A Publication of the UMass Extension Greenhouse Crops & Floriculture Program

Floral Notes Newsletter

Volume 22, No. 6 www.umass.edu/umext/floriculture May-June 2010

In This Issue

New Greenhouse Update

The bidding process for new UMass greenhouses and headhouse to replace the nearly 100 year-old French Hall Greenhouses is underway and will be complete by the end of May. The new structures will be located adjacent to Bowditch Hall on the west side of campus. Construction will begin this summer following demolition of some miscellaneous small structures and site prep. The entire construction project is expected to be complete by this time next year (2011).

New construction will consist of two sections of commercial, gutter-connected, glass greenhouses totaling about 12,800 sq. ft. connected to a new headhouse. The headhouse will contain a staff office, two labs, a space for growth chambers, a classroom/potting room, a small shop, seed and bulb storage facilities, rest rooms, and many spaces housing electrical and mechanical support for the greenhouses.

The greenhouses will be equipped with advanced climate control systems including evaporative cooling, mechanical shade, HAF, HID lighting, and a humidification system all controlled and integrated with the heating and ventilation systems by computer. The new greenhouses and headhouse will be connected by an enclosed walkway to an existing 4,200 sq. ft. 1950s-era glasshouse which will get new benching and environmental control upgrades.

Upon completion the French greenhouses will be demolished to make way for a parking lot. When complete the new and upgraded complex will be, by far, the best greenhouses on campus and will support exciting teaching and research in the College of Natural Sciences for many years to come.

Growing an Energy- and Space-Efficient Poinsettia Crop

Editor's note: This piece is literature for growing Selecta poinsettias to save energy and space. The general principles can be applied to other poinsettia varieties meant for energy efficient production. However, for best success, growers should consult the specific recommendations from the propagators of the varieties they are growing.

A successful energy- and space-efficient poinsettia crop starts with the variety selection, correct planning, quality young plant material (rooted or unrooted cuttings), perfect planting conditions, and proper pinching.

A critical time is the vegetative crop period from planting until the beginning of short days (about two weeks into short days). This is the time a strong plant with proper height and a healthy root system needs to be built. Once you reach week 3 of the short day (or generative) crop period, it is all about finishing and saving. If you short-cut the vegetative crop period, cost savings and quality plants are more difficult to achieve.

The general growing practices vary slightly between a regular and a cool crop using energy-efficient Selecta varieties like Christmas Feelings series, Christmas Eve, and Christmas Carol series. The following recommendations will focus on the Christmas Feelings series and those differences (but can be applied to the above-listed varieties as well).

Planning

The Christmas Feelings series is a low vigor series and requires more time to grow before entering short days. In addition they don't grow much after the beginning of short days and don't stretch toward the end of the crop. Those are all good things, but they need to be considered during the planning process. Plant varieties in the Christmas Feelings series one to two weeks earlier compared to more vigorous varieties. The extra time is necessary to ensure height and overall plant quality.

Starting in week three after the beginning of short days, temperatures are much lower, reducing heating costs. The crop will be delayed by about one week, but the overall quality and shelf-life will be improved. It's also the period when heating is most expensive. By growing energy- and space-efficient varieties like, you not only reduce heating costs but also grow more plants per square foot, reducing your cost per plant even further. They are low maintenance with little or no shrink, helping to maximize cost efficiency. It is the cost per plant that counts and not per square feet/meter. Looking at it this way will eliminate many energy-efficient varieties because of their high space requirements, shrink, and higher maintenance.

Vegetative period

Don't try to reduce costs during the wrong time. Energy-efficient varieties are not intended to be grown cool from planting on. During the first weeks, until the beginning of short days, you need to keep the temperature up. Night temperatures are especially important, as heating may be necessary during cool nights in August and September.

Recommended temperatures during the vegetative growing period are 68-73° DT/ 68°F NT. Depending on the location of your greenhouse and the general condition, cool-morning drops can be applied to control growth. Drop temperature by 8-10°F two hours before sunrise until about two to three hours after sunrise. Keep the average temperature in mind to avoid stunting, and watch for the dew point. Don't use cool morning if side shoots look uneven. Keep the temperature up in the morning until the plants even out. When

humidity is a problem, negative DIF with 68° NT and 65°F DT has proven to be the better choice.

Additional PGR treatments may become necessary, but remember that varieties like the Christmas Feelings series are low-vigor varieties so fewer applications with lower concentrations are recommended. General good growing practices should be applied to reach a strong plant quality when entering the generative crop period.

Generative period

This is the time to reduce costs by turning down the heat. About two to three weeks into short days (depending on the crop and location of your greenhouse) slowly lower the temperatures to the recommended minimum temperatures for the energy-efficient variety you grow. For example, Christmas Feelings™ can be finished with 66°-73° DT/62°F NT. You can continue to use cool-morning drops or negative DIF for height control until the end of week 4 of short days, just keep in mind that Christmas Feelings TM, for example, needs a minimum average day temperature of 63°F. Keep in mind also that with such temperatures the plant won't grow much anymore, and that explains why the vegetative crop period is so important.

You need to enter the final phase with strong, healthy, and good-sized plants. Heating is not expensive during summer and early fall but will become more expensive starting mid-October, so build the plant when it's cost effective and save when it's not.

Points to remember

To secure quality and cost savings, you will need to watch a couple of important points during the low temperature finishing phase. In general, a cooler grown crop will finish a couple days later; will have smaller bracts, and darker colors (whites may turn cream-yellow). If you grow the crop cooler than recommended, the crop might be further delayed and bracts underdeveloped. However, varieties like ‘Christmas Feelings’ gives you the option to balance cooler night temperatures with higher day temperatures. So if you have a nice bright fall and are able to keep the day temperature up, you can further lower the night temperature without delaying the crop. Just keep the needed minimum average day temperature in mind and don't undercut it.

Keep the humidity in mind as well, and if possible, stay below 75%. Keep the air circulating! Regular air exchange will help you to avoid botrytis and powdery mildew problems. Space plants accordingly to help keep humidity lower. Avoid dropping the temperature below the dew-point (especially in humid areas)!

Use the correct light levels whenever nature provides it. Especially in northern areas, wash the roof if necessary. In southern areas shading may be necessary. Recommended light levels are 3,500-4,500 footcandles from a week after pinching until mid-October, 3,000 foot-candles until two weeks before shipping, and 2,000-2,500 foot-candles for the last two weeks. Observe light level recommendations for propagation, planting, pinching, and spacing, as those are periods where poinsettias require less light!

When planning on growing an energy-efficient crop, avoid mixing energy-efficient varieties with regular varieties. You can grow energy-efficient varieties warmer, but it won't work the other way around. Know your varieties and consider all aspects during the planning process.

A Few Pointers for Better Irrigation

John W. Bartok, Jr.
Extension Professor Emeritus
Natural Resources Mgt. & Agric. Engineering
University of Connecticut
Storrs

As the weather warms up, watering plants becomes more important and time consuming. Here are a few ideas that can make the irrigation system more efficient.

Undersize pipe size can affect flow

Whether it is by hand watering or an automatic system, the correct supply pipe size is important to get good coverage. Water flow in a pipe is affected by the pressure, length and number of fittings. Most systems should have a pressure switch and pressure tank that provides water at between 30-50 or 40-60 pounds per square inch (psi) pressure. Lower pressure reduces flow and higher pressure may damage the plants.

A 1” supply pipe will provide about 12 gallons per minute (gpm) without losing too much pressure to friction loss. This is not adequate to supply two 5/8" diameter hoses to full capacity. It is also not adequate to provide water for more that a dozen 1-gallon/minute nozzles in an overhead irrigation system. The generally recommended flow rates for 100' of plastic pipe are shown in the following table. For longer runs, the flow rate decreases more.

Pipe size	Flow rate (gal./min.)	Friction loss (psi/100 ft.)
¾”	8	5.8
1”	12	4.4
1¼”	22	3.1
1½”	30	2.6
2”	50	2.0

Use shorter hoses

Friction loss in rubber hose is considerably more than in plastic pipe. For example at 8 gpm, friction loss in ¾” plastic pipe is 5.8 psi/100' whereas in ¾” hose the loss is 8.8 psi. It is better to pipe the water supply to the ends and middle of a 100' greenhouse and then use 50' hoses to get the coverage.

Install a hose cart or Hi-Hose cable support

These devices keep the hose out of the aisle where it can be damaged or tripped on. They also keep the nozzle clean, reducing the chance of spreading plant diseases while watering.

Add an intermediate water storage tank

Where an adequate water supply for peak irrigation needs is limited, an intermediate storage tank should be installed. This is located between the well and the pressurized distribution system. This reservoir can be a nonpressurized concrete, wood or steel tank that serves as a primary source of supply for the pressure pump. It should be sized to make up the difference between the well yield

and the maximum demand. The intermediate tank is filled during the evening or night when irrigation is not needed.

For most systems, supplying the water from the intermediate tank to a pressure tank is desirable to keep the pump from starting too frequently. In larger greenhouses, pumping directly from the intermediate tank to the more extensive irrigation system may be best.

There is another advantage to an intermediate reservoir. If the tank is located above ground in the greenhouse or headhouse, the water can be tempered before irrigating the plants. It could also be heated from a hot water heater or boiler.

Protect your water system with a good filter

Suspended solids in the water source need to be removed to prevent clogged piping, valves, nozzles and emitters. Screen or disk filters work well for most applications. A 100 mesh filter is fine enough for most hand and overhead sprinkler applications. A 200 mesh filter is usually recommended for micro-irrigation. The filter should be sized so that the flow rate is large enough to handle the peak demand.

Maintenance on a filter is important also. Installing pressure gauges on both sides of the filter will indicate when it is becoming clogged. When the pressure variation between the two gauges exceeds about 10% the filter should be cleaned.

Save labor with an irrigation controller

Controllers are available from one to twenty or more zones. The electronic controllers sold today are more flexible than the older mechanical timer models. Features available include easy programming, manual override of any zone, variable start and run time, activation when it is daylight, battery backup and remote control. Special controllers are available for misting, boom irrigation and locations where power is not available. A controller will operate your irrigation system when you are not available.

Design the automatic watering system for uniform coverage

The most uniform watering is achieved with flood benches, flood floors or a boom system. Drip systems do a good job if pressure compensating nozzles are used and the supply pipes are not too long. In overhead systems, the design should include double or triple overlap of nozzle patterns.

Nozzle selection should be based on the water pressure and desired irrigation rate. Select a nozzle that has a droplet size that will penetrate the foliage and minimize drift. Follow the manufacturer's recommendation for spacing and coverage. Monitor pressure at the nozzle. Look for variations in the pattern that indicate plugging or wear. Run a cup test which involves measuring the irrigation water caught in a series of cups laid out on a regular grid system throughout the growing area.

Avoid waste

Design and operate the irrigation system to limit the amount of wasted water. Avoid watering the aisles and walls. This will save on pumping cost and extend the water supply. Use anti-drip nozzles and repair any system leaks.

As water supplies become shorter due to drought and over development, conservation becomes more important. Good system design and control can extend the water source and provide more uniform watering.

Crop Production

A Hedge with an Edge for Erosion Control[z]

Ann Perry
USDA Agricultural Research Service (ARS)

Editor's note: Using familiar Miscanthus grass to trap field runoff might be a useful technique for those who grow field-grown cut flowers, perennials, hardy mums, and some outdoor container crops in environmentally sensitive areas.

One way farmers can preserve soil and protect water quality is by planting grass hedges to trap sediment that would otherwise be washed away by field runoff. Agricultural Research Service scientists at the agency's National Sedimentation Laboratory in Oxford, Miss., have calculated how much soil erosion these hedges prevent and verified predictions of the Revised Universal Soil Loss Equation version 2 (RUSLE2).

Hedges of miscanthus grass can trap as much as 90 percent of sediment eroding from crop fields, according to new ARS research.

Agronomist Seth Dabney, hydrologist Glenn Wilson and agricultural engineer Robert Cullum collaborated with retired agricultural engineer Keith McGregor in a series of studies over 13 years to assess the effectiveness of grass hedges for erosion control in wide or ultra-narrow-row conventional tillage or no-till cotton systems.

The researchers established single-row continuous swaths of miscanthus, a tall perennial grass, across the lower ends of 72' long plots with a 5% slope. Then they tracked how much sediment was trapped by the vegetation from both the wide and ultra-narrow-row conventional tillage and no-till fields. The hedges eventually became a yard wide and were clipped two to three times every year after the grass was 5-6½' tall.

The scientists found that the ability of the hedges to trap sediment increased as the hedges matured. The hedges were more effective at intercepting sediments that washed out of conventionally tilled fields, possibly because the eroded materials from no-till fields were composed of smaller particles.

The hedges captured approximately 90% of eroded sediment from ultra-narrow-row conventionally tilled fields, and only about 50% of sediment from no-till fields. Nevertheless, the actual soil loss from the no-till plots-either with or without grass hedges-was much less than the conventionally tilled plots with or without grass hedges, because no-till production helps mitigate erosion.

The team also found that hedge effectiveness was enhanced when clippings were allowed to accumulate uphill of the hedges. But even if all the clippings from grass hedges over 1½' tall are removed for livestock feed or bioenergy production, the hedges can still help protect against field erosion. Hedges could be especially valuable if highly erodible lands in the U.S. Department of Agriculture (USDA) Conservation Reserve Program are brought back into production.

Results from this study were published in the *Soil Science Society of America Journal.*

ARS is the principal intramural scientific research agency of USDA.

Reprinted from the October 2009 issue of "*Suffolk County Agricultural News*", Cornell Univ. Coop. Extension.

Business Management

Should Production in High Tunnels Be Part of Your Specialty Crop Enterprise?[z]

H. Chris Wien, Dept. of Horticulture
Miguel I. Gomez & Bradley Rickard, Dept. of Applied Economics & Management
Cornell University
Ithaca, NY

Everyone seems to be thinking about producing horticultural crops in high tunnels these days. High tunnels are inexpensive, unheated greenhouses in which the crops are planted in the ground. The structures are commonly covered by a single layer of polyethylene plastic and have rudimentary ventilation arrangements that regulate internal temperatures. High tunnels can significantly increase the length of the market season by allowing earlier planting and by protecting plants from frost in the fall. With tomatoes, for instance, one can expect to plant a month earlier and market for a month longer than for a field-grown crop. During summer, tunnels protect sensitive crops like raspberries and cut flowers from wind and rain. So high tunnels are attractive, but are they affordable?

A recent economic study conducted by Wen-fei Uva and Mei-Luan Cheng, Cornell University, and involving several New York producers using high tunnels indicates that these structures can be profitable, but it depends on the crop grown and how it is marketed. The study, sponsored by the New York Farm Viability Institute, surveyed growers of tomatoes, English cucumbers, cut flowers and raspberries keeping expenses and income from crops sold for the 2006 and 2007 growing season. In addition, the growers shared information about the initial cost of the high tunnels they had erected on their farms.

The cost of building a high tunnel is often a major deciding factor in use of this technology. Among the growers surveyed, costs varied by a factor of 8, depending on the complexity of the structure and how and by whom it was constructed (Table 1). Tunnels ranged in floor area from 2,400 to 4,800 ft^2; the less expensive structures were either constructed by the grower or purchased from commercial sources. Farmer B's tunnel was purchased, included an in-ground heating system and included a more costly system for ridge ventilation, while the other tunnels were ventilated by roll-up sides.

Table 1. Initial fixed costs of materials and construction for five high tunnels in NYS, compiled in 2006.

Location and crop	Tunnel size (ft^2) and type	Fixed cost, $/$ft^2$
Farm A, cucumbers	2400, welded frame	1.53
Farm A, tomatoes	4800, welded frame	1.67
Farm B, tomatoes	2880, pipe frame, gothic	11.93
Farm C, cut flowers	2880, pipe frame,	gothic 3.56
Farm D, raspberries	2880, pipe frame,	gothic 3.72

The costs of the structure would normally be amortized over its probable useful life. The study assumed a life span of 10 years on the tunnel skeleton and 3 years on its plastic covering. To determine income, the farmers kept track of the yields and the selling price of their commodities in each year of the study.

Table 2. Annual production cost, revenue and net income per unit area for six high tunnel-grown crops, averaged over the 2006 and 2007 growing seasons for the annuals, and over 10 years for raspberries.			
Location and crop	Annual production $/ft^2	Annual revenue, $/ft^2	Net income, $/ft^2
Farm A, cucumbers	1.71	1.49	-0.53
Farm A, tomatoes	1.70	2.60	0.57
Farm B, tomatoes	2.34	4.66	1.44
Farm C, lisanthus	0.57	3.02	2.08
Farm C, sunflower	0.38	0.86	0.14
Farm D, raspberries[z]	1.15	3.47	1.51
[z]Income averaged over a 10-year production period			

Labor costs for crop management and harvest were also complied. In addition to the fixed costs of the structure (Table 1), production costs, including plants, fertilizer, pest control, and labor were complied (Table 2). Income from sale of crops could then be compared to costs, resulting in a net income per unit high tunnel area for each of the crops (Table 2).

Table 2 highlights the finding that net income was very dependent on the crop grown. The cut flower crop lisianthus, which was marketed at a farmers market and to florists, was most profitable, due to a low production cost and high selling price. Cucumbers, on the other hand, lost money because production costs exceeded the selling price. It and the sunflowers only occupied the high tunnel for part of the season, but the calculations did not consider additional income in that season from successive crops. The calculations emphasize the importance of growing income-producing crops in the structure for the entire growing season. The nearly three-fold difference in net income from tomatoes is largely due to differences in marketing: tomatoes from Farm A went to a wholesale auction market; those from Farm B were sold retail at a farmers market.

When high tunnels are intended for perennial crops such as raspberries, an additional factor must be kept in mind. Raspberries will take a couple of years to produce berries, so expenses will exceed income until the third year. In spite of the lag in income production, net income from raspberries average out at $1.51/ft^2 over 10 years (Table 2). For a detailed analysis of costs and income on raspberry high tunnels, see the high tunnel raspberry and blackberry manual at: http://www.fruit.cornell.edu/Berries/ bramblepdf/hightunnelsrasp.pdf .

So are high tunnels for you? As long as you have a good market for your product, and can meet the expectation of buyers with regard to product availability, product quality, price and level of value-added features, the answer could well be “yes”.

The authors gratefully acknowledge that this report is based on information contained in an Economic and Marketing Study final report by Mei-Luan Cheng and Wen-fei Uva for a NY Farm Viability Institute-sponsored grant on high tunnels. [z]This article was originally published in the January 2010 issue of *Suffolk County Agricultural News*.

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