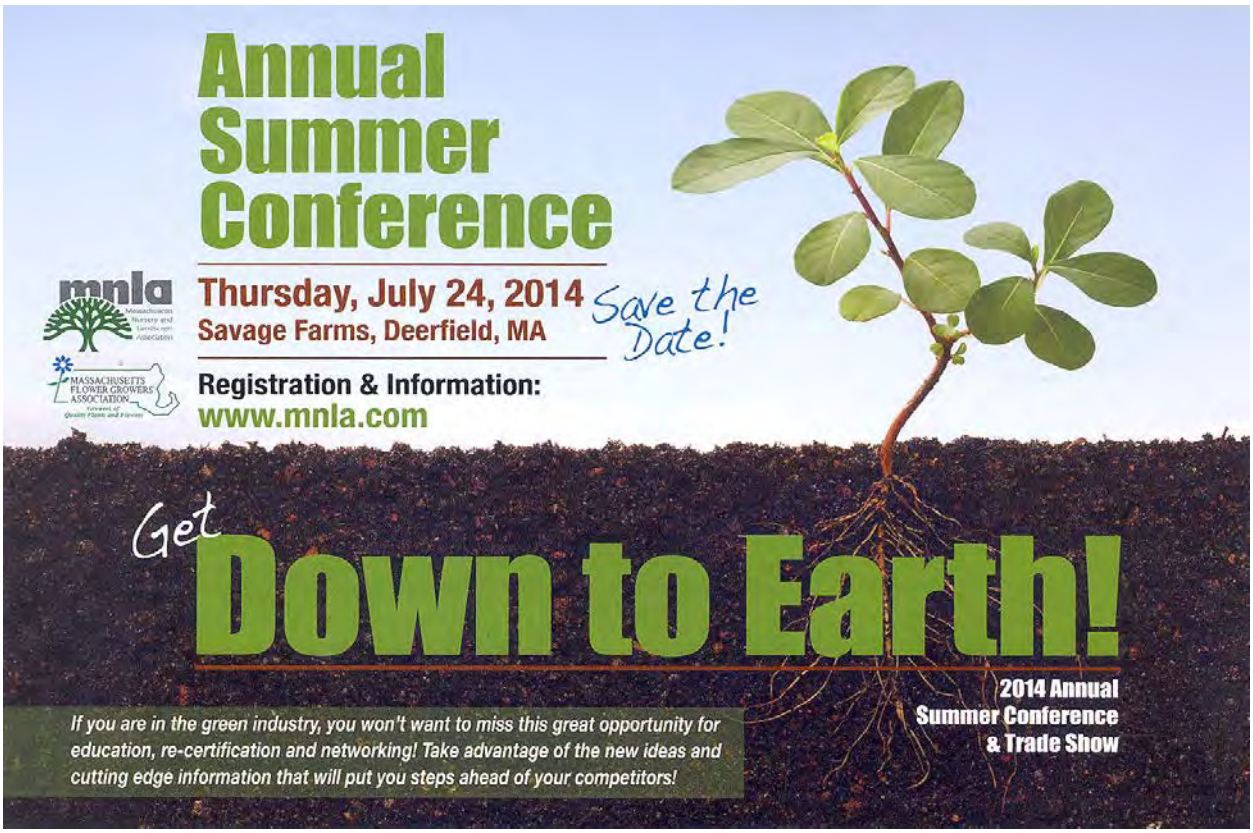
The MAYFLOWER & Floral Notes

A Joint Publication
Massachusetts Flower Growers' Association
& UMass Extension

April 2014



2014 Northeast Greenhouse Conference and Expo

November 5 & 6, 2014

The Northeast Greenhouse Conference (formerly the New England Greenhouse Conference) will be held on November 5th and 6th at the Mass Mutual Center in Springfield, MA. Save the date for the Northeast's premier horticultural event! Don't miss the opportunity to network with growers and other colleagues, hear the latest updates from nationally recognized speakers and visit the trade show.

Educational sessions will include 4 tracks throughout both days focused on edibles (greenhouse vegetables), pest and disease management, production techniques and crops, herbaceous perennials and business and marketing strategies. Pesticide recertification credits will be available for many of the educational sessions. In addition to the educational sessions, the trade show will be held both days with three dedicated hours in each day of the program.

Visit our web site: http://www.negreenhouse.org

Association News

Massachusetts Flower Growers' Association
Growers of Quality Plants and Flowers

New Board of Directors

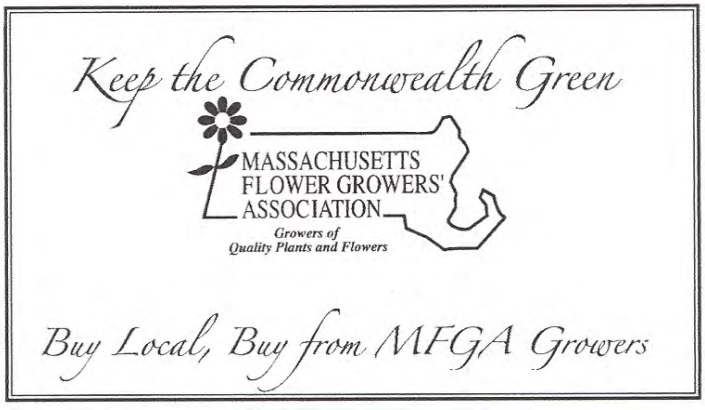
The 2014 MFGA Board of Directors has six new members: Charlene Leinomen of Oak Hill Greenhouses, Samantha Stoddard of Farm Credit East, Christy Langone of King Farms, Robin Messer of J.P. Bartlett, P.J. Molloy of Berry's Greenhouses, and Mark Farmham of Bioworks, Inc. Outgoing Board members are Bill Cauley, Chris Graziano, John Jaffe, and Arthur Taylor. The MFGA greatly appreciates the service of the outgoing members and the new members' willingness to serve the Association.

The Board is comprised of 12 members as well as Ed Bemis (Legislative Committee), Henry S. Gillet, Jr., Richard LeBlanc (MDAR), and Tina Smith and Geoffrey Njue (UMass Extension).

MFGA Announces Annual Scholarship

Each year the **Massachusetts Flowers Growers Association** sponsors a $4,000 college scholarship. The scholarship is open to Massachusetts residents planning to attend college to study in floriculture or related fields. The successful applicant will receive $1,000 for each year of study up to four years. Students are encouraged to apply for the scholarship before the application deadline of **May 15th**

The scholarship application is available online at http://www.massflowergrowers.com/scholarships.php or by contacting the MFGA office at (781)275-4811.



Tobacco Mosaic Virus

Tina Smith
Extension Floriculture Specialist
UMass Extension
Amherst

Note: This article was adapted from the article, "Tobacco Mosaic Virus (TMV)", posted on the New England Greenhouse Update website on Feb. 22, 2007 by Leanne Pundt and Sharon Douglas. This final article was edited by Bess Dicklow, UMass Extension Plant Diagnostic Laboratory.

The diagnosis of Tobacco Mosaic Virus (TMV) on petunia this spring is a reminder of the importance of having a disease prevention system in place to prevent spreading virus from infected plants to healthy plants. While no propagator or wholesale grower intends to distribute infectious diseases such as TMV or *Xanthomonas*, (both transmitted mechanically), growers are advised to protect their own crops in case there are slip-ups in the production chain.

Hosts: TMV has a wide host range but is of special concern on solanaceous crops. In addition to petunias, TMV has also been reported on ajuga, begonia, calibrachoa, chrysanthemum, cyclamen, epimedium, gazania, geranium, gerbera, helianthus, impatiens, lisanthus, lobelia, lysimachia, New Guinea impatiens, osteospermum, nicotiana, pepper, petunia, penstemon, tomato, torenia and verbena.

Symptoms: Symptoms include yellow and green mottling, upward leaf curling, necrotic leaf spots, leaf distortion, and overall stunting. In some cases, infected plants may not show any symptoms or some cultivars may not show obvious symptoms until they are stressed. Overall stunting is often very hard to distinguish, especially if all of the incoming plants in a flat or plug tray are stunted.

Transmission: TMV is not transmitted by insects. It is a very stable virus that is spread mechanically in sap, by contact with any contaminated surface including equipment (watering nozzles, containers), door handles, clothing, hands and by vegetative propagation, and it can be carried in the seed.

Greenhouse workers can easily spread this virus when they handle plants or when cutting tools become contaminated with the virus. Since TMV can also persist in dried tobacco leaves, cigarettes and other tobacco products can be important sources of TMV. This is a way the virus can be transmitted to a healthy crop and why smoking and handling tobacco products should not be permitted in greenhouses, especially propagation houses!

Once a plant is infected with a virus, it cannot be cured. Treating with insecticides is not helpful for TMV, because there is no insect vector. Identifying infected plants can be difficult because the symptoms are often not distinctive. This is in contrast to the situation when impatiens are infected with Impatiens Necrotic Spot Virus (INSV) and exhibit distinct ringspots and black lesions on stems. Samples may be sent a Diagnostic Laboratory (listed in last weeks' notice), sent to Agdia (www.agdia.com), or tested in house by purchasing test kits for TMV from Agdia (www.agdia.com).

Precautions for Handling Plants to Prevent Spreading Disease

Use disposable gloves. When shipped plants arrive, unpack plants wearing disposable gloves and discard after handling these plants and before handling any others. Use a clean set of gloves for shipments from different propagators. This will help to prevent movement of disease from one source to another within the greenhouse. If gloves are not an option, then workers should wash their hands and fingernails carefully between shipments of plants. Research has shown that a 1-minute dip of 20% non-fat dry milk solution can limit the spread of TMV. Tools can be treated for one minute with 10% bleach (1:10 dilution of 5.25% bleach) and allowed to air dry.

Work in designated blocks whenever handling plants. This includes removing senescent foliage and flowers, taking cuttings, and monitoring for insects and diseases. Hands should be washed or, if gloves are worn, they should be washed or discarded after each block of plants. Again, this prevents movement

of disease from one source to another. Propagation tools should also be cleaned between designated blocks of plants. TMV can survive for many years on greenhouse surfaces.

Keep vegetable transplants separate from ornamental plants. If possible have a designated greenhouse for vegetable transplants. In addition to TMV, diseases such as Tomato spotted wilt virus and INSV (vectored by western flower thrips) are diseases of both vegetable plants and ornamentals.

Control perennial weeds in the solanaceous family such as ground cherry and horsenettle in and around the greenhouse because they can be reservoirs of TMV.

Clean up

Discard and destroy infected plants including roots, stems and leaves as well as their containers.

Clean up all debris from plants.

Use disposable gloves and disposable aprons (disposable Tyvek spray suit works) when removing plants. If gloves are not used, disinfect hands after removing plants before working with other plants. Clean up thoroughly before going into other greenhouses.

Thoroughly disinfect the growing area with a commercial disinfectant such as ZeroTol, Oxidate, Green-Shield, Physan, or Triathlon, following label directions. In greenhouses, hard surfaces such as doorknobs, or flats can become contaminated after handling virus-infected plants and remain a source of infection.

References

Catlin N. Tobacco Mosaic Virus on Petunia. e-Gro Alert. 15(3):14. http://e-gro.org/pdf/3-15.pdf

Daughtrey M. and S. Adkins. If You Know One Virus, You Don't Know Them All. Greenhouse Business, April, 2005
http://iapreview.ars.usda.gov/research/publications/publications.htm?SEQ_NO_115=182628

Douglas S. and L. Pundt. Tobacco Mosaic Virus (TMV), New England Greenhouse Update, Feb. 22, 2007. http://negreenhouseupdate.info/updates/tobacco-mosaic-virus-tmv

A Publication of the UMass Extension Greenhouse Crops & Floriculture Program

Floral Notes Newsletter

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In This Issue

Seed Buying 101: A Seed Gardener's Glossary

Reprinted with permission from the Home Garden Seed Association, www.ezfromseed.org

How often do you hear or find yourself wondering what is the difference between an heirloom and an open-pollinated seed variety, an F-1 hybrid and a "GMO?" Misconceptions about these terms are common in both amateur professional horticulture. Breeding techniques continue to evolve, and the ethical debate on the long-term effects of this brave new world of hi-tech breeding will rage on. One concrete way we as seed professionals can help is by providing clarity.

Consider this a plain-language "go-to" resource. It will help set the record straight the next time your retail customers refers to the "GMO Food Agenda" or asks the question, "Which is better, an heirloom or a hybrid"? Seed choices abound, and gardeners and horticulturalists deserve to make educated decisions about what is best for their own use. The following is a list of common (and a few not-so-common) terms that you are likely to encounter:

Cultivar: The word cultivar derives from the term "cultivated variety." A cultivar name is often presented as the "variety name" after the genus and species in home garden seed catalogs. In this example: Morning Glory (*Ipomoea purpurea*) , the cultivar name is 'Grandpa Ott's'. Described by the International Code of Nomenclature as an "assemblage of cultivated plants clearly distinguished by one or more characteristics, which, when reproduced, retains its distinguishing characteristics," a seed-grown cultivar can be either a hybrid or open-pollinated variety. So a cultivar is a cultivated variety with specific characteristics (a.k.a."traits").

GE (Genetically Engineered): The terms GE and GMO frequently used interchangeably in the media, but they do not mean the same thing; it is modern Genetic Engineering that is the subject of much discussion. Genetic Engineering describes the high-tech methods used in recent decades to incorporate genes directly into an organism. The only way scientists can transfer genes between organisms that are not sexually compatible is to use recombinant DNA techniques. The plants that result do not occur in

nature; they are " genetically engineered" by human intervention and manipulation. Examples of GE crops currently grown by agribusiness include corn modified with a naturally occurring soil bacterium for protection from corn borer damage (Bt-corn), and herbicide-resistant ("Roundup Ready") soybeans, corn, cotton, canola, and alfalfa. All of these are larger acreage, commercial crops. At the present time, home gardeners will not encounter any packets of GE seeds sold through home garden seed catalogs or garden center seed racks.

GMO (Genetically Modified Organism) The USDA defines a GMO as an organism produced through *any* type of genetic modification, whether by high-tech modern genetic engineering, OR long time traditional plant breeding methods. While you often hear the GE and GMO used interchangeably, they have different meanings. For hundreds of years, genes have been manipulated empirically by plant breeders who monitor their effects on specific characteristics or traits of the organism to improve productivity, quality, or performance. When plant breeders, working with conventional or organically produced varieties, select for traits like uniformity or disease resistance in an open-pollinated variety or create a hybrid cross between two cultivars, they are making the same kind of selections which can also occur in nature; in; other words, they are genetically modifying organisms and this is where the term GMO actually applies. Examples of 20th century breeding work include familiar vegetables and fruits such as seedless watermelons, pluots, and modern broccoli.

Open Pollinated (a.k.a. OP): Open-pollinated varieties are seeds that result from pollination by insects, wind, self-pollination (when both male and female flowers occur on the same plant) or other natural forms of pollination. If you save seeds from open-pollinated varieties and grow them in following years, they will "come true," meaning that the plants will produce plants with characteristics or "traits" like the parent plant from which the seeds were harvested. Keep in mind, however, that both the wind and insects will pollinate different open- pollinated varieties that are planted close together. Because of this, with some common home garden plants, notably squash and pumpkins, saving seed can be a gamble, because unless different varieties are separated by specified distances, they may exchange pollen or "cross pollinate" each other.

Hybrid (F-1): An "F-1", or first generation hybrid occurs when a breeder selects two pure lines (plants that produce identical offspring when self-pollinated) and cross-pollinates them to produce a seed that combines desirable characteristics or "traits" from both parents. Common traits breeders work to increase in hybrids might include, for example, disease resistance, uniformity, earliness, high nutrition or color. Hybrid seed is often more expensive than non-hybrid seed, due to production methods- the pure lines must be consistently maintained so that F-1 seed can be produced each year, and the process of cross-pollinating is often done by hand. Seeds can be saved and planted from F-1 hybrids, however, plants grown from that seed "will not come true"; in other words, may lack the desirable characteristics of the parents, which were crossed specifically to incorporate them. Examples of popular home garden hybrids include Premium Crop Broccoli and Better Boy, Celebrity and Sungold Tomatoes.

Heirloom: Heirlooms can be generally defined as open-pollinated varieties that have resulted from natural selection rather than a controlled hybridization process. Some sources use 50 years as an arbitrary age marker to define what constitutes an heirloom variety. Others classify any cultivated variety as an heirloom if it was developed prior to the 1940s and 50s (starting in the 1960s, plant breeders began producing and selling many modern hybrid varieties). Like any other open- pollinated variety, seed saved

from an heirloom produces plants with the same characteristics as the parent plant. Seed saving organizations have played an important role in preserving many noncommercial heirloom varieties. Examples of popular home garden heirlooms offered by many packet seed companies include Brandywine and Black Krim tomatoes and Kentucky Wonder beans. The romantic view of heirlooms is that they are varieties that have been passed down through generations of gardeners. Though this was certainly true in the past, it is often not the case in our modern world. Commercial seed producing companies now grow out seeds for many celebrated heirlooms, including, for example, Brandywine tomatoes and Lemon cucumbers, and sell them to seed packet companies to offer to home gardeners.

Organic: When you see the words "Certified Organic" on a seed packet, it has distinct legal meaning. It can only be used for seed by growers who are in compliance with all the detailed rules and regulations specified by the USDA's National Organic Program. While other countries have their own organic systems, in the US, organic regulations specify that the land in which crops are grown cannot have had prohibited substances applied for three years prior to harvest, and the operation must be managed according to an Organic System Plan that is approved and regularly inspected by a USDA accredited certifier. Organic seeds are grown strictly without the use of synthetic fertilizers and pesticides; the use of sewage sludge, irradiation, and genetic engineering are also prohibited.

Pelleted: Pelleted seeds are enclosed in a round pellet made from simple clay or another inert material to bulk them up. The process makes very small seeds such as lettuce, carrots, and onions easier to sow and is a way to make expensive tiny flower seeds easier to see and handle. Pelleted seeds may also be "primed". Priming is a hydration treatment bringing seeds to the brink of germination and they are dried for storage and distribution. Primed seeds break dormancy and germinate quickly when sown, but should be used the same season they are purchased, as priming can decrease storage life.

Treated/Untreated: Seeds labeled "Treated" are generally coated with a fungicide- check the packaging for specifics about the treatment. Treated seed is available primarily for commercial crops because farmers want to protect germinating seed in the field from pathogens when planted in cold or wet soil. Packet seed companies that sell to home gardeners generally specify if any of the seed they are offering is treated. Current rules for USDA certified organic production prohibit the use of treated seed. This might change in the future as biological seed treatments are approved for organic production and become available.

Safe Seed Pledge: The Safe Seed Pledge arose as a response to the release of first genetically engineered plants in the mid-90s. Signers pledge not to buy or sell genetically engineered seeds. A list of companies that have signed the pledge is maintained by the Council for Responsible Genetics, a non-profit with a stated mission of educating the public about and advocating for socially responsible use of new genetic technologies.

The EZfromSEED Website shows you everything you need to know about growing plants from seed. It's brought to you by the Home Garden Seed Association (HGSA), an international group of seed producers and seed packet companies committed to supporting home gardening success, specifically through the use of seeds. Contact us at: renee@reneesgarden.com or chhart@hartseed.com

Add Greenhouse Vegetables to Your Production Mix

Geoffrey Njue
Extension Educator
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Greenhouse growers with some downtime between ornamental crops are experimenting with greenhouse vegetable crops to add to their revenue and the year-end profit for their operations. Others are adding greenhouse vegetables and herbs to their crop mixes to diversify their operations and improve on the bottom line. Greenhouse growers are trying to take advantage of the increasing demand for locally grown produce and the growth of farmers' markets. Before adding food crops to your production mix, there are a number of things you need to consider.

Consider your market

It is important to do some market research to find out the market that would be viable for your produce. Careful planning is required to find the right market for your produce and to determine the vegetable crops and varieties to grow. You can explore different markets such as: whole food stores, restaurants, schools and institutions, farmers' markets and your own retail store if you are a retail grower. Markets that value locally grown produce would be ideal because they are willing to pay higher prices for local produce

Food safety regulations

Find out about any food safety regulations that would have an impact on your ability to sell your vegetables. Check with your potential customers if they require GAP (Good Agricultural Practices) certification from their growers. To learn about food safety regulations you can attend the GAP training offered by UMass Extension and the Massachusetts Department of Agricultural Resources. For information about the upcoming GAP training contact UMass Extension. You should also talk to your insurance agent to find out if there are any additional liability issues associated with producing food crops in your greenhouse.

Education and training

You will not be successful by simply adding vegetables to your ornamental production system in the greenhouse. Growing vegetables in the greenhouse will require additional technical skills and knowledge. Consider attending educational programs on vegetable production offered by UMass Extension and other regional programs. You can also gain a lot of knowledge and skills by talking to other greenhouse vegetable growers, greenhouse vegetable experts, consultants and seed, fertilizer and pest management product suppliers. Contact the UMass Extension vegetable program for education programs on vegetable production.

What to Grow

Start small and select crops that are easier to grow, grow fast and have less local competition. As you expand your production you can include other crops that your customers are willing to buy from you. Crops that are easier to start with include lettuce and other leafy greens such as Swiss chard, Kale and Collards. Others include salad greens such as spinach, mesculin, arugula, red beet greens, and water cress. Tomatoes, cucumber and pepper are the staple greenhouse vegetable crops but they require more investment and labor to grow and there is probably more local completion for these crops. These crops take longer in the greenhouse and may require pollination (use of bumble bees) and pruning. You have to be able to fit these in your production schedule. Before deciding to grow these crops you need to determine if you have the market for the produce and if your customers are willing to pay good prices to

cover your production cost and a reasonable profit margin. Other crops to consider may include micro-greens, edible flowers and strawberries.

Pest management

Managing diseases, insects and mites pests on food crops in the greenhouse may be different from your current pest management for ornamental crops. Products labeled for use on greenhouse ornamental crops may not be labeled for use on food crops in the greenhouse. As a grower you will need to learn the problem pests on your crops and how to manage them. Keep food crops separate from ornamentals wherever possible, so that problem pests will have less opportunity to move from ornamentals to food crops. Select varieties that offer disease and pest resistance and consider using biocontrols for pest management.

Productioncosts

In order to grow vegetables in your greenhouse profitably you will need to manage your production costs very closely. Adding greenhouse vegetables to your production mix will require additional costs for pest and nutrient management and other costs such as harvesting labor costs, packaging, pollination (e.g. tomatoes), and delivery costs.

For more information on growing vegetables crops in the greenhouse please access the resources below:

Slide Shows by Brian Krug, UNH Extension

Part I. Basics for Bench Top Greens: http://www.greenhousegrower.com/video/plant-culture/v-salad-greens-as-greenhouse-gap-crops-basics-for-winter-benchtop-production/

Part II. http://www.greenhousegrower.com/video/plant-culture/v-salad-greens-winter-benchtop-production-basics/

Summer Flowers, Winter Greens – an article about UNH research project

Growing Winter Crops in Maine - Summary of a 2010 grower meeting at Paul Lorrain's Sunset Farm Organics in Lyman, Maine

Winter Harvest Handbook by Eliot Coleman

Cornell High Tunnels- Cold Hardy Greens

The Michigan State University Hoop House website
http://hoophouse.msu.edu/ and planting schedules

New England Vegetable Management Guide - Vegetable Transplants Section

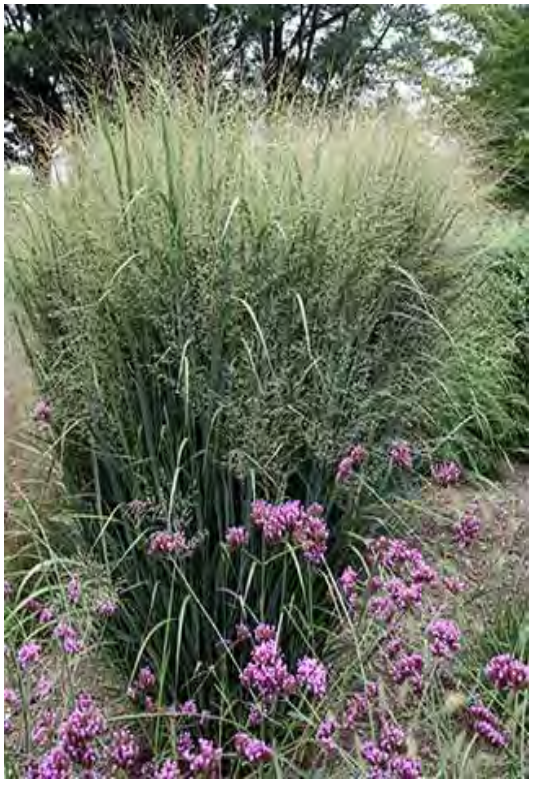
Greenhouse and High Tunnel Tomatoes Resources: http://extension.umass.edu/floriculture/fact-sheets/greenhouse-and-high-tunnel-tomatoes-resources

North Carolina State University greenhouse vegetable productions list of references:
http://www.ces.ncsu.edu/depts/hort/hil/hil-32-a.html

British Columbia greenhouse vegetable production business planning guide:
http://www.agf.gov.bc.ca/busmgmt/bus_guides/green_guide.htm

Florida greenhouse vegetable production handbook: http://edis.ifas.ufl.edu/topic_book_florida_greenhouse_v3

Penn State Extension Greenhouse IPM Manual with an Emphasis on Biocontrols:
http://extension.psu.edu/pests/ipm/program/greenhouse/greenhouse-manual/entire.pdf/view



2014 Perennial Plant of the Year™

Panicum virgatum 'Northwind'

Panicum virgatum 'Northwind' is the Perennial Plant Association's 2014 Perennial Plant of the Year™. *Panicum virgatum*, pronounced PAN-ic-um ver-GATE-um, carries the common name of switch grass or switchgrass.

Hardiness: USDA Zones 4 to 10

Light: Switch grass performs best in full sun and will tolerate light shade.

Soil: Panicum is famously adaptable to almost any soil.

Uses: Switchgrass is a stalwart selection in the full-sun, especially native, meadow or prairie gardens. Flower arrangers find the foliage and plumes useful for arrangements. Finally, this warm-season perennial grass offers golden fall color.

Unique Qualities: 'Northwind' is very easy to grow. It will enhance any sunny border, not just a native, meadow- or prairie-style garden. 'Northwind' has a refined, garden-worthy appearance and habit. This warm-season perennial grass has blue-green foliage and stands more erect than is typical of the species.

Maintenance: There are no serious insect or disease problems with Switchgrass. Plants are best divided in spring. 'Northwind' is not patented. It can be reproduced from divisions. Liners are available from numerous propagators, including members of the Perennial Plant Association.

The genus *Panicum*, native to North America, is a member of the Poaceae family (formerly family Gramineae). Regardless of nomenclature, members of *Panicum* are excellent perennial grasses for the landscape. The genus botanical name (*Panicum*) is thought to derive from the Latin pan bread. One species (*P. miliaceum*, common millet) has been used for centuries to make flour.

The origin of the common name switchgrass or switch grass is obscure. "Switch" is believed to be a variation of Middle English "quitch," among whose meanings is "quick," or alive, suggesting the grass is difficult to kill. Others say the name derives from the swishing sound the grass makes when tossed by the wind.

Roy Diblik selected 'Northwind' from a population of *Panicum virgatum* he raised using wild-collected seed from plants growing along railroad tracks in South Elgin, Illinois. In July 1983, he noticed that one plant had wider leaves and a very upright growth habit, unlike the typical arching form of the others. He gradually built up stock of the upright one. In 1992, when Northwind Perennial Farm opened, he introduced it and named it 'Northwind'.

Panicum virgatum 'Northwind' spreads slowly to form erect clumps of slender, steel-blue leaves about five feet tall. In late summer, the foliage is topped by a haze of showy, finely-textured flower panicles that rise to six or even seven feet, and that open golden yellow and mature to beige.

Deep roots make 'Northwind' remarkably drought-tolerant, once established. And like most ornamental grasses, *Panicum virgatum* 'Northwind' is seldom eaten by deer.

Natural Ventilation in Greenhouses

John W. Bartok, Jr.
Extension Professor Emeritus & Agricultural Engineer
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The concept of cooling a greenhouse with thermal bouyancy and wind goes back to the beginning of controlled environment. All greenhouses built prior to the 1950's had some form of vents or louvers that were opened to allow the excess heat to escape and cooler outside air to enter.

When polyethylene was developed with large sheets covering the whole roof, placing vents on the roof proved difficult. Engineers then came up with the concept of using fans that draw outside air through louvers in one endwall and exhaust it out the opposite end. With thermostatic control, this was, and still is the accepted method for cooling many structures where positive air movement is needed.

Proper design of a fan cooled greenhouse is to provide a summer ventilation capacity of 8-10 cubic feet of air per square foot of floor space. This will give about one volume air change/minute which will keep the temperature difference between the louver end and the fan end to 7-10ºF. Besides the initial investment in a large number of fans, the increasing cost of electricity to run them has growers moving to adopt the natural ventilation system in new greenhouses that they build.

Growers with hoophouses have found that roll-up sides work well for warm season ventilation. Both manual and motorized systems are available. A location with good summer breezes and plenty of space between houses is needed. It helps to have greenhouses designed with a vertical sidewall up to the height of the attachment rail to reduce the amount of rain that can drip in.

Greenhouses with roof and sidewall vents operate on the principle that heat is removed by a pressure difference created by wind and temperature gradients. Wind plays the major role. In a well-designed greenhouse, a wind speed of 2-3 miles/hour provides 80% or more of the ventilation. Wind passing over the roof creates a vacuum and sucks the heated air out the vent. If sidewall vents are open, cool replacement air enters and drops to the floor level. If there are no sidewall vents or if the sidewall vents are closed, cool air enters the bottom of the roof vent and the heated are escapes out the top of the vent. The transition zone between the two moving air streams slows the air movement and reduces cooling somewhat.

Buoyancy, the effect of warm, moist air rising, also aides ventilation. Heavy cool air near the floor becomes lighter as it is heated and rises towards the roof. On cool days the large temperature difference creates excellent air exchange. On hot days the temperature difference can be only 5 or 10 degrees and the buoyancy effect is almost non-existent. The trend toward taller greenhouses has helped in that it gets the hot air higher above the plants. Horizontal air flow fans should be shut off to avoid destratifying the warm air.

Roof and side vents on conventional greenhouses need to be large enough to get good air movement. The American Society of Agricultural & Biological Engineers recommends that the combined sidewall vent area should equal the combined ridge vent area and each should be 15 to 20% of the floor area. The best orientation for the greenhouse is to have the normal summer wind direction blow over the ridge so that it creates a vacuum on the leeward ridge vent. For summer ventilation, the windward sidewall vent opening should equal the leeward ridge vent opening.

Until the development of the open-roof greenhouse concept, cooling large gutter-connected structures was difficult especially in southern climates. Area for sidewall vents is usually limited, and passing cool outside air and warm inside air through the roof vents usually results in uneven cooling.

Open-roof greenhouses are available from most major manufacturers. Most designs use standard vent hardware and controls to operate the roof system. Some have roof panels that are hinged at the gutter and open upward. Others have panels that are hinged at the ridge and one gutter and slide sideways on Teflon bearings. The size of the opening can be controlled from 0% to about 75%. Most designs use rubber gasketing to seal the joints.

Open- roof greenhouses have several advantages.

- During warm weather, the temperature inside the greenhouse can be maintained within a degree or two of outside temperature with little or no energy needed. Many growers have found that this shortens production time and produces a better quality plant.
- In the spring, plants can be hardened off by opening the roof on nice days. This saves considerable labor of moving plants outside.
- Energy costs are reduced. Fan ventilation can use from 0.5 to 1 kilowatt hour/sq ft/year.
- Depending on design and orientation, the crops may receive more light during the middle of the day than in a conventional greenhouse or less light in early morning or late afternoon due to more layers of glazing that it has to pass through. Further research is needed in this area.
- Reduced irrigation due to more uniform temperature and the potential for natural rainfall.
- Adding side vents allows cooling and air movement when high winds or rain prevent the roof from being opened. The guillotine vent, available from a couple of manufacturers eliminates the conventional vent with arms that interfere with inside or outside work area.

To get adequate cooling on hot, sunny days, a shade system may be needed. It should be porous so that the heat generated below can escape up through the shade material. Evaporative cooling, either a fog system or portable evaporative coolers can give added cooling. A large number of hanging baskets tends to reduce natural cooling. Further research is needed to determine air exchange rates and ventilation patterns within open-roof structures.

Continued developments in the design of natural ventilation systems are giving growers better control of temperature and humidity at lower cost. Proper sizing, orientation and operation can provide better control than with fan systems.

UMass Greenhouse Crops and Floriculture Extension Program

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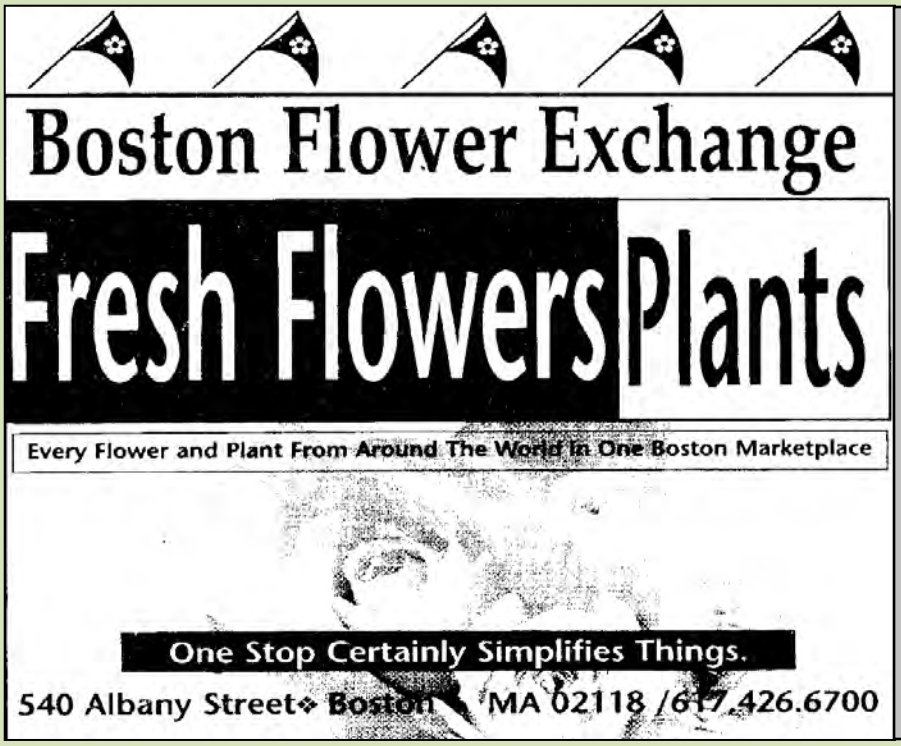

Berkeley Florist Supply Company
Elgreen Orchid – Boston
Chester Brown Wholesale Florist
Cupp & Cupp Corporation
Fall River Florist Supply
Hunter Gallery Design
Kelley Wholesale Florist, Inc.
Montgomery Rose Company, Inc.
Quinlan Wasserman, Inc.
Riccardi Wholesale
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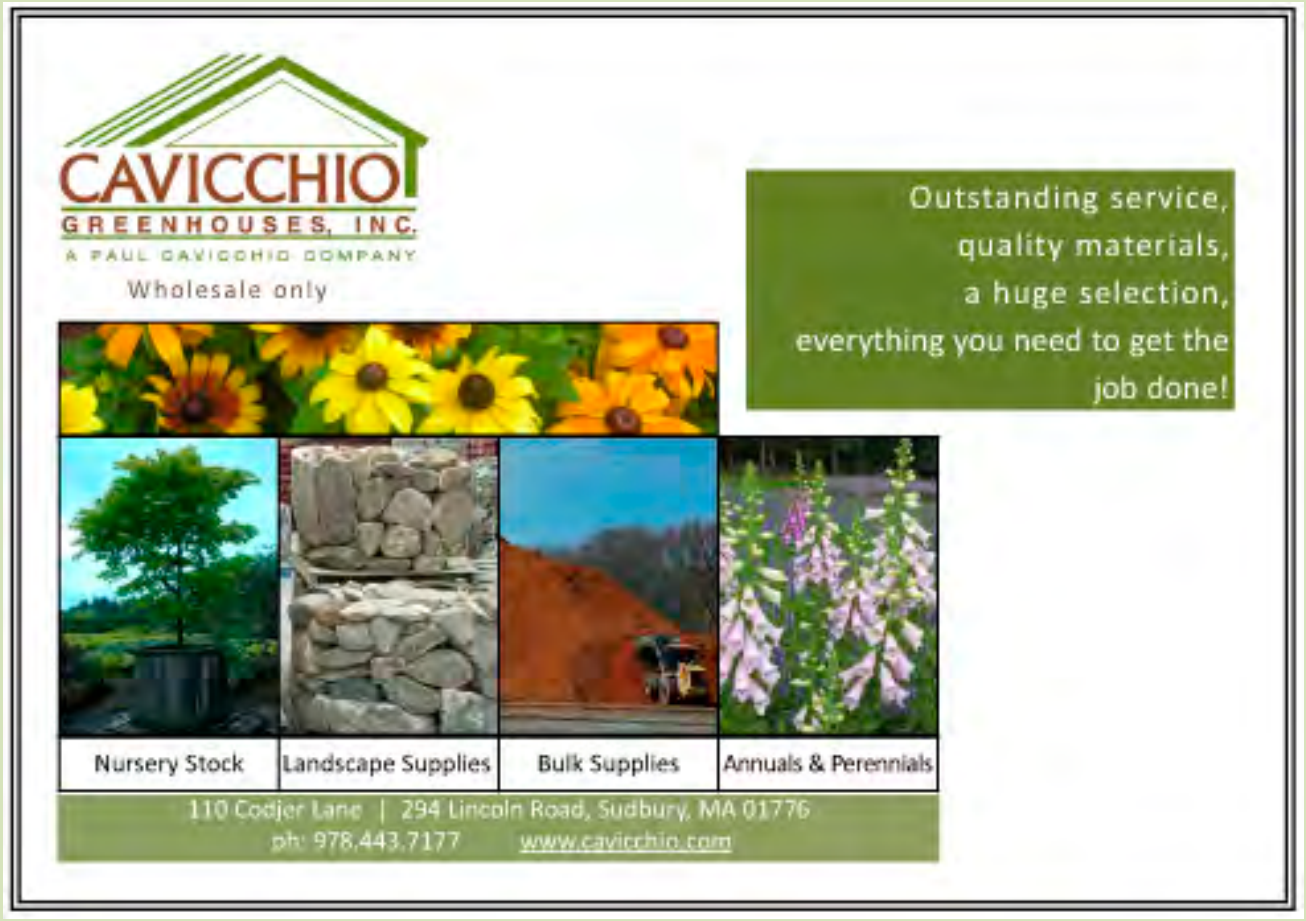

Mayflower & Floral Notes Newsletter Editor

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