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Using Coralbells as Cut Flowers

Dr. Susan S. Han, Plant, Soil and Insect Science
University of Massachusetts-Amherst

Heuchera, commonly known as coralbells, is a popular garden perennial. There are many different species available on the market, all of which are native to North America. The slender scapes bear open clusters of flower buds of different colors, ranging from white to greenish white, pink, crimson, scarlet, and red. Opening of the flowers buds typically starts from the base of each branch and continues toward the tip resulting in an attractive inflorescence that could be used as a filler in floral arrangement.

Coralbells can be forced to flower in the greenhouse year round by placing mature plants (plants that are 10 month from seeding) in a 40 F cooler for 10 to 12 weeks. Following the cold treatment, plants should be moved to the greenhouse for forcing. The first buds on the inflorescence open 6 to 9 weeks after transfer to a greenhouse with 62 F night temperature. The forcing time varies depending on cultivar, environmental conditions, and length of the vernalization treatment. The size of the plants at the time of the cold treatment and the duration of the cold treatment will determine the number of inflorescences produced by each plant.

At the University of Massachusetts, we evaluated the postharvest quality of cut coralbells. Plants of two cultivars, 'Splendens' and 'Bressingham', were started from seed and the cold treatment was applied to plants as previously described. In this study, there was an average of 57 and 86 buds per inflorescence for 'Splendens' and 'Bressingham', respectively, which were harvested from the greenhouse at the predetermined stage of development. They were then placed individually in test tubes containing preservative solutions or water (for comparison) and the postharvest quality of the cut stems was evaluated in a 70 F interior room illuminated for 12 hours a day with a cool-white fluorescent lamp. The inflorescence were examined daily and the vase life of each inflorescence was considered terminated when the number of senescing flowers on the inflorescence exceeded that of the open flowers. We investigated several factors that affect postharvest quality of cut flowers, including the optimum harvesting stage, the concentration of sucrose in the preservative, and the effects of ethylene.

Harvesting stage and preservatives

Like many other cut flowers, the harvesting stage of the inflorescence determines the vase life of the cut stems. In coralbells, all flower buds on inflorescences with more than 70% of the buds open at harvest continued to develop when placed in water. The vase life of the inflorescence, however, was only 4 to 6 days. Inflorescences that were harvested at an earlier stage (1 to 2 buds opened on each axillary branch), however, had a vase life of 16 days for 'Splendens'

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and 9 days for 'Bressingham' if proper postharvest treatments were provided. However when placed in water, buds on these inflorescences did not open or develop and open flowers abscised rapidly if they were placed in water, resulting in a vase life (defined previously) of approximately 4 days. As in the case of other species of cut flowers harvested with developing flower buds, the continuous development of immature buds requires a supply of carbohydrates. Carbohydrate is limited in the leafless, slender scapes, therefore, when the cut stems were placed in preservative solutions containing a small amount of sugar and a biocide, the vase life significantly increased. Our studies revealed that sugar concentration of 0.5 to 1% (approximately 1-2 teaspoons of sugar per quart of water) was sufficient for the opening of all flower buds. The quality as well as the vase life of the cut inflorescences was significantly improved. Too much sugar (>2%), however, was detrimental to coralbells and resulted in collapsed stems.

Most of the commercially available preservatives, when properly mixed, contain 1 to 2% sugars. Therefore, when commercial preservatives are used, it is critical that a small-scale experiment be conducted. Place the cut inflorescences in a solution that is prepared according to the directions provided by the manufacturer of the preservative. Compare the postharvest quality of the inflorescences to those placed in water. You should expect the postharvest life of cut stems in the preservative solution to be significantly higher than those placed in water. If stem collapse occurs on cut coralbells that are placed in a flower food solution, it is an indication that the solution contains too much sugar. In this case, you should test other commercially available flower food or prepare your own preservative solution. In no circumstances would you reduce the amount of flower food added to the solution as it has been demonstrated that flower food solutions that are made too weak can reduce the postharvest life of cut flowers.

Ethylene and ethylene inhibitors

During the early phase of our investigation, we learned that a large number of flower buds abscised a few days after placing the cut stems in an interior environment that was free of ethylene pollution. This phenomenon suggested that ethylene might be produced by the cut coralbells and that pretreatment with ethylene inhibitors might be necessary. Silver thiosulfate (STS) was the only ethylene inhibitor available commercially at the time of the study. Silver thiosulfate was and still is used to treat many species of cut flowers that are sensitive to ethylene. Treatment with STS completely prevents the damaging effects of ethylene and ensures that flowers have a satisfactory vase life. We treated cut coralbells with 4mm (standard concentration of STS used in treating cut flowers) for 4 hours and found that the treatment completely prevented the bud abscission. Buds on the STS-treated inflorescences, however, did not develop and shriveled if the inflorescences were placed in a solution with no sugar. In contrast, when placed in preservative solution containing 0.5 to 1% of sugars (and a biocide), all flower buds opened and the vase life of the stems was significantly improved. In addition, we also demonstrated that coralbells are very sensitive to ethylene gas in the environment. An exposure to ethylene caused all of the open flowers to senesce and the buds to abscise. Once again, treatment with STS completely blocked the damaging effects of ethylene and the buds developed into flowers as long as the stems are placed in a solution containing sugar and a biocide.

Another ethylene inhibitor was introduced after we completed our study. EthylBloc, containing 1-methylcyclopropene (1-MCP), is as effective as STS in preventing the negative effects of ethylene on most cut flowers. EthylBloc is a safe product to the environment and mammals and is the preferred inhibitor to use. STS, on the other hand, contains silver and strict protocols should be followed regarding the disposal of unused solution. One benefit of STS is that one application is sufficient to protect the cut flowers for the entire display life. Repeated applications, however, might be required if cut stems containing a large number of developing buds are treated with 1-MCP. The application methods of both inhibitors are different. STS is a solution and cut flowers are placed in the solution for a predetermined amount of time. EthylBloc is a powder and when it is in contact with water, it will release the inhibitor in a gaseous form. Therefore, EthylBloc should be applied in a sealed environment. In order to simplify the application method, the manufacturer of EthylBloc has developed a new packaging method in which a fixed amount of EthylBloc is sealed in each sachet. All the user needs to do is to place cut flowers in a shipping box, wet the sachet, place it inside the box, and put the cover on the shipping box. In a few hours, all of the cut stems are treated with the ethylene inhibitor and the cut stems are protected from ethylene that is produced by the flowers or other sources. The cost of the EthylBloc sachet for treating a full box of flowers is about $0.40 and the result is a significant increase in vase life of all ethylene-sensitive cut species.

In conclusion, cut coralbells which contain open clusters of flower buds of many different colors can be used as filler flowers in floral arrangements. The minimum harvesting stage (defined as the stage at which buds on the stems will continue to develop with proper postharvest treatment, resulting in a satisfactory vase life) of coralbells

is when 2-3% of the flower buds are opened (1 open flower bud per axillary branch). When harvested at this stage, the inflorescence should be treated with an ethylene inhibitor and then placed in a preservative solution containing 0.5 to 1% sugars and a biocide. Without the preservative, the large number of immature buds on the stem will not develop. In addition, inflorescences can be harvested at a later stage when most of the buds are open. At this stage, inflorescence should be treated with an ethylene inhibitor but the use of sugars in the vase solution is optional. Adding sugars to the vase solution, however, will improve the quality of the inflorescence by enhancing the color of the petals and increasing the number and size of flowers.

Powdery Mildews in the Greenhouse

Leanne Pundt, Extension Educator, University of Connecticut

Introduction

Powdery mildew is one of the most common diseases in greenhouse production. Some greenhouse crops prone to infection include African violet, begonia, dahlia, gerbera daisy, hydrangea, verbena, roses, kalanchoe and poinsettia. Many herbaceous perennials such as aster, centaurea, coreopsis, delphinum, monarda, phlox, rudbeckia and sedum may become infected. Herbs such as rosemary, sage, St. Johnswort, and mint as well as greenhouse tomatoes and cucumbers may become infected with this disease. Although powdery mildews rarely kill a plant, they reduce the aesthetic value and salability of the diseased plants.

Symptoms

Powdery mildew is easily recognized by its white talcum-like growth. Symptoms may appear first on the upper leaf surface, but they can also develop on the lower leaves. When symptoms develop on the more mature leaves, powdery mildew is harder to detect and seems to occur "overnight," catching many growers unaware. As soon as favorable environmental conditions develop, powdery mildew develops into an epidemic as more leaves become infected.

Causal Organisms and Disease Development

Powdery mildews generally look alike so it is a common misconception that they are all caused by the same fungus. But, different types of fungi such as *Erysiphe, Leveillula, Microsphaera* and *Spaerotheca* may occur in the greenhouse. All of these fungi are obligate parasites that need a living plant host in order to complete their life cycle. They usually survive in the greenhouse on crop or weed hosts.

Powdery mildews can attack healthy, vigorously growing plants. *Erysiphe* has a broad host range and attacks many members of the Aster family. Sometimes, mildews are relatively host specific. For example, *Sphaerotheca violae* only attacks Viola. If you are growing a diverse mix of herbaceous perennials in the greenhouse, it is helpful to know the type of powdery mildew so you can better determine the potential spread of the disease to your crops. This will make scouting easier.

Powdery mildew, unlike many foliar diseases, does not need free moisture on the leaf to thrive. Favorable environmental conditions include high relative humidity (greater than 95%), moderate temperatures of between 68 to 86 F and relatively low light levels. Infections may be more common in the spring and fall when changes between the day and night temperatures encourage high relative humidity levels, especially at night.

Spores (conidia) are produced in chains. Air currents and water splash in the greenhouse easily move these spores. The spores germinate and thread-like strands (hyphae) grow along the leaf tissue. Powdery mildews obtain plant nutrients by sending feeding organs (haustoria) into the epidermis. Once a spore lands on a plant, it may take as little as 3 days but more often five to 7 days for infection to develop.

Prevention

Maintain proper plant spacing to reduce relative humidity levels within the plant canopy. (This will also help you gain better spray coverage). Keep relative humidity levels below 93 percent in the greenhouse. Heat and ventilate in the late afternoon and early morning to reduce high relatively humidity at night. Clean your greenhouse thoroughly between crops, removing all weeds that could be potential hosts.

Most ornamental crops are not selected for pest resistance. However, some resistant cultivars are available. Resistant pansy cultivars are Delta Pure Rose and Bingo Deep Purple. The Profusion series of zinnia is also resistant to powdery mildew. Many different cultivars of Monarda are resistant, such as ‘Jacob Cline’, ‘Little Siberia’ ‘Marshalls Delight’. The Phlox cultivars ‘David’, ‘EcoPastel Dream’ ‘Frosted Elegance’, ‘Miss Lingard’, ‘Norah Leigh’ and ‘Speed Limit 45’ are also resistant. Certain cultivars of gerbera daisy including ‘Terrafame’ tend to be more resistant. Verbena cultivars also vary greatly in their susceptibility to powdery mildew.

Monitoring

Begin scouting early and as often as you can, at least once a week and more often, every two to three days, if possible. Look for the fluffy, talcum-like, powdery colonies especially on the upper surfaces of leaves. Stems and flowers may also be attacked. On kalanchoe and sedum, brown scab-like lesions develop with little

powdery growth. From a distance, it looks like a leaf spot disease or perhaps spray injury. On greenhouse tomatoes, fungal growth is very sparse and easily overlooked. Use a 10x-hand lens to look for whitish threads radiating out from a central point or for chains of spores. Spray residue does not appear as fluffy and tends to have more of a droplet like outline. If powdery mildew develops on the lower surface, you may see a small, yellow spot on the upper surface on poinsettia and other crops.

Powdery mildew may first be detected in locations with more changes between day and night temperatures. Hanging baskets or plants near the vents may first develop powdery mildew. Flag the affected area so you can easily revisit the plants after sprays have been applied. If only a low level of disease is detected, remove infected leaves or plants. Because the spores are so easily airborne, carry a plastic bag and carefully place the infected material into the bag.

Chemical Controls

Powdery mildews only colonize the upper layer of cells, so chemical eradication is possible. You do not need to spray preventatively for powdery mildew, but you do need to spray as soon as the disease is detected. Rotate among fungicide classes to discourage development of resistance. See the most recent edition of the New England Greenhouse Floriculture Guide: A Management Guide for Insects, Diseases, Weeds and Growth Regulators for more specific up-to-date recommendations.

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16th Annual Massachusetts Flower Growers' Association Benefit Golf Tournament

MFGA is again sponsoring a benefit golf tournament, to be held on Tuesday, August 7, 2007 at the Juniper Hill Country Club in Northborough.

This year the Association is dedicating the tournament in memory of Bill Randall, former MFGA President and owner of FAF Growers, Inc. in Northfield. Bill was a great supporter of the our organization and programs. It is an honor to dedicate this tournament in his memory.

If you would like to help sponsor the event contact the Association office at 781-275-4811. Everyone is certainly welcome to join us on this day in August.

Massachusetts Department of Agricultural Resources - News Update

Energy Efficiency/Energy Conservation/Renewable Energy

In the coming months, the Massachusetts Department of Agricultural Resources (MDAR) will be increasing its involvement in regard to energy efficiency, energy conservation and renewable energy opportunities for the agricultural community. To that end, MDAR recently hired a renewable energy coordinator, Gerry Palano, whose primary function will be to "cultivate" the greening of our farming industry, as a means to reduce both energy costs and environmental pollution, through energy efficiency and renewable energy applications. MDAR looks forward to working with numbers of Massachusetts Flower Growers Association on this very important project.

If you have any questions please feel free to contact:

Gerry Palano, Renewable Energy Coordinator, Massachusetts Department of Agricultural Resources, 251 Causeway Street, Suite 500, Boston, MA 02114

Gerald.Palano@state.ma.us Tel: 617.626.1706

Potential Greenhouse Opportunity?

The Massachusetts Department of Agricultural Resources (MDAR) has been made aware of a proposed biomass power plant project in Russell, MA. The 50 megawatt electric generating plant will use wood chips as a fuel and operate year round as a base plant feeding into the electric grid. The project is in the final stages of permit approvals and hoping to begin construction by mid-2008 and be on-line by mid-2010.

The proposed project is interested in any ventures that could utilize the year round waste heat generated from this process, including greenhouses. If you have any thoughts or interests or would like to find out more regarding this matter, please contact:

William B. Hull, CEO, Hull Forest Products, Inc., 101 Hampton Road, Pomfret Center, CT 06259

FREE - Agricultural Chemical Collections for Massachusetts Producers of Agricultural Products

FREE collections of agricultural chemicals for Massachusetts producers of agricultural products are being sponsored by Cape Cod Cooperative Extension, collaborating with the Massachusetts Department of Agricultural Resources and Enviro-Safe Corporation. Dispose of no longer registered and unused agricultural chemicals while there is no cost to you!

In order to participate, participants will need to complete the DISPOSAL RESPONSE FORM and return it two weeks before the collection date.

Participate in any of the collections on the 2007 schedule of collections, but transport no more than 55 gallons or 440 pounds of product at one time. Information about accumulation, storage and transportation of hazardous materials is on our website capecodextension.org/agpest.

Contact Marilyn B. Lopes, Extension Educator, Water Quality, Cape Cod Cooperative Extension, PO Box 367 Barnstable, MA 02630-0367. Phone: 508-375-6699 Cell: 774-487-8802; Fax: 508-362-4518; E-mail: mlopes@umext.umass.edu

Dates to Remember

Ohio Short Course
July 14-17, 2007
Columbus, Ohio

MFGA/MNLA Field Day
July 18, 2007
Tower Hill Botanic Garden
Boylston, MA

MFGA Golf Tournament
August 7, 2007
Juniper Hill Country Club
Northboro, MA

Greenhouse Experience and Pest Management Conference
September 9-12, 2007
Cleveland, Ohio