	Major	None	22.9 x 29.0
Daffy	The Flower Fields	Early only	14 Aug	52.3 x 47.4
Dappled Apple	Proven Selections	Major	3 July	33.0 x 41.9
Dark Chocolate	PanAmerican Seed	Major	3 July	29.2 x 33.7
Dark Heart	unbranded	Minor	3 July	23.1 x 45.3
Dark Star	unbranded	Early only	3 July	34.5 x 48.7
Dipt in Wine	Proven Winners	Early only	17 July	35.6 x 47.4
El Brighto	Proven Selections	Major	14 Aug	35.1 x 47.6
Electric Lime	Ball FloraPlant	Major	3 Jul	28.2 x 36.0
Emerald and Snow	The Flower Fields	Major	None	26.0 x 36.4
Fishnet Stockings	Proven Selections	Early only	None	30.9 x 29.4
Florida City Yalaha	unbranded	Early only	28 Aug	38.1 x 38.1
Florida Sun Jade	Ball FloraPlant	Early only	31 July	51.4 x 51.4

Florida Sun Rose	Ball FloraPlant	Major	3 July	29.4 x 52.9
Florida Sun Splash	Ball FloraPlant	Early only	3 July	29.6 x 44.0
Freckles	Proven Selections	Major	3 July	24.8 x 37.2
Gay's Delight	Proven Selections	Major	31 July	25.0 x 36.6
Glennis	unbranded	Major	28 Aug	17.1 x 24.8
Grape Expectations	unbranded	None	None	30.1 x 28.6
Henna	Ball FloraPlant	Early only	None	61.2 x 72.4
Indian Summer	Ball FloraPlant	Early only	None	48.9 x 46.1
Juliet Quartermain	Proven Selections	Minor	17 July	47.0 x 54.0
Kingswood Torch	Proven Winners	Early only	3 July	36.2 x 43.0
Kiwi Fern	unbranded	None	3 July	33.2 x 42.5
Kong Mosaic	PanAmerican Seed	Major	3 July	28.4 x 58.4
Kong Red	Ball Horticultural Co	Minor	3 July	39.4 x 52.1
Kong Rose	Ball Horticultural Co	Major	3 July	23.3 x 33.2
Kong Salmon Pink	Ball Horticultural Co	Major	3 July	26.9 x 47.2
Kong Scarlet	Ball Horticultural Co	Early only	3 July	31.3 x 51.9
Lava Rose	Ball FloraPlant	None	None	18.6 x 45.7
LifeLime	Proven Winners	Major	None	18.4 x 36.0
Limon Blush	Proven Selections	Major	31 July	28.0 x 33.0
Merlin's Magic	Proven Selections	Early only	31 July	19.9 x 34.5
Merlot	unbranded	None	None	20.3 x 21.0
Midnight Train	The Flower Fields	Early only	31 July	26.9 x 30.5
Mint Mocha	Ball FloraPlant	Early only	None	43.6 x 49.1
Molten Lava	The Flower Fields	Intermediate	31 July	54.4 x 44.0
Moonglow	unbranded	Early only	None	19.7 x 22.4
Mt. Washington	Proven Selections	None	14 Aug	49.7 x 48.3
Needlepoint	The Flower Fields	Minor	31 July	20.5 x 31.3
Oscar	Proven Selections	Intermediate	3 July	23.9 x 32.2
Pele	Proven Selections	Major	None	24.8 x 10.8
Peter's Wonder	unbranded	Early only	28 Aug	53.1 x 50.8
Pineapple	Proven Selections	Minor	None	31.3 x 44.5
Pink Chaos	Proven Selections	Minor	31 July	19.5 x 30.7
Pistachio Nightmare	Proven Selections	Early only	17 July	25.8 x 30.5
Religious Radish	Proven Selections	Early only	3 July	48.7 x 52.9
Royal Glissade	Proven Winners	Early only	28 Aug	46.6 x 53.1
Saturn	unbranded	Minor	31 July	49.1 x 45.3
Saturn Improved	Proven Selections	Minor	3 July	47.4 x 52.3
Sedona	Proven Winners	Major	3 July	37.3 x 64.3
Show and Tell	The Flower Fields	Major	17 July	27.9 x 37.7
Sky Fire	Proven Selections	None	14 Aug	39.8 x 55.5

Strawberry Drop	Proven Selections	Early only	3 July	31.5 x 56.3
Texas Parking Lot	Proven Selections	Major	17 July	36.8 x 52.3
The Flume	Proven Selections	Major	3 July	26.9 x 38.9
Tilt A Whirl	unbranded	Early only	17 July	43.0 x 42.3
Trailing Plum	The Flower Fields	Minor	31 July	36.0 x 59.3
Trailing Purple Heart	unbranded	None	31 July	41.1 x 74.3
Twist and Twirl	Proven Selections	Intermediate	31 July	54.2 x 55.7
Velvet Mocha	Proven Selections	Early only	None	41.9 x 61.0
Watermelon	PanAmerican Seed	Major	14 Aug	24.8 x 26.9
Witch Doctor	The Flower Fields	Early only	None	44.7 x 35.6
Wizard Coral Sunrise	PanAmerican Seed	Major	3 July	18.4 x 22.6
Wizard Golden	PanAmerican Seed	Major	None	11.6 x 17.1
Wizard Sunset	PanAmerican Seed	Minor	14 Aug	33.2 x 40.9
Wizard Velvet Red	PanAmerican Seed	Intermediate	31 July	36.2 x 44.0

[1] Cultivars from PanAmerican Seed and Ball Horticultural Company were grown from seed; all others were grown from cuttings.
[2] Cultivars listed as "unbranded" were received as unrooted cuttings and planted into the field as 606 pack plants; all others were planted into the field as 4-inch pot plants.
[3] Plant size information reports height of foliage, not foliage-plus-flowers.

Cultivars were rated "None" if they never displayed sunscald; "Early only" if they displayed sunscald only on the first date (July 3); "Minor" if they displayed sunscald on just one of rating dates 2-5; "Intermediate" if they displayed unscald on 2-3 dates; or "Major" if they displayed sunscald on 4-5 dates.
Flowering was noted on each of the five data collection dates. Table 1 reports those cultivars that did not develop any flowers over the course of the season, and the first date that flowers were observed on those cultivars that did produce flowers.

Height and width values presented in Table 1 are averages of six plants of each cultivar.

Discussion

This one-season field study evaluated all of the coleus under the same conditions. Depending on local conditions, these same cultivars might reach different sizes, display different levels of sunscald and perhaps flower at different dates, but these data provide a starting point for selecting cultivars for various uses.

Some specific recommendations concerning sunscald include:

● Cultivars listed as displaying "none," "early only" or "minor" sunscald are good candidates for full sun locations.

● Cultivars listed as displaying "early only" sunscald most likely developed that sunscald during the hardening-off process, as the greenhouse in which they were grown to transplant size did not provide full light. These cultivars might be grown in brighter light, or hardened off more gradually, to avoid sunscald.

● Plants listed as displaying "major" sunscald will perform better if planted in shaded locations.

Some specific recommendations concerning flowers include:

● Cultivars listed as having no flowers, and those that developed flowers only in mid-to-late August would be good suggestions for low maintenance gardens and landscapes where deadheading is not an option.

● Cultivars that produced flowers as early as July are better suited to higher-maintenance gardens where deadheading is included in routine maintenance. It is possible that these cultivars might not flower as early when grown in more shaded sites, but this was not evaluated in this study.

Some specific recommendations concerning plant size include:

● Nearly all of the coleus cultivars in this study were wider than tall by late August, and would be good candidates for containers or bedding. Garden center personnel might develop plant spacing recommendations based on these dimensions.

● A few of the coleus cultivars in this study are much wider than tall, and would be useful in hanging baskets or other containers in which they can display a spreading, trailing habit.

More Information

Your garden customers might enjoy Ray Rogers' new book, "Coleus: Rainbow Foliage for Containers and Gardens", published by Timber Press in 2008. A related website, http://coleussociety.org/index.html, provides a forum for discussion among coleus enthusiasts.

If you'd like to see pictures of the coleus cultivars in this study, go to http://www.google.com, click on the "images" option, then enter the name of the cultivar plus the word "coleus", and click on "search images".

If you're interested in finding unusual coleus cultivars, check http://www.Coleusfinder.org, a search engine that lists 1433 cultivars of coleus, displays 1115 photos, and connects with 44 suppliers.

And, stay tuned for more information. University of Maine graduate student Kate Garland has taken the coleus project into the greenhouse this winter. She is evaluating how light level impacts foliar variegation of two coleus cultivars. She's growing 'Kong Red' and 'Wizard Sunset' coleus plants under 0, 30, 60, and 90% shade. Throughout her experiment, she's measuring growth patterns. Later, she'll evaluate digital images of leaves in Adobe Photoshop to determine the total percentage of leaf area that is variegated. This technique has been successfully used to evaluate the effect of light intensity on patterns of variegation in other popular foliage crops such as *Hedera*, *Dracaena*, and *Peperomia*. Through this study, Kate hopes to provide growers with specific light recommendations for producing high quality, uniform plants.

Acknowledgements

This project was funded by New England Floriculture, Inc., sponsors of the New England Greenhouse Conference. Thanks to summer student workers Aaron Fitzpatrick, Kate Garland, Jeff Hake and Emily Palmer; Extension Professors Gleason Gray and John Jemison; and consultant Phil Stack for their assistance in installing and maintaining plants and collecting data. Thanks to the following companies for supplying seeds and vegetative cuttings for this project: Ball Horticultural Company; D.S. Cole, Loudon NH; Four Star Greenhouse, Carleton MI; Pleasant View Gardens, Loudon NH; and The Flower Fields, Encinitas CA

Contact UMass Floriculture Extension Staff

Douglas Cox	Floral Notes Editor	dcox@pssci.umass.edu
Tina Smith	Outreach Educator	tsmith@umext.umass.edu
Paul Lopes	Outreach Educator	lopes@umext.umass.edu