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Floral Notes Newsletter

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In This Issue

Plant Nutrition for Greenhouse Crops

October 20, 2009

9:30-3:30

Publick House, Sturbridge, MA

UMass Extension, University of Connecticut, and Northeast SARE will sponsor an educational program providing practical information on plant nutrition for greenhouse crops. Sheila Graham of Plant Products Co. and Lela Kelly of Dosatron Co. will talk on water-soluble fertilizers, determining ppm, and fertilizer injectors. The topics of organic fertilization and water testing will be discussed by Doug Cox of UMass. Fred Hulme of Scotts Co. will speak on controlled fertilizers and Brian Krug of UNH and Rich McAvoy of UConn will cover identifying and correcting nutritional problems. Registration is $40 per person, including lunch. For more information contact Tina Smith **(tsmith@umext.umass.edu)**

Shelled Corn for Greenhouse Heat

Growers of greenhouse crops are invited to participate in year two of the Shelled Corn for Greenhouse Heat project. Funding is available to provide cost-share for purchasing one corn furnace or boiler per farm (up to 50% of the cost, maximum $3,000 per farm) for a limited number of farms. If you are interested, please complete the application form which can be downloaded from http://www.umass.edu/umext/floriculture/upcoming_events/index.html

For more information, contact Andy Cavanagh, acavanagh@psis.umass.edu, 413-577-3976 Vegetable Crops Program.

2009 Greenhouse and High Tunnel Tomato Conference

November 3, 2009
9:15-3:30
Sturbridge Host Hotel and Conference Center
Sturbridge, MA

Support for this program is being provided by a grant from Northeast SARE

8:30-9:15 **Registration**

9:15-10:00 **High Tunnels for Tomato Production**
Judson Reid, Cornell University

10:00-10:45 **Greenhouse Tomatiology**
Richard Snyder, Mississippi State University

10:45-11:00 **Break**

11:00-11:45 **How We Grow Tomatoes in High Tunnels**
Steve Groff, Cedar Meadow Farm, Holtwood, PA & SARE Educator

11:45-12:40 **Lunch** (Reservations due by October 27)

12:40-1:30 **Disease Management**
Sharon Douglas, Connecticut Agriculture Experiment Station

1:30-2:15 **Greenhouse Tomatoes: Problems and Solutions**
Richard Snyder, Mississippi State University

2:15-2:30 **Break**

2:30-3:30 **Panel Discussion with Growers of Greenhouse and High Tunnel Tomatoes**
Nelson Hoover, Hoover Farm, Milo, NY; Skip Paul, Wishingstone Farm, Little Compton, RI; Steve Groff, Cedar Meadow Farm, Holtwood, PA; Gideon Porth, Atlas Farm, Deerfield, MA

For more information contact Tina Smith (413)545-5306, tsmith@umext.umass.edu or Paul Lopes (508)295-2212x24, lopes@umext.umass.edu

To resister online go to: www.umass.edu/floriculture/upcoming_events/index.html

Crop Production

Notes on Some New Bedding Plants and Annual Garden Flowers

Douglas Cox
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University of Massachusetts
Amherst

Weather this summer was not ideal for many outdoor activities including plant-growing, but it seems most bedding plants and garden flowers did pretty well if they had a little extra care and maintenance (especially fertilizer and a little strategic irrigation). In this article I report some observations on some new and recent introductions. These observations were made on plants growing in a small trial garden run by Durfee Conservatory at UMass, the trials at Elm Bank, and several significant plantings in my own garden in Sunderland, MA. My main interest is the less common annuals, especially the low maintenance and long-blooming types, and the really innovative or unusual types of the most popular species. In each entry I list the source of the seeds or vegetative liners I used to start the plants. Proven Winners varieties were vegetatively propagated; plants from other sources were started from seeds.

Alyssum 'Snow Princess' (Proven Winners). Proven Winners says 'Snow Princess' is a "unique breakthrough" for its heat tolerance and extended season of bloom. The heat tolerance was hard to evaluate this summer, but 'Snow Princess' did indeed have a long flowering season starting at planting in mid-May through to October. We cut our plants back once and they quickly recovered to rebloom very well. Plants are compact (4-6"tall) and are excellent spreaders. Individual plants would do well in containers. 'Snow Princess' is definitely a big change from most seed-propagated Alyssum.

Angelonia 'Serena' (Park Seed Wholesale). 'Serena' is not a new plant but it remains the principal seed-propagated Angelonia. Flowers are white, purple, lavender, and lavender pink. Plants are about 10-12" tall, shorter than the vegetative Angelonias. In my opinion, the two best characteristics of Angelonias are the vigorous and continuous blooming once the plants are established and the long life of each flower stalk which can extend many weeks. Based on my experience it's clear that success with 'Serena' starts with seeding. Germination temperature should be 68-70F and irrigation should be carefully managed to avoid overwatering. Overwatering also slows seedling development. Seed should not be covered.

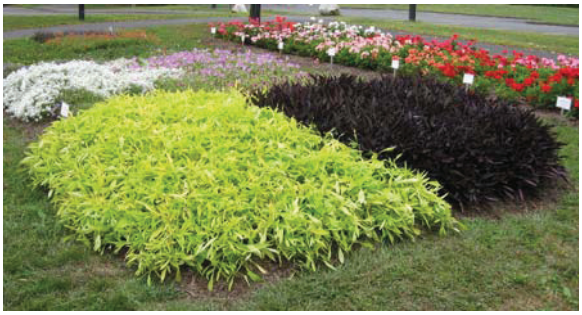
Angelonias are often thought of as heat-loving plants. Over the years I have found that cool temperatures at planting outdoors do slow development of 'Serena', but by the middle or end of June the plants really take off. Angelonia 'Serena' was quite successful for me this summer as evidenced by the accompanying picture.

Cuphea 'Matchmaker' (Park Seed Wholesale). Cuphea has become a popular plant in recent years, but of the different types I like the good old "Cigar Flower" (*Cuphea ignea*) with its simple tubular flowers the best. In 2009 red, white, and pink varieties of 'Matchmaker' appeared and in my garden they performed very well this summer. Plants are about 12-14" tall and wide and the leaves are deep green with occasional reddish highlights. Cupheas are not good competitors for attention when they are combined with plants with large bright-colored flowers (i.e., petunias) because their flowers are sometimes partially hidden by the leaves. However, in containers and in the garden together with less showy neighbors they really do show well.

Gomphrena 'Fireworks' (Ball Horticultural Co.). I think Gomphrenas are very useful garden plants because they require very little maintenance, minimal deadheading, and the

individual flowers last for many weeks. 'Fireworks' is a much larger (4' tall, 3-4' in diameter) plant and has larger flowers than the familiar Gomphrenas. Its growth habit is similar to 'Strawberry Fields', but 'Fireworks' is more upright and less sprawling. The plant is aptly named because the flowers are tipped with numerous yellow "star bursts" each on top of a hot pink "fireworks tail". This plant may be a tough sell to the average consumer because these plants in packs and small containers may be too small to flower, so some promotion with pictures may be necessary.

Ipomoea 'Illusion Emerald Lace' and **'Midnight Lace'** (Proven Winners). These sweet potato vines have very deeply cut leaves and the similar chartreuse and deep purple color of earlier varieties. In our trials it developed a dense mound of foliage with 6-8" upright, rather than vining, stems. The 'Illusion' sweet potato vines can be used in containers and they are the best varieties for landscape use that I've seen.



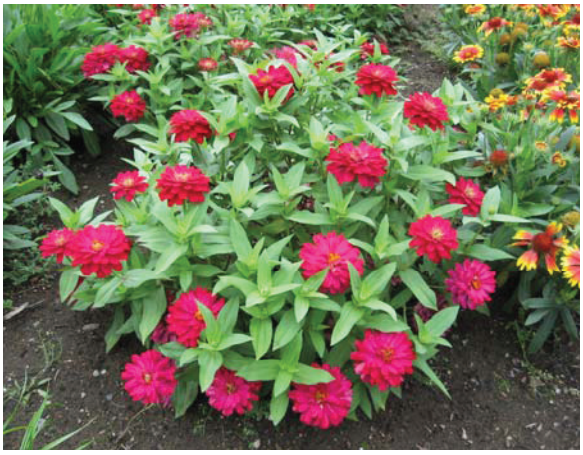
Petunia 'Pretty Much Picasso' (Proven Winners). This petunia is quite unusual as its flowers have purple centers and green-tipped lobes. Green in petunia flowers was common in varieties years ago, but not so much today. The flowers are about the size of those of multiflora petunias. 'Pretty Much Picasso' has a spreading/trailing growth habit and can be used in the landscape or in containers. In our trials it

flowered continuously, but was not as floriferous as other spreading petunias.

Zinnia 'Solcito' (Ball Horticultural Co.). 'Solcito' has been around a few years and is a competitor with Sanvitalia and Bidens. Like their competitors, Zinnia 'Solcito' has small yellow daisy flowers with dark centers ('Solcito' flowers, however, are the largest of the three species). In the garden plants form dense, spreading mounds about 8-10" tall and it is good for containers. In my experience 'Solcito' does not suffer from the foliar diseases afflicting other zinnia types. The plant establishes quickly outdoors and blooms steadily into October. It is tolerant of heat, drought, and cool weather. 'Solcito' performs well and remains compact in larger packs and small pots. Unlike other zinnias, seeds of 'Solcito' must have light to germinate.

Zinnia 'Zahara' (Park Seed Wholesale). Most readers are aware that interspecific hybrid zinnias are compact, highly branched, free-flowering, and have excellent resistance to several foliar diseases compared to traditional zinnias. The new 'Zahara' series was introduced in 2008-09 and is a competitor to the excellent 'Profusion' series released some years ago. The flowers of 'Zahara' are somewhat larger than 'Profusion' and 'Coral Rose', 'Yellow', and 'Starlight Rose' are currently the series' most unique colors. 'Starlight Rose', introduced by Pan American, is the first bicolor of this zinnia type and it is the 2010 All-America Bedding Plant Award Winner.

In the near future I'm sure we'll see many new colors and more doubling in the flowers in both the 'Zaharas' and 'Profusions'. For example, at Elm Bank I saw an as yet unreleased dark red, doubled 'Zahara' on display. (**Note:** The official scientific name of 'Zahara' zinnias is *Zinnia marylandica*. By chance, looking through some files, I found the a copy of the scientific paper which proposed the name *Z. marylandica* for this type of Zinnia based on its genetic makeup; one of the coauthors was the late Thomas Boyle when he was a graduate student at the University of Maryland in the 1980s).



Selecting an Energy/Shade Screen System

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Energy/shade screens are one of the most popular methods of reducing greenhouse fuel usage. Savings of 30-50% in heating costs are common in many installations. Often referred to as energy blankets or curtains, screens save energy by reducing the heat loss surface area, providing an extra insulation barrier and trapping an insulating layer of air on both sides of the screen material. If the material contains some aluminum, the infrared part of the heat within the greenhouse will be reflected back toward the plants reducing heat loss another few percent. The aluminum strips can also save energy in the summer by reflecting the incoming heat back out of the greenhouse.

With a typical cost of $2.00-2.50/sq ft installed, the payback usually works out to 1-3 years. This can be influenced by the fuel cost, length of the heating season, climate and the night greenhouse temperature.

Select the best system

Although energy screens can be installed in free-standing greenhouses and hoophouses, they are most common in gutter-connected ranges. The standard system uses nylon monofiliment or stainless steel cables to support the blanket material. The material can either rest on top of a network of cables or be suspended by hooks from the cables. A gearmotor powers a drum or rack and pinion that moves the leading edge of the blanket material.

Energy/shade screens can be installed gutter to gutter or truss to truss. Factors to consider with the gutter to gutter system are:

- Less volume of greenhouse has to be heated.
- Less material is needed but it forms a larger bundle in the storage position.
- Installation is easier as work is done at a lower height.
- Equipment cannot be supported from the lower truss cord.

Truss to truss systems are generally more common. They can be installed flat at the gutter or up near the roof glazing (6-12" spacing). Configurations of slope-slope or slope-flat-slope are used. These systems:

- Usually require more material.
- More space has to be heated.
- Heating, lighting and watering equipment may not have to be moved.

In many gutter connected greenhouses a lightweight truss can be installed below the screen (energy truss) to support heating, HAF, water, electrical systems and hanging baskets. Adequate gutter height is needed as this truss usually takes up about two feet of space. It is important when building a new greenhouse to anticipate the installation of the screen by keeping the truss area free of electrical, plumbing and other obstructions.

Some growers in northern climates are installing two screen systems. The lower screen has a high energy rating and the upper one is mainly for shade but provides additional energy savings when extended at night. This may provide an additional 10 to 15% savings in fuel. Sidewall screens are also becoming popular especially with the taller gutter-connected houses. These usually roll-up under the gutter or at the wall purlins.

Screen drive systems

Three types of drive systems are used to move the screen, cable and drum, push pull and chain and cable.

The cable and drum system operates like a clothesline. It uses a gear motor that rotates a shaft near the center of the greenhouse. A stainless steel cable wrapped around a grooved drum connects shafts at each bay. The cable is attached to the

leading edge of the screen. It extends the screen when the cable pulls the leading edge. It gathers and retracts the screen when moved in the other direction. Depending on the layout of the greenhouse, one drive motor can handle up to 40,000 sq ft of screen material.

Push and pull systems are used for truss to truss systems. Pinion gears on cross shafts move the toothed racks back and forth over the distance between the trusses. The leading edge of the curtain in each space between the trusses is connected to the racks and provides back and forth motion.

The chain and cable drive system is similar to the push and pull system with the exception that lengths of roller drive chain moved by a gearmotor and sprockets pulls or pushes the leading edge of the curtain between the trusses or across the width of the greenhouse.

There are screen systems available that can be installed in hoophouses. These are usually more difficult to install due to the shape of the structure and the amount of overhead space available. They also eliminate the space for hanging baskets.

I have seen a simple system installed in a hoophouse that uses a light weight steel cable stretched horizontally at each bow at 8-9' above the floor. The cable is attached to the bow with band clamps. The screen material is attached to the hoops at one side and rolled on a piece of tubing across to the other side forming an insulating ceiling. The inflated poly usually creates a seal at the sidewall. The ends of the screen roll over a fixed section of poly attached at the endwall and first cable to create a seal. Cost of this system is less than $1.00/sq.ft. for the materials.

Select the right screen material

Although the same mechanical support system can be used for energy savings, shading or photoperiod control, the screen material is different. The most common materials for energy screen are composite fabrics of alternating strips of clear and aluminized polyester or acrylic held together by a finely woven mesh of threads. Other materials available include knitted and woven bonded polyester, metalized HDPE (high density polyethylene) and polyproplyene. Things to look for when selecting a material include the warranty life (usually 5-10 years), strength and flexibility.

Many screen materials are designed to also provide shading during the summer. For comparison of materials, manufacturers list both the shade factor and the energy savings. Shade percentages from 10-100% and energy savings percentages from 20-75% are available. When selecting a shade screen material, consider the crop to be grown and the time of year. For most crops a shade material that provides 30-50% reduction is satisfactory. Too much shade limits the amount of light that reaches the lower leaves in the canopy

Screens can also have an open or closed weave. The closed weave has a higher energy savings and is used in greenhouses with fan ventilation systems. For natural ventilation, an open weave allows the heat to rise through the screen when it is extended. Some growers install a closed weave and then crack the screen open to allow the heat to escape · up through the roof vents. Some porosity is desirable to prevent accumulation of moisture on top of the screen and the thread used to sew the strips together usually provides this.

Screens can also be used for photoperiod (daylength) control. Polyester or composite materials with an aluminized top layer and opaque bottom layer are popular as they reflect the incoming radiation to reduce the temperature buildup. They also allow water and moisture to pass through. These materials have a 99.9% light exclusion. Sidewalls have to have a similar system to maintain darkness.

Fire safety

Most screen materials are plastic. In a fire these can support combustion and increase the intensity of the fire. Screens have been the cause of the spread of several greenhouse fires. Materials selected should be either have a fire break installed or be fire-retardant. The fire break is usually section of fire-retardant material on both edges of a screen panel. It reduces the flame travel. In controlled tests (Ludvig Svensson), fire break material reduced the peak heat released by more than 20 times over plain aluminum/polyethylene screen material. The fire-retardant material, although more expensive, reduced peak heat release more than 200 times.

In general, a fire break material is the minimum

requirement for production greenhouses. A fire retardant material should be used for retail greenhouses open to the public. The closure strip installed along the sidewalls of the greenhouse should be fire-retardant material to prevent the spread of the fire from panel to panel.

Experience has also shown that the polyester monofilament wires can cause spread of a fire. Use either stainless steel or the new fire-retardant polyester wire (FT Wire) for the support cables.

Installation and maintenance are keys to energy savings

A screen system is easiest to install if the greenhouse is empty of plants. The long cables and large pieces of screen require open space during installation. Man-lifts are frequently used to elevate workers to the truss level and require space to maneuver.

Closed weave energy screens need to be installed to provide a tight seal all the way around the edges. There are several ways to get a good seal. In most screen installations, one edge is permanently attached to a truss or gutter. The leading edge usually has a sealing flap. The side edges ride along a ledge of polycarbonate sheets or fire-resistant screen material.

Typical temperatures that would be observed in a heated greenhouse on a cold night might be 60°F under the screen and 35-40°F above. I have been in greenhouses where it was warmer above the screen than below showing that heat was escaping through holes, gaps or around the edges of the screen. Remember that heat supply pipes that are above the screen have to be insulated or moved lower.

Regular maintenance is needed to keep proper tension in the cable system. Pulleys and gear motors should be lubricated once or twice a year. Screen materials tend to wear on rub points and where they are supported by hooks. Repairs may have to be made at these points.

Control the screen by outdoor light level

It is important to properly use an energy/shade screen. It has to be closed and opened at the right time based on weather conditions and the time of year. Operation can be done manually or automatically using a photocell or time clock. Light activated operation is most desirable and doesn't have to be changed with the seasons. A light level of 50 ftc is a good threshold point. Most environment controllers and computers can be programmed to operate a blanket system.

Operation

If a screen is opened rapidly, the cold air from the attic will flow down to the plants. Some plants are susceptible to damage from this cold air. Setting the controls to open the screen slowly over a half hour eliminates this problem. Some growers solve the problem by waiting for the sun to warm the attic before the screen is opened.

To prevent damage to the greenhouse structure, energy screens should remain open when snow is predicted. The heating system should be designed for the heat loss with the screen retracted.

The installation of an energy/shade screen becomes more attractive as fuels prices continue to rise. The key to a good installation is the use of good materials and having tight seals around the edges.

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