MASSACHUSETTS FLOWER GROWERS' ASSOCIATION
Growers of Quality Plants and Flowers
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The
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A few thoughts on how to deal with high heating costs

by Dr. Claudio Pasian
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During the last two years, growers' worries and complaints have grown as fuel prices have climbed. Some growers have even told me that they would not be able to survive if energy costs keep rising. With present energy costs, growers may have to adopt many of the energy saving techniques that were developed during the seventies and, to some extent, forgotten during times of bonanza.

The amount of fuel used to maintain a given temperature in the greenhouse depends on many internal and external factors. However, a "rule of thumb" indicates that for each degree Fahrenheit we reduce the greenhouse temperature, we reduce the cost of heating by 3%. If this rule is true, even modest reductions in greenhouse temperatures can produce substantial energy savings. Growers are always tempted to lower the temperatures on their thermostats.

The question is: can we reduce greenhouse temperatures and still produce high quality crops? The answer to this question is yes, no and it depends. Very clear, right? Some crops like vincas and begonias suffer at lower temperatures and take too long to reach shipping size. Crops like nemesias and trailing snapdragons may actually reward lower temperatures with improved flowering. Other crops, like osteospermums, require low temperature for flowering by a process called vernalization. But, in addition to lowering temperatures, what other options do growers have? We'll discuss a few of them in this article. Before I proceed, I would like to call to the attention of the readers that I will provide information about the response of crops to low temperature as the literature has presented it through many years. Cultivar specific responses can be different to the general response of a crop. As a consequence, growers are advised to contact the breeders for cultural information before growing large quantities of plants at temperatures lower than those described in the literature.

Compartmentalization

During winter and spring in the US, it is very rare to enter a greenhouse and find it filled with a single crop. Most likely, in the greenhouses growers have a variety of crops all with different requirements of temperature, watering, pH, etc. Creating compartments in a large

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greenhouse or using different separate structures to house crops with different temperature requirements represents a way of saving fuel with crops that tolerate low temperatures and even increasing quality for crops that prefer it warmer. (There are reasons other than temperature that growers should compartmentalize their production facilities but that will be the topic for another article.)

Lowering Temperature

Your snapdragons, osteospermums, cyclamens, dianthus, etc. can be grown in a separate house or section at a lower temperature. However, remember, "There is no free lunch". Temperature affects development (or the aging process of the plant): the lower the temperature, the longer it takes a plant to complete its life cycle. In other words, it will take longer for a plant to be ready for sale at lower temperatures. You have to take this into consideration when making the decision of lowering greenhouse temperature: you may be heating less for a longer time. Lowering the growing temperature of a warm crop (e.g. vinca), will have a greater impact on timing (take longer to selling stage) than the same temperature reduction on a cool crop (e.g. petunias).

Avoid reducing temperature at critical stages of plant development such as germination, floral initiation, and floral development. For example poinsettia bract growth is better at temperatures above 68° F. Usually, towards the end of the crop cycle, temperature reductions are positive since they allow the grower to maintain the crop in the greenhouse for a longer time and produce its hardening before the crop is sent out. For example, marigolds can be grown at 60° F but can be hardened at 50° F; pansies can be grown at 55° F and hardened at 45° F. As a rule of thumb, hardening can be achieved at temperatures 10° F below growing normal temperatures for many crops. At least for a few days before selling the crop, growers can have some energy savings.

Lowering Night Temperature

Growers are tempted to lower the thermostat at night because is when they see the heaters work the most. The result is a larger difference of temperature between the day and night or in other words a larger +DIF which may result in stretching. To avoid stretched and low quality plants, more plant growth regulators will have to be used. If you plan to reduce greenhouse temperature, reduce BOTH day and night temperatures trying to maintain the smallest +DIF possible. Again, this still will result in longer growing times.

Don't Keep Your Crops on the Floor

This advice is for all soils but specially for those that are unheated. If putting the crops on benches is not feasible (bedding plants growers usually have many flats directly on the floor), at the very least, flats should be raised 3 or 4 inches from the soil surface. Unheated soils are usually colder than the greenhouse air. It takes more energy to warm up the roots of plants that are sitting on the soil than those that are separated from it. In addition, warmer roots are less prone to diseases.

Use Bottom Heat and/or Thermal Blankets

Bottom heat puts the heat near the plants. It keeps roots and foliage warm without heating the large volume of air of the greenhouse. There are different systems using this principle. Initial installation cost may be an issue for some growers. Additional benefits of this heating method is that it keeps the plants dry even when the greenhouse temperature is reduced. avoiding some diseases such as *Botrytis.*

Thermal blankets are one of the most effective tools for greenhouse environmental control. They can be used to reduce temperatures during the day and keep the heat inside the greenhouse at night. This tool also has a high installation cost.

Cultivar Selection and Scheduling

Although limited, growers have the option of selecting shorter cycle crops (fewer weeks from start to finish) and/or crops that grow at lower temperatures. Crops that grow faster can be sown and planted later requiring fewer days of heating. These faster crops/cultivars will make use of the higher levels of light and possible higher temperatures later in the growing season. Scheduling can become a tool for energy saving.

Proper Use of Spacing

Keep the crop in a small area when the crop is small and plants can be kept pot to pot and then, progressively, open and heat new areas (greenhouses or sections of a greenhouse) when the crop has to be spaced because of its growth. In this case it is very important to make efficient use of greenhouse space. If benches have to be used, movable benches are probably the best. Also, how plants are distributed on benches is very important: staggering pots is more efficient that placing them in rows. It is possible to put 15% more pots by staggering than by standard row spacing.

Preheat Irrigation Water

If greenhouse temperatures are be lowered to conserve fuel, preheating irrigation water becomes very important. Depending on the crop, low temperatures may reduce root activity and absorption of nutrients may stop. Furthermore, low temperatures may stress roots and make them more susceptible to diseases.

Grow Cool-crops

Assuming that crops that can be grown cool can also be sold profitably, switching to them should make sense. However, proper consideration of the length of the growing cycle (crop timing) and quality of the crop grown

at lower temperatures should be taken into consideration before deciding. It may not be an advantage to heat less for a longer time! Many bedding plant growers have multiple cycles of a given crop. Growing crops colder may interfere with how many crop cycles they can obtain from a given area. These types of decisions require growers to have a good idea of the costs of production of each one of their crops. Unfortunately, not all growers have a handle on this issue.

The following is a list of crops that can be grown at cooler temperatures (below 60° F). A few of these can be grown at temperatures in the lower fifties. Some are "old" and well-known crops. Others have become popular more recently.

Alstroemeria	Delphinium	Osteospermum
Alyssum	Dianthus	Pansy
Anemone	Diascia	Primula
Argyranthemum	Dill	Ranunculus
Aquilegia	Freesia	Schizanthus
Bracteantha	Fuchsia (some cv.)	Snapdragons
Calceolaria	Gazania	Statice
Calendula	Iris	Torenia
Centaurea	Matthiola	Tulip
Coreopsis	Nemesia	Veronica
		Viola

Greenhouse Weatherization

A typical greenhouse structure contains heat as efficiently as a colander contains water. Of the many ways heat escapes a greenhouse, some can be eliminated or substantially reduced. It is imperative for growers to seal holes in the polyethylene film and cracks in the walls. Doors and vents that do not shut properly should be repaired. Walls that are not made of translucent materials should be insulated. Metals conduct heat so all metal parts having contact between the greenhouse interior and exterior should be insulated. For example, metal gutters of gutter-connected greenhouses have one surface on the (warm) interior and the other surface on the (cold) exterior. Some growers insulate the interior surface of gutters with foam to reduce heat loss. One word of caution before improving insulation: growers located in climates with heavy snow falls benefit from their heat inefficiency because snow melts fast on their greenhouse roofs. If snow does not melt and accumulates on the roof, the greenhouse can collapse due to snow weight.

There are good sources of information on how to weatherize greenhouses, for example the website of the National Greenhouse Manufacturers Association (www.NGMA.com).

Conclusions

Growers should be careful when reducing greenhouse growing temperatures in order to save fuel – especially night temperatures. The two most reasonable approaches are to compartmentalize and to make an effort to reduce heat losses by greenhouse weatherization. In addition, changing/adopting some of the crop management practices described above should help growers conserve energy without sacrificing crop quality.

Combat Higher Fuel Prices with Efficient Heating Systems

by John Bartok, University of Connecticut

Heating fuel prices have continued to rise over the past few years. How high they will go will depend on many factors including the world fuel supply situation, demand, level of inflation and the weather. Good energy conservation measures can help to offset this increase and keep production costs under control.

Keeping the greenhouse heating system in peak operating condition is a good starting point. It can save by increasing efficiency, providing more uniform temperature in the growing area, reducing service calls and letting you sleep through the night.

Fuel

Protect fuel tanks - Twenty percent of all service calls result from dirty fuel or problems related to the flow of the fuel. Tanks should be located away from dusty locations and water tight fittings should be used. Outdoor tanks should be protected from harsh winter weather with an enclosure.

Have all heating units serviced before winter – The efficiency of most greenhouse heating systems can be improved by at least 5%. A first step towards this is to have a competent service person clean and adjust all furnaces and boilers before the start of the heating season. This should include:

Oil furnaces

- Changing the fuel filter on oil furnaces. It is surprising how much sludge and dirt collects in the fuel.
- Replace the nozzle. Wear increases the nozzle orifice opening increasing fuel usage. Select a nozzle with the correct spray angle to fit the firebox. Follow the manufacturers' recommendations.
- Replace and adjust electrodes
- Inspect safety controls including cad cell sensor, transformer, limit switch and fan control.

Gas furnaces

- On natural gas units, check gas inlet and manifold pressure to make sure it is properly set.

- On propane units check gas regulators for proper pressure settings and to be certain the regulator and gas port vents are not plugged
- Tank relief valves should be replaced every 5 to 10 years.
- On larger systems an evaporator or vaporizer converts the liquid propane into the gaseous state. These heaters with safety valves and flame supervisor need to be checked and maintained
- The mixer, a valve which combines propane gas with atmospheric air should be serviced and tested to manufacturers' recommendations. It is best to operate the furnace on a monthly basis during the year to check for problems.

Heat Exchanger

Soot should be removed from heat exchanger surfaces. A 1/8-inch soot deposit can increase fuel consumption by as much as 10%. Brush and vacuum surfaces or clean them with special cleaning compounds.

Exterior heat exchange surfaces, such as tubes, fins and radiators collect considerable dust and dirt in a greenhouse atmosphere. Brush and vacuum surfaces to increase heat output. Clean blowers for efficient air movement.

Drain off dirty water in steam and hot water systems. Analyze boiler water periodically to determine if treatment is needed.

Combustion Efficiency

Efficiency testing of a furnace or boiler is a 10 minute procedure that can indicate when problems begin to occur. It is the key to saving money on the heating bill. Increasing efficiency one or two percent can significantly reduce fuel consumption over the year. For example, a 2% increase in efficiency of a million Btu/hr burner operating 3300 hours from September to May will save about 650 gallons of fuel oil. This is quite realistic based on efficiency tests conducted on greenhouse heating equipment in Connecticut and Massachusetts.

Combustion Air

The combustion process combines the carbon in the fuel with the oxygen in the air. The lack of adequate oxygen results in incomplete combustion and carbon buildup. A 400,000 Btu/hr furnace will require about 100 cu ft of air/minute to operate efficiently. In tight poly and glass greenhouses, a makeup air supply of 1 sq in of intake area/2000 Btu/hr burner input should be available from a pipe or louver through the endwall unless a separated-combustion heater is installed. These are installed with a direct connection to outside air.

Flue pipe connections should be tight and the chimney should extend at least 2' above the ridge of the greenhouse. The top of the chimney should be at least 8' above the combustion chamber and have a cap to prevent backdrafts and possible air pollution injury to plants.

Controls

Accurate controls are important to achieve high efficiency. The payback of replacing an old mechanical thermostat with a new electronic thermostats having a +/- 1 degree F differential is very short. The sensor should be shielded and aspirated with a small fan to quickly sense changes in the environment.

Heat Distribution

Air circulation will reduce temperature stratification in the greenhouse. Installing horizontal air flow (HAF) fans that move the air at 50 to 100 feet/min can limit temperature differences to no more than 2 degrees at any point in the growing area. Use 1/10 th horsepower circulating fans located 40' to 50' apart to create a circular flow pattern.

Publication

A 100 page handbook "Energy Conservation for Commercial Greenhouses" – NRAES-3 gives many helpful hints and suggestions for saving energy in your greenhouses this winter. Copies are available for $20 including shipping and handling from the University of Connecticut , NRME Dept., 1376 Storrs Road, Storrs CT 06269-4087. Make check payable to University of Connecticut.

MFGA Contestants Earn Greenbacks

One green thumb can get you hundreds of greenbacks. Just ask the winners of this year's Massachusetts Flower Growers' Association "Love My Garden" home flower garden contest. The MFGA announced the winners of its summer-long "Love My Garden" contest, awarding gardeners throughout the state with more than $1500.00 in garden center gift certificates.

Rose Macrina of Brockton was named top winner for her home flower garden from a field of over 100 entries from across Massachusetts. Another Brockton gardener, Mary Jones, was also named a winner in the contest, taking third place. Ms. Macrina was awarded a $500.00 gift certificate to one of the local MFGA-member-owned independent farm stands or garden centers, and Ms. Jones received a $300.00 gift certificate.

Rose and Frank Macrina – "Love My Garden" Contest Winners

The "Love My Garden" contest was open to all Massachusetts residents over the age of 18 and drew entries from over 75 cities and towns statewide. Contestants were asked to send in one photograph of their beloved home flower garden for judging.

Choosing the winners was an extremely difficult task," said Bob Luczai, secretary of the Massachusetts Flower Growers' Association. "The response was absolutely amazing, and each entry had its own unique beauty. It was really wonderful to see all of the obvious time, hard work and creativity that each entrant put into his or her garden."

He continued, "All members of the MFGA also want to sincerely thank everyone who participated in this year's "Love My Garden" contest. We look forward to announcing the second annual garden contest and watching for the photos of the beautiful gardens created by Massachusetts residents using Massachusetts-grown flowers and plants."

Mr. Luczai said that Ms. Macrina's flower garden was loved by the judges for a number of reasons including the variety of plant material used, the seasonality and vibrant color of her flower and plant selections, the effective use of a small lot, the creative use of flowers including containers and garden beds and finally, Ms. Macrina's obvious enthusiasm and love for gardening with Massachusetts-grown flowers and plants. Ms. Jones' colorful mixed perennial garden showed a good use of both containers and hanging baskets to complement the outdoor living area, noted judges when announcing their decision.

In addition to bragging rights until next year's "Love My Garden" contest, all winners received gift certificates in varying amounts to their local MFGA-member-owned independent farm stands or garden centers. Second place winner was Jean Shaw of Middleboro, Judith Dupont of East Falmouth took fourth place and Monica Kent of Chelmsford was chosen as the fifth place winner.

Visit the MFGA web site at www.massflowergrowers.com to see photos of all the winning entries.

"The response was really a testament to the pride and enjoyment Massachusetts residents take in their home flower gardens," Mr. Luczai said. "I think it was a fun competition for everyone involved. We plan to make it an annual event and hope that even more gardeners will participate next year."

The Association held the contest in an effort to raise awareness of the beauty and happiness Massachusetts-grown flowers bring to our lives and the importance of supporting our local independent garden centers and farm stands. The Massachusetts floriculture industry is the state's largest agricultural industry with more than 800 businesses offering Massachusetts-grown plants and flowers.

The industry plays a large role in the Massachusetts economy, generating an estimated $763 million from Massachusetts plant and flower sales each year.

The Massachusetts Flower Growers' Association was established in 1947 for promotion of the Massachusetts floriculture industry. With over 200 members, the nonprofit is comprised of flower growers and associated tradesmen. The Association represents the state's commercial industry with leadership in the areas of legislation, promotion and education. For more information about the Association and a directory of where to find Massachusetts-grown plants and flowers, please visit www.massflowergrowers.com.

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Finishing Tips for Poinsettia

by Ecke Ranch

As poinsettia crops enter the final stages of production, give special attention to cultural practices and greenhouse conditions that are appropriate for finishing the crops. The process of toning does not end until the plants have all been shipped.

Maintain normal temperatures (75-80°F/24-26°C day temperatures, 64-66°F/18-19°C night temperatures for most cultivars) throughout bract expansion and development. Higher day and night temperatures contribute to bract edge burn and premature cyathia drop. Until the plants have fully colored bracts (primary and secondary bracts), do not reduce temperatures on the crop. Avoid dropping temperatures below 58°F/14°C) after bract formation.

Maintain good ventilation and air circulation in the greenhouse to lower relative humidity to 90% or less. Bract edge burn can result from reduced root activity and restricted water uptake that occurs under conditions of high humidity. Conditions of high humidity favor *Botrytis* which can easily attack soft bract tissue during the final stages of development. Growers have found the use of horizontal airflow fans beneficial to enhance air movement, increase transpiration and even temperatures. Maintain good soil moisture management throughout the finishing stages of growth. Constantly wet soil will restrict root activity, increase the potential of root rot organisms, and result in softer plant tissue that is susceptible to damage.

Maintain full light intensities on the crop until primary bracts have fully colored and secondary bracts are near maturity. Any reduction of light before this stage will

reduce bract color and slow development. Shading to 2000 foot-candles/21,520 lux after the bracts have matured prevents fading and potential damage from sunburn.

Eliminate all fertilization 2-3 weeks before the crop becomes fully mature and ready for sale. Excessive soluble salts in the media contribute to bract damage and reduce post-production longevity.

Recent Changes and New Labels for Growth Regulators

by Richard McAvoy, University of Connecticut

Several new labels have been added for use on ornamental crops. One (Topflor) is a new PGR compound. The other labels represent alternative sources of existing materials. For example, Paczol contains the same active ingredient as Bonzi and Piccolo in the identical formulation and Concise is identical to Sumagic.

Similarly, Fresco is the same as Fascination; Dazide is identical to B-Nine; and Chlormequat E-Pro is an identical formulation to Cycocel. However, be aware that there are sometimes differences in label recommendations between identical products. For example Fascination has an expanded label that covers usage on annuals, perennials and poinsettia while Fresco only provides recommendations for use on lilies.

More information is available in the 2007-2008 New England Floriculture Guide –A Management Guide for Insects, Diseases, Weeds and Growth Regulators. See page 6 for details on order the guide.

University of Connecticut Poinsettia Cultivar Trials

Poinsettia cultivar trials are now underway with the newest and best cultivars from Dummen USA (Red Fox), Paul Ecke Ranch, Selecta First Class, Oglevee and Fischer USA.

An open house and grower evaluation will be held on Friday, November 17, 2006 from 10 AM to 4 PM at the Floriculture Greenhouses, Route 195 on the Storrs campus of University of Connecticut.

Growers can walk through the cultivar trials and evaluate varieties on their own. Handouts will be available, and University of Connecticut researchers will be available to answer questions. No charge to participate.

For more information, contact: Dr. Richard McAvoy, University of Connecticut, phone: 860-486-0627 or email: richard.mcavoy@uconn.edu or visit the web site: www.hort.uconn.edu/ipm.

MFGA Members

The 2007 MFGA Directory and Buyer's Guide is in the process of being completed. To guarantee their company listing in the new guide, members must respond to the questionnaire received in the mail. Contact the MFGA office if you have any questions at 781-275-4811.

As an Association member your probably know someone who should belong to MFGA. Consider passing along the enclosed information sheet and membership application to potential Association members.

Integrated Pest Management and Weed Management for Herbaceous Perennials

Sponsored by University of Massachusetts Extension, University of Connecticut Extension and Northeast SARE

January 16, 2007

Sturbridge Host Hotel, Sturbridge, MA

9:00 AM – 12:30 PM

Based upon her ten years experience working with herbaceous perennial growers in Connecticut, Leanne Pundt, University of Connecticut Extension will discuss how to develop an effective, practical IPM program, Extension Weed Specialist, Randall Prostak of the University of Massachusetts will present weed identification and management strategies for herbaceous perennials

Topics will include IPM strategies to control key insects, diseases and weeds for the major types of perennials produced, and new and emerging pests and diseases. Learn how to use cultural controls, natural biological controls and environmentally friendly pesticides to produce healthy perennials, whether you are propagating perennials, growing them on in your greenhouses, producing container-grown perennials outdoors or selling perennials from your retail garden center.

Registration is $25 per person, including educational materials and continental breakfast. Financial support is being provided with a grant from Northeast SARE. Three pesticide recertification credits (pending state approval).

For more information, contact: Tina M. Smith, University of Massachusetts, tsmith@umext.umass.edu 413-545-5306 or Paul Lopes, University of Massachusetts, 508-295-2212 x24, lopes@umext.umass.edu.

UMass Seven-Week Course on Integrated Pest Management for Greenhouse Crops

French Hall, University of Massachusetts-Amherst

Thursdays: February 1, 8, 15, 22, March 1, 8, 15, 2007

Tina Smith will be teaching a seven-week progressive course designed to provide basic, practical information on common greenhouse pests including identification, monitoring, and management strategies for greenhouse crops. Each session will include classroom lectures and hands-on experience in the greenhouse. For more information, contact Tina at 413-545-5306, email: tsmith@umext.umass.edu.

Sustainable Greenhouse Health Maintenance Program

The University of Massachusetts Extension Floriculture Program is now accepting registrations for one-to-one training for the 2007 spring crops season. This project is designed to assist growers in Massachusetts who have diversified farms that include greenhouses. Extension educators work one on one with growers, demonstrating the use of on-site disease test kits, pH and EC meters and helping growers identify pests and choose solutions to pest problems.

Farmers who have greenhouses growing spring crops are encouraged to call and arrange for a visit to their greenhouses. Cooperating growers will be required to provide information for a short survey and follow-up evaluation.

If you are interested in participating in the project, contact our office. The program will begin in mid-February and continue through May. Northeast SARE is providing funding for this project.

Paul Lopes, lopes@umext.umass.edu 508-295-2212 x 24 or Tina Smith, tsmith@umext.umass.edu 413-545-5306.

New England Greenhouse Conference and Expo

November 1, 2 and 3, 2006 Worcester, MA

2007 - 2008 New England Greenhouse Floriculture Guide - A Management Guide for Insects, Diseases, Weeds and Growth Regulators

The 2007-2008 New England Greenhouse Floriculture Guide will be available for sale at the New England Greenhouse Conference and Expo. This Guide is prepared every two years and published by New England Floriculture Inc. in cooperation with the six New England State Universities. This reference guide includes labeled products used in the greenhouse production of ornamental plants.

The Insect Management section outlines strategies for the biological control of common greenhouse pests, such as "Bio Control of Aphids, Fungus Gnats, Mites, Thrips and Whiteflies". The guide also includes complete information on growth regulators, weed and algae control and disease management of greenhouse crops.

The guide is prepared by faculty and staff involved in floriculture research and Extension at the six New England State Universities. It will be for sale at the New England Greenhouse Conference for a reduced conference rate of $15 per copy. After the conference, it will be available for $25 per copy.

Pesticide applicator recertification credits will be available for each day of the conference for the six New England States plus New York and Pennsylvania.

To purchase a guide directly send a check for $25.00 payable to New England Floriculture Inc., UMass Experiment Station, PO Box 569, East Wareham, MA 02538.

Contributions to MFGA

Cavicchio Greenhouses, Sudbury
Brox Farm, Dracut
Fairview Gardens, Northfield
Fairview Farms, Inc., Whately
J. Gilson Greenhouses, Inc., Groton
Heimlich Nurseries, Woburn
Herbal Acres, Lancaster
Horse & Buggy Feeds, Inc., Winchendon
Lakeview Nurseries, Lunenburg
Mount Greylock Greenhouses, Adams
Nunan Florist & Greenhouses, Inc., Georgetown
Quansett Nurseries, Inc. South Dartmouth
Ricky's Flower Market, Somerville
Rogers Spring Hill Garden Center, Ward Hill
Russell's Garden Center, Inc., Wayland
J. Shannon & Sons, Inc., Woburn
Simmons Farm & Greenhouse, Dunstable
Tilleys Flower Shop, Peabody
Tolman's Greenhouse, Berlin
Walsh's Greenhouse, Norfolk
Williams Trading Post, Middleboro