Plant Health

Numerous options available for "green" insect control

by Dan Gilrein

Beneath the marketing hyperbole and attraction of the "green" concept to consumers, there is an increasing interest on the part of ornamental growers and landscape professionals to use production and maintenance practices that are environmentally friendly. These practices minimize or reduce pollution and dependence upon nonrenewable and imported energy, are safer for employees, are compatible with biocontrols and get the job done in an economical way.

Interest in biocontrols is the highest it has been in 20 years, boosted by commitment to quality control by suppliers and an increasing number of success stories in greenhouse ornamental production. Here in the Northeast, the increased regulation of pesticide and fertilizer use is also raising the awareness of biocontrols.

Fortunately, incorporating "greener" practices doesn't always require a major financial capital outlay or a "cold turkey" approach. Growers may be surprised to learn that some of their current practices already put them on the greener side of the spectrum.

Practical practices

Some of the obvious "green" pest management tactics already familiar to most growers include: using clean plant material; growing in uninfested greenhouses; inspecting plant material upon arrival; using sticky cards as an early warning for whiteflies, thrips and fungus gnats; conducting regular inspections of plants for any signs or symptoms of pests; and practicing good sanitation (eliminating weeds and removing infested plants, plant parts or debris).

Some growers have come to accept the fact that pests are inevitable, and that infestations are likely to occur. But growing in a clean environment and starting with uninfested plant material are important ways to minimize the need for pest controls later on.

EPA-designated green controls

When insect/mite controls are needed, several EPA-designated reduced-risk materials might be considered "greener" choices. These products have low toxicity, low risk of groundwater contamination, low use rates, low potential for pesticide resistance, and proven efficacy and compatibility with integrated pest management programs. EPA review also considers comparisons of proposed products with existing alternatives.

Commercially available reduced-risk products include Endeavor for aphids and whiteflies; Conserve for caterpillars, thrips and several other pests; Pedestal for thrips, armyworms, leafminers and whiteflies; Acelepryn for caterpillars and white grubs in landscapes only; TriStar for aphids, whiteflies, mealybugs, thrips, fungus gnats and several others; Floramite for spider mites; Akari for spider mites and other kinds of mites; and Shuttle for spider mites. These products are generally effective to very effective for labeled uses.

Biopesticides

Biopesticides are microbial pesticides (made from bacteria, fungi, viruses, etc.), plant-pesticides (such as hybrid corn that incorporates a gene to produce an insect-killing endotoxin from *Bacillus thuringiensis*), and biochemical pesticides (naturally occurring substances). Commercially available biopesticides include: BotaniGard or Naturalis (*Beauveria bassiana*, an insect-killing fungus), *B. thuringiensis* (Bt) insecticides (DiPel Pro, XenTari, Javelin), Sluggo (iron phosphate), Triact (neem oil), E-Rase (jojoba oil), Azatin/Ornazin/Aza-Direct (azadirachtin), and Met52 (*Metarhizium anisopliae*, an insect-killing fungus).

Several other products based on garlic, citrus peel and hot pepper extracts are also considered biopesticides. Generally these products work moderately to very well for certain infestations, but may not be strong choices against some labeled pests.

Minimum-risk insecticides

An unusual group of products for insect and mite control are the minimum-risk pesticides. These are products made from ingredients on two federal lists, the Federal Insecticide, Fungicide, and Rodenticide Act 25(b) (active ingredients) and 4A (inert ingredients) lists. These lists can be found online and include some unusual materials (e.g.

white pepper, mint oil, cinnamon).

Minimum-risk pesticides bear no EPA registration number and must show all ingredients by name including active ingredients by percent weight. Labels must have no misleading claims or statements (which incorrectly implies federal review or endorsement), have no public health claims (although uses for public health pests must be supported by data), and must have tolerances or be exempt from residue tolerances for ingredients in products used on food crops.

Some of the minimum-risk products we have tested at Cornell University include Organocide, Hexacide, GC-Mite, Garlic Barrier, Indoor Pharm, Rose Pharm and EcoTrol. All are labeled for control of mites and aphids for which most work reasonably well.

Don't expect much residual control with these materials, which also require good contact to be effective. Despite the innocuous-sounding ingredients (e. g. essential oils), some greenhouse plants in our trials have been sensitive at tested label rates. Growers should conduct their own small-scale trials on site before application of any of these materials to entire crops.

These products may have a useful niche for organic production, where there is a strong preference for such products, where plant sensitivity isn't an issue or where being used on an indoor food crop such as herbs for which registrations are few.

Compatibility with natural enemies

Many of the products listed above show good compatibility with natural enemies in greenhouses. If using or planning to release parasitoids, predator mites or other natural enemies, or if using bumblebees for pollination, it is essential to carefully select pesticides that have the least impact on beneficial insects and mites, particularly those with only a minimal or short-residual effect. Biocontrol suppliers can provide more information, or you can check the side effects section on the Koppert (www.koppert.com) or BioBest (www.biobest.be) Web sites. You'll need the name of the product's active ingredient, which can be found on the label. All compatibilities may not be entirely known so check with your suppliers.

A learning curve

Like with most aspects of ornamental production, there is a learning curve with using biological controls. It helps that there are several effective insecticides and miticides that are not only compatible with biocontrols but can be used to "rescue" plants in case natural enemies can't do the job alone.

When releasing natural enemies, include quality-control checks to verify beneficials arrive alive and in the stated quantity. Monitor crops regularly for both the beneficials and target pests.

If you're interested in trying biocontrol, but not sure where to start, begin with biocontrols for whiteflies or aphids. Read some of the helpful online references about using biocontrols from suppliers' Web sites. You can also talk with a biocontrol supplier representative or extension specialist to work up some plans before starting.

***Dan Gilrein** is extension entomologist, Cornell University Cooperative Extension, Long Island Horticultural Research and Extension Center, (631) 727-3595; dog1@cornell.edu.*

Scouting Notes

Infrared photography may lead to early disease detection. Color infrared (CIR) photography may someday be used for early detection of disease pathogens on greenhouse crops. Scientists at University of Texas-Pan American and Kansas State University led a study examining disease infection of greenhouse plants.

Using CIR photography, the study compared the differences in the images of healthy leaves with those from plants infected with powdery mildew and sooty mold. Scientists compared photos of healthy leaves with those of leaves that had a range of disease symptoms. Based on differences in image color and light reflection, the image analysis allowed for early detection of these diseases.

For more: Kenneth Summy, University of Texas-Pan American, (956) 381-3537; krsummy@utpa.edu.

Color infrared photography may be used for early detection of diseases like powdery mildew. Photo by Leanne Pundt

Scale insects showing up on foliage plants. Extension personnel with University of Maryland Cooperative Extension reported in February of receiving plant samples with scale infestations. Fern scale, which is usually found on ferns, liriope and mondo grass, was identified in two locations. This is an armored scale that has overlapping generations in the greenhouse. Ferns are very sensitive to pesticides. Extension officials said horticultural oil at a rate of 1 percent will help suppress the scale population without causing excess phytotoxicity. The application should be made when the solution can dry rapidly on the foliage.

The university also identified hemispherical scale. This tropical insect can become a common greenhouse pest. Hemispherical scale secretes little wax, but produces large quantities of honeydew which allows sooty mold to grow. Controls for this soft scale include foliar sprays of Distance and drench applications of imidaclorprid or dinotefuran.

For more: University of Maryland Cooperative Extension, Central Maryland Research and Education Center, (301) 596-9413; www.ipmnet.umd.edu.

Red palm mite
Photo by Eric Erbe,
digital colorization by Chris Pooley

Red palm mite is potential ornamentals pest. Red palm mite (*Raoiella indica*), which is a native of southern Asia and the Middle East, was first discovered on the U.S. mainland in Florida in 2007. The mite damages many palm species, heliconia, ginger and bird-of-paradise. The greatest threat from this mite is in areas where palms and other host plants are commercially produced or used in landscapes. Symptoms may resemble nutritional problems (leaf yellowing or yellow spots) or lethal yellowing disease of palms.

OHP senior technical manager Dick Lindquist said chemical control is practical only in commercial production where smaller size plants are easier to treat. Plants should be scouted to keep mite populations from increasing to damaging levels.

Effective products include Judo (nursery), Forbid (landscape), Floramite, TetraSan, Ultiflora and Shuttle O. Pylon is effective, but not yet registered for nursery and landscape use. Biological controls are being evaluated, but they need to be applied before mite populations get out of hand.

For more: OHP Inc., (800) 659-6745; www.ohp.com.

APHIS is changing status of swede midge. On April 1, 2009, USDA-Animal and Plant Health Inspection Service removed the regulations for and changed the status of swede midge (*Contarinia nasturtii*) from a reportable/actionable pest to a non-reportable/non-actionable pest.

It is unlikely that swede midge can be eradicated from the North American continent. Regulating movement of host material using compliance agreements or other regulatory measures is impractical because the pest is difficult to detect until damage is evident and would create undue burden on regulated industries.

Pest management will be required to slow the natural spread of swede midge to all areas that may be prone to infestation. Good management practices minimize the impact of swede midge damage on Brassica crops.

In September 2004, swede midge was first detected in the United States in Niagara County, N.Y. Additional finds of the insect have occurred in New York from 2004 to 2007. It has also been positively confirmed in portions of Connecticut and Vermont.

For more: Animal and Plant Health Inspection Service, (301) 734-3769; www.pestalert.org.

Take precautions to avoid pesticide phytotoxicity. Pesticide phytotoxicity on plants can often be distinguished from pest problems by the pattern and timing of symptom development. University of Massachusetts extension floriculture specialist Tina Smith said the damage may not appear for several days. Pesticide damage symptoms often occur all at once and have a regular distribution on the crop. Pathogen-caused symptoms usually develop over an extended period of time in random or grouped patterns.

Pesticide phytotoxicity can appear as different symptoms, including leaf speckling, cupping and twisting and other leaf distortions or plant death. Pesticide damage can be prevented by applying pesticides during the cooler parts of the day (i.e., early morning or evening). Early morning treatments allow foliage to dry before temperatures reach 85°F-90°F.

Take special precautions when using oils. Treat when conditions allow the oil to dry quickly.

Other suggestions to prevent pesticide damage to plants include: add surfactants only when recommended on the pesticide label; never apply insecticides with a sprayer that was previously used to apply herbicides; don't apply pesticides to plants that are under moisture stress; avoid using more than one emulsifiable concentrate in a tank mix; don't apply pesticides with fertilizers unless the label states otherwise; never use broad-leaved weed killers and brush killers around a greenhouse; follow label directions exactly.

Pesticide phytotoxicty on verbana.
Photo by Tina Smith

For more: Tina Smith, University of Massachusetts, (413) 545-5306; www.negreenhouseupdate.info.

Crown gall can infect perennial plants. Crown gall, caused by the bacterial pathogen *Agrobacterium tumefaciens*, is a disease known to infect woody ornamentals and tree fruits. Jan Byrne with Michigan State University Diagnostic Services said growers of herbaceous perennials, especially those propagated by cuttings, should be aware of the disease and its symptoms.

Crown gall on *Galliardia* × *grandiflora*
Photo by Jan Byrne

Galls can appear on the roots, stems and foliage and range from pea-size to more than 1 foot in diameter. The bacterium enters plants through wounds, often those made by cultural practices such as grafting, pruning or cutting propagation. Larger galls may destroy plant vascular tissue causing dieback or death. With time gall tissue breaks down, releasing the bacterium back into the soil or onto other host material.

Good sanitation is an important component of control. There are several control products that contain a strain of Agrobacterium that is antagonistic toward the gall-causing pathogen. Product efficacy varies with the type of plant material being treated. These products are meant to protect healthy plants and do not eradicate current infections. Copper-based fungicides can help limit spread, but do not eradicate infections.

For more: Jan Byrne, Michigan State University Diagnostic Services, (517) 355-3504; www.ipm.msu.edu/greenhouseAlert.htm.