A Publication of the UMass Extension Floriculture Program

Floral Notes Newsletter

Volume 22, No. 4 www.umass.edu/umext/floriculture January-February 2010

In This Issue

Employee Training for Garden Retailers: Green, Organic & Sustainable Solutions

March 23, 2010
9:30 - 3:30
Publick House, Sturbridge, MA

Training for garden center employees and horticulture retailers. Learn about pest control products and fertilizers for home gardens, trees, shrubs and lawns and how they work assist customers to make proper choices for pest management.

For more information visit: http://www.umass.edu/umext/floriculture/upcoming_events/event_details

2010 Northeast Greenhouse Conference

New England Floriculture, Inc is excited to announce the name change of the New England Greenhouse Conference to the Northeast Greenhouse Conference. "The name change reflects the formal inclusion of New York State on our Board of Directors, and our conference committee, as well as welcoming attendees from outside New England with similar growing and market conditions." said Tina Bemis, President of the Northeast Greenhouse Conference.

The conference will be held on November 3 and 4, 2010 in Worcester, MA. Each day will feature consecutive tracks of educational programs. These educational sessions will focus on greenhouse production, business management, pest management and greenhouse engineering. A trade show will be held on both days. Visit our web site: http://www.negreenhouse.org

Biocontrol for Spring Crops Begins with Propagation

Tina Smith
UMass Extension
Greenhouse Crops and Floriculture Program
Amherst

Plan early! Thinking about using biocontrol for pest management in your greenhouse for spring crops? Then plan early. Management, growers and staff all need to be on-board and involved. A biological control program should never be started in the middle of a growing season. To be successful, it needs to begin at the start of a new crop cycle, during propagation if you root your own plants and/or start your own seeds.

Past Pests and Pesticides

Begin by reviewing your pest problems that occurred during 2009 spring crop production and VERY IMPORTANT, avoid pesticide use 3-4 months prior to using biological control in greenhouses. It is important to phase out the use of pest control materials in the organophosphate, carbamate, and pyrethroid chemical classes prior to releasing natural enemies since many materials in these chemical classes can persist for four months or longer in the greenhouse.

During the transition period, before using biocontrol, growers might use products that are not necessarily compatible with natural enemies, but have a short residual effect of less than two weeks. Examples of these pesticides are abamectin (Avid), imidacloprid (Marathon, Tristar), dinotefuran (Safari) and pyriproxyfen (Sanmite) Products that are compatible and have short residual include bifenazate (Floramite) and pymetrozine (Endeavor).

For more information on the compatibility of pest control materials with natural enemies refer to on-line databases, such as Koppert, Inc., (www.koppert.com) or Biobest (www.biobest.be). Check under "Side Effects." Talk with your supplier of natural enemies, too. Research is continuing on the compatibility of pest control materials with natural enemies.

Monitoring and Start Date

Plan to have a consistent monitoring program in place as soon as plants are in the greenhouse. This is a responsibility that needs to continue throughout the growing season and cannot take a back seat when it gets busy.

Set a start date for using biological control based on past pest problems, when seeds are started and cuttings are rooted, or when plants arrive, in other words, based on past pest problems and the beginning of your production cycle. Begin using biological control agents in your propagation area. If you purchase rooted or unrooted cuttings ask your supplier/broker to supply specific information on what pesticides may have been using on the cuttings. Toxic pesticide residues, either on, in or around the greenhouse, or on plant material, are one of the main reasons for failure when using biocontrol agents.

Choosing Biological Control Agents

The biological agents chosen will depend on several factors including the crops being grown, crop longevity and past pest problems. Biological control programs are tailored to address the needs of each individual crop.

Fungus gnats and shore flies. Fungus gnats and shore flies are common problems in propagation areas. As a preventative, some growers are using the predatory mite *Stratiolaelaps scimitus* (formerly known as *Hypoaspis miles*) for fungus gnat larvae. These mites are very mobile and will colonize the surface of the growing media. They arrive in a tube of vermiculite/peat which is evenly distributed by sprinkling across the area to be treated and is usually reapplied when transplanting or repotting. For shore flies (and also fungus gnats), *Atheta coriaria* (Rove Beetle) is commonly used, applied one time during seeding or sticking cuttings. *Atheta* are nocturnal and are easily established in greenhouses. They also come in a tube of peat/vermiculite mix with all three stages of the insect present (egg, larva and adult). The container is opened where they are released and sprinkled evenly across the area to be treated. Usually one application soon after seeding or when planting rooted cuttings is enough to obtain management for fungus gnats and shore flies for the propagation stage of production. Growers usually use a second application when plants are transplanted. If, after treatment, areas become infested with fungus gnats, then the parasitic nematode *Steinernema feltiae* can be used. The nematodes are mixed with water and watered in as a soil drench.

Thrips. Growers are also including the predatory mite *Amblyseius cucumeris* as a preventative for thrips in their propagation areas. The best way to manage thrips using biological control is to begin as early as possible to prevent the young larva from reaching later stages which are more difficult to manage. The early, first instar larval stage of thrips is most susceptible to *Amblyseius.* A small pile of bran containing mites is placed on each seedling tray which acts as a breeder pile for mites for a period of four weeks. Last spring, some growers used a rate of one level teaspoon (about 100 mites) per flat and obtained excellent control. The mites arrive in a plastic bottle along with barley grain and grain mites.

The *A. cucumeris* tend to accumulate near the top of the bottle, so gently shake before applying to ensure even distribution of predacious mites and grain mites. Place the teaspoon of grain in a pile in the middle of the flat so the predaceous mites will have a feeding site. They will breed and fan out across the crops. If propagation is longer, a second application may be needed. Adult mites emerge from the pile and attack early larval stages of thrips development and sometimes eat spider mites and their eggs. Plants can be overhead watered, as long as it is gentle. The pile needs to be kept intact for mites to emerge. *Amblyseius* should be reapplied when transplanting or repotting.

A small pile of bran containing *Amblyseius* mites is placed in the center of each seedling tray to acts as a breeder pile.

Checking Quality

As with any purchased biological control agent, the quality of the product can affect efficacy. Quality of the product can be affected by batch, shipping, storage, and application conditions. Be sure to check viability of each shipment. A small sample of the mixed product should be checked with a hand lens or magnifying glass.

Sampling studies have shown that packages from any supplier may have an occasional high or low count. Because there is always a chance that a sample will contain an unusually high or low number, the more samples tested from a particular shipment, the more accurate the estimate will be of the real number shipped. Growers do not have much time to spend checking samples, therefore, if only one sample from a shipment is tested, then several shipments in a row should be sampled to get an idea of the consistency of the counts.

It is essential to keep good written records, including the date the shipment was received, as well as any dates or lot numbers that appear on packages. The supplier needs this information to trace which production series packages came from. If a majority of the biological agents are dead (>50%), then immediately contact the supplier. Be sure to return the original shipment to the supplier.

Stratiolaelaps scimitus (Formerly *Hypoaspis*): The predators are tan and move very quickly, compared to their food source mites, which are smaller, slow moving and white or translucent. Evaluate a small sample of the contents to see whether the mites are alive and whether you received the correct quantity. First, gently rotate the contents of the package to mix the predatory mites with the bran carrier. Pour a small amount, about 2.5% of the material onto a white sheet of paper and gently spread the contents out using a small soft paint brush. Count the tan, predatory mites that move.

Atheta coriaria (Rove Beetle): They are active fliers so do not open containers until in the release area. The adults may be seen, moving in the media.

Steinernema feltiae: Assess the quality by placing a teaspoon of nematodes mixed with water into a small clear dish, place over a black background (paper, counter). Look for moving nematodes, with curves shaped like a "J". Nematodes that are very straight and motionless may be dead, and therefore, ineffective.

Amblyseius cucumeris: Check for predatory mites inside the lid of the container or in the bran carrier under 10-15X magnification. Healthy predators are light tan and move more quickly than the food source mites, which are smaller, slow moving and white or translucent. If you open a container and it smells strongly of ammonia, the mites are probably not in good condition.

For information on rates, contact your supplier. Also see: 2009-2010 New England Greenhouse Floriculture.

References

2009-2010 New England Greenhouse Floriculture Guide: Product Quality (Ordering info):
http://www.negreenhouse.org/html/resources.shtml

Becker Underwood: Chemical Compati Chemical Compatibility Chart for Beneficial Nematodes:
http://www.beckerunderwood.com/library/Nematodes_Chemical_Compatibilty_05%2007%202008.pdf

Biobest, Crop Info-Sheet: Propagation of Ornamental Crops:
http://www.umass.edu/umext/floriculture/fact_sheets/pest_management/BiocontrolPropagation%20Ornamentals.pdf

Biobest, Crop Info-Sheet: Spring Crops (Bedding Plants and Hanging Baskets)
http://www.umass.edu/umext/floriculture/fact_sheets/pest_management/BiocontrolSpring%20Crops.pdf

Care on Arrival: Checking Quality
http://www.rinconvitova.com/check.htm

New England Greenhouse Update, October 9, 2009 http://www.negreenhouseupdate.info/index.php/october/621-preparing-to-use-biocontrol-for-spring-2010

Crop Management

Prevent Iron Chlorosis on Spring Crops

Douglas Cox
Plant, Soil and Insect Sciences
University of Massachusetts
Amherst

Iron deficiency problems are common in bedding plants and spring crop production. The main symptom of iron (Fe) deficiency is chlorosis, sometimes starting at the shoot tips, but more often occurring throughout the entire plant. The leaves of some plants turn almost white in extreme cases. However, in all but the most extreme cases, Fe deficiency can be easily mistaken for nitrogen or magnesium deficiency, so a soil or tissue test is necessary to confirm a suspected case of deficiency.

Susceptible crops

The fact that reports of Fe deficiency are more common is in part explained by the growing popularity of some crops susceptible to the disorder. Here is a list of crops that may develop Fe deficiency: Argyranthemum, Bacopa, Brachyscome, Calibrachoa, Pansy, Petunias, Scaevola, Snapdragon, and Annual Vinca.

Prevent deficiency

There are three ways to prevent Fe deficiency - growth medium pH control, low phosphorus fertilization, and use of an iron chelate treatment.

Iron deficient Calibrachoa

pH control. Acid pH favors the availability of Fe to plants, therefore the target pH range for these crops is fairly low, 5.5 to 6.0. Most commercial soilless media have pHs falling in this range and in most cases the use of an acid-forming fertilizer with a balance of ammonium and nitrate will be enough to keep the pH in this range. A major exception would be if the irrigation water alkalinity above 80 ppm and then acid injection might be needed. If a grower mixes his/her own sphagnum peat-based growth medium dolomitic limestone should be added at a rate of no more than 5 lbs./yd. Too much limestone is an aggravating factor contributing to Fe deficiency. For most growers keeping pH in the 5.5-6.0 range will help prevent Fe deficiency.

Low phosphorus fertilization. Under certain circumstances phosphorus (P) and Fe can react together to form insoluble Fe phosphates. The Fe in Fe phosphate is not available to plants. The chemistry of this reaction is well understood in field soil, but no so much in soilless media. However, to be on the safe side excess P should be avoided for the Fe sensitive crops. This means that no superphosphate should be mixed in the growth medium, an acid other than phosphoric acid should be used if acid injection is practiced, and, if possible, a water-soluble fertilizer supplying no more than 5% P_2O_5 should be the main fertilizer. Keeping P low will help prevent Fe deficiency, but the key is maintaining acid growth medium pH.

Iron chelate. Fertilizing sensitive crops with Fe chelate fertilizer from time to time is probably the least complicated way of preventing Fe deficiency. Most greenhouse supply companies carry Sprint 138® (6% iron) or similar iron chelate products. Sprint 138 is the preferred because it will maintain P availability even at high pH. Sprint is generally applied as a soil drench at the rate of 8 oz./100 gal. (½-¾ tsp. gal.). The chelate is also soluble enough to make a concentrated solution for injection and low rates can be mixed and injected with other fertilizers. At the rate recommended here, Fe chelate can be applied every 3 or 4 weeks if desired. Soil drench is the safest method of application; foliar sprays should be tried experimentally first to look for injury or residues.

Another possible quick corrective treatment is a couple of applications of 21-7-7 fertilizer. A "shock treatment" with this highly acidic fertilizer has been used successfully by some growers to correct Fe deficiency. While fertilizing with iron chelate or 21-7-7 are easy treatments to make, their corrective effects may be only short-term and may wear off as the plants grow. The short-term effects have implications for plant quality as the plants reach marketing time.

Caution!

Use the information in this article only for those crops known to have a special requirement for Fe. Ironically some spring crops are susceptible to Fe ***toxicity*** rather than ***deficiency*****.** These crops include marigolds, zonal geraniums, and seed geraniums and their nutrition is managed to minimize plant-available Fe. This is done by keeping pH in a higher range and avoiding fertilizing with too much Fe. Applying the treatments I have described in this article to plants susceptible to Fe toxicity would be disastrous!

Reference

Cox, D.A. 2003. pH and fertility review for vegetatively-propagated annuals. *Floral Notes.* 16(2):5-6. Sept.-Oct. issue.

Rainwater Harvesting

John W. Bartok, Jr.
Agricultural Engineer
Natural Resources Management and Environment Department
University of Connecticut
Storrs

Water is a precious resource necessary for growing plants. We often take our water supply for granted until its quantity or quality declines. Then we are forced to adopt drip irrigation methods or expensive filtration systems.

About 97% of the earth's water is seawater and another 2% is in the form of ice. Of the remaining 1%, as much as 75% is used by agriculture in some states. Depending on the crop, time of year and location, greenhouse and nursery crops may need as much as 0.4 gallons per square foot of growing space per day. This can exceed the supply that is available.

With the development of gutter-connected greenhouses, growers have the opportunity to collect large quantities of high quality rainwater that can be used for plant irrigation. Rainwater harvesting, as it is referred to, is promoted in arid western states such as New Mexico and Arizona. It can also be adopted almost anywhere in the U.S.

Quantity

Significant quantities of water can be collected. A one-inch rainfall on an acre of greenhouse amounts to 27,100 gallons. A common yield is about 65% with losses due to evaporation, wind, leakage of the piping system and diversion of the first few minutes of the rainfall to remove debris. To calculate the amount that can be collected, multiply the footprint of the greenhouse by 0.4 and this will give you a quantity in gallons.

Quality

Rain water is generally soft with very few chemicals. It is clean except for any debris that gets into the system. In some parts of the country, it is slightly acid and may have to be treated.

It is fairly easy to set up a collection system. In addition to the roof and gutters, a filtration and storage system are needed. Where water is in very short supply, some growers have captured rainfall from driveways and parking lots. It is also possible to add a gutter to the base of a hoophouse and collect water that would normally run off to a drain or swale

Collection

In most gutter-connected greenhouses, the gutters are drained through a downspout and piping system. Usually the downspouts are connected to a 4 inch or 6 inch PVC pipe. The downspouts are connected to larger pipes as more gutters are fed into the system. In large greenhouses, the end pipes may be 18 inches or larger. A minimum slope of 1/16 inch per foot with cleanouts every 100' is the recommend pipe installation.

Filtration

Before entering the tank or pond, the debris should be removed from the water. A device called a roof washer is normally used to divert the first flush of water that is collected. This is a small tank, sized for the quantity of water collected. The sloped top is covered with ¼ inch hardware cloth to trap and divert any leaves. Dust, bugs, bird droppings and other small debris that gets through the screen settles in the small tank and are drained away with a small pipe. Some systems have a diverter valve that switches once rainfall picks up. This tank has a full size pipe at the top to carry the rainwater to a cistern, tank or water silo. Roof washers are commercially available or can be homemade.

Storage

A concrete cistern is a low-cost storage device available locally. It can be a concrete septic tank that is set in place or a one that is cast in place. The largest septic tanks are usually 5000 gallons as this is about the largest size that can be handled on a truck. A typical cost is about $4,000 to $5,000. Larger tanks are made by using forms that are filled with concrete. A good seal is needed between the base and sidewalls to prevent leakage.

Fiberglass or Polyethylene tanks are available from many greenhouse suppliers. They are available as above ground or buried tanks the largest being about 12,000 gallons. A 12,000 gallon tank would be about 12 feet in diameter and 16 feet long. Depending on the transportation cost, they run from $0.80 to 1.25/gallon. They come with threaded fittings for pipe connections and large manholes for c1eanout.

Water silos, manufactured by Zwart Systems (www.zwartsystems.ca), are corrugated steel tanks that can be assembled to provide a large water holding capacity. A chemical resistant liner is installed to contain the water. As they are formed in sections from sheet steel they are easy to ship and assemble on site. Tanks and silos that are inside a greenhouse or headhouse allow the water to be warmed some before it is used for irrigation.

Growers with several acres of greenhouses usually build a pond to retain rainwater. These can be made to any size but usually require a design by a licensed engineer and a permit from the local wetlands agency. If the soil is porous, a vinyl liner is placed on the bottom of the pond to prevent seepage. The disadvantage to a pond is that the water may become contaminated from algae or other plant growth.

In all of the above storage devices, an overflow is needed to handle excess water. The water needs to be directed to a wetland or drainage area where it does not flood neighboring property.

Once you have collected the water, it can be distributed to the greenhouses with the normal irrigation system.

As good water supplies become more difficult to get, water harvesting may be a necessary option for many growers. The gutter-connected greenhouse allows large quantities of water to be collected at low cost.

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