From Forest Nursery Notes, Summer 2009

146. Know your organic pest control options. Cloyd, R. Greenhouse Management and Production 29(3):40, 42. 2009.

Know your organic pest control options

by Raymond Cloyd

Since there is so much fanfare and discussion associated with "organic" and "sustainability," it is appropriate to address these terms as they pertain to managing insect and mite pests. These terms are not interchangeable.

There are distinct differences between organic and sustainability. In general, organic refers to growing plants without the use of conventional pesticides, synthetically-derived fertilizers, sewage sludge, and/or food additives. Sometimes it is difficult to determine which pesticides are considered conventional.

In contrast, sustainability, an extremely vague term, may be loosely defined as the use of goods and services that respond to basic needs and provide a better quality of life, while minimizing the use of natural resources, toxic materials and emissions of waste and pollutants.

Organic pesticides

If you are going to grow plants organically, you need to be aware of the pest control materials that are legal to use in an organic production system based on the requirements of the National Organic Program (NOP). There are a number of pest control materials available for use in organic production systems including the active ingredients *Bacillus thuringiensis*, *Beauveria bassiana*, potassium salts of fatty acids, azadirachtin, neem oil, pyrethrum, spinosad and horticultural oils (e.g. petroleum-, plant- and fish-based).

Nearly all of these materials share similar characteristics: short-residual activity; subject to ultraviolet light degradation and rainfall; primarily active on the young (immature) stages of insect and mite pests; generally less indirectly (or sublethal) harmful to natural enemies such as parasitoids and predators; low mammalian toxicity; and may take longer to kill target insect and/or mite pests than conventional pest control materials.

What's available?

Here are some materials that may be used to control insect and mite pest populations in organic production systems.

1. *Bacillus thuringiensis* (soil-derived bacteria)

Products include *Bacillus thuringiensis* spp. *kurstaki* or Btk (Dipel and other trade names) and *B. thuringiensis* spp. *israelensis* or Bti (Gnatrol). Btk is only active on caterpillars whereas Bti is solely active on fungus gnats. Insects must consume the bacteria in order to be affected. In general, these bacteria are more active on young larvae than older (mature) larvae.

Bacillus is subject to ultraviolet light degradation and rainfall. The bacteria may indirectly impact natural enemies by reducing the quantity of hosts.

2. *Beauveria bassiana* (entomopathogenic fungus)

Products include Mycotrol and Naturalis. Insects are affected either by consuming the fungus or the fungus penetrates the insect cuticle. Speed of kill depends on the number or concentration of fungal spores contacting the insect, the insect age and the environmental conditions. *Beauveria* is active on soft-bodied insects, including thrips, whiteflies, aphids and caterpillars. In general, the fungus is more active on young larvae than on mature larvae.

The fungus is susceptible to ultraviolet light degradation. Multiple applications may be required.

3. Potassium salts of fatty acids (insecticidal soap)

M-Pede is an example of an insecticidal soap. Soaps kill target insect and mite pests by disrupting the cuticle resulting in desiccation. Soaps kill by contact only, so thorough coverage of all plant parts is essential. These products have a short-residual activity.

Soaps are primarily effective against soft-bodied insect and mite pests such as aphids, whiteflies, spider mites and mealybugs. In general, soaps are directly toxic to natural enemies.

Hard water or water with high amounts of calcium or magnesium may reduce soap effectiveness. They can be phytotoxic to plants if used too frequently.

4. Azadirachtin

Products include Azatrol and Neemix. They are derived from the neem tree, *Azadirachta indica*. They have multiple mechanisms of action (insect growth regulator, anti-feedant, sterilant and oviposition inhibitor). These products are primarily active on caterpillars. *Azadirachtin* is more effective on young (larvae or nymphs) stages than eggs and adults.

Multiple applications are typically required. These products are subject to ultraviolet degradation and rainfall. They tend to work better at warmer temperatures higher than 70°F.

5. Neem oil

Products include Triact and Organica. The active ingredient is clarified hydro-

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phobic extract of neem oil. These products work by suffocating the breathing pores of insect and mite pests. They are primarily active on soft-bodied insects and mites such as aphids, spider mites, whiteflies, mealybugs and scales.

These products may be phytotoxic to plants if applied too frequently. They may directly affect natural enemies.

6. Pyrethrum

PyGanic is a pyrethrum product. Pyrethrum is a generic name. Pyrethrins are the six active constituent compounds derived from chrysanthemum flowers.

These products work by contact only, so thorough coverage of all plant parts is critical. They also have very short residual activity and are susceptible to ultraviolet light degradation.

Pyrethrum may be active on a broad range of insect and mite pests including true bugs, caterpillars, flies, aphids and whiteflies. They are highly toxic to bees.

The final spray solution should be buffered to a pH of 5.5-7.0. A synergist such as piperonyl butoxide may be added to enhance efficacy.

However, the use of piperonyl butoxide is not allowed under the National Organic Program.

7. Spinosad

Entrust is a spinosad product. The active ingredient is *Saccharopolyspora spinosa*. Products are composed of spinosyns A (85 percent) and D (15 percent).

These products are fast-acting and have both contact and ingestion activity. They also have translaminar properties, meaning the material penetrates leaf tissues and forms a reservoir of active ingredient within the leaf thus providing protection even after spray residues have dried.

These products are active on caterpillars, thrips, flies and certain beetles. Any wet residues may harm certain natural enemies, particularly parasitoids.

8. Horticultural oils

Products include PureSpray Green, Golden Pest Spray Oil and Organocide. Types of oil available are petroleum- (or mineral), plant- and fish-based.

They work by preventing normal exchange of gases or by suffocation via blocking openings in the respiratory system. They are active on most life stages of insect and mite pests including eggs, young (larvae or nymph) and adult. These oils are primarily effective against soft-bodied insect and mite pests such as aphids, spider mites, scales, thrips, whiteflies and mealybugs.

Oils act by contact only, so thorough coverage of all plant parts is important. However, they may be phytotoxic to plants if applied too frequently or if applied during conditions of high humidity (higher than 75 percent). They may be directly harmful to natural enemies.

Vary management practices

Minimizing the use of pest control materials to deal with insect and mite pests is highly recommended in order to avoid potential problems associated with resistance and phytotoxicity. However, because there are a limited number of pest control materials available, when deciding to legally produce crops organically, it may be more difficult to deal with outbreaks of insect and mite pests.

It is equally important to use the pest control materials mentioned in this article diligently and in conjunction with other pest management tactics including scouting, cultural, physical barriers and biological controls. Using a variety of management tactics will help avoid substantial problems with insect and mite pests.

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Scouting Notes

Gear up to use biologicals this spring. If you're planning to use biological controls on spring crops, University of Massachusetts extension floriculture specialist Tina Smith advises to clean the greenhouses and work areas as early as possible to eliminate over-wintering sites for pests. Pests over-winter in weeds and protected areas in unheated greenhouses and especially during years with unseasonably warm temperatures. Phase out applications of chemical controls in the organophosphate, carbamate and pyrethroid classes up to four months prior to releasing natural enemies. Set up a weekly monitoring program to detect problems early since biologicals are introduced at the first sign of an infestation. Establish a biologicals supplier in advance to ensure availability and delivery. If this is the first time using biologicals, consider trying them in an isolated greenhouse to gain experience.

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

Rotate thrips controls to avoid resistance. During the last 10 years many greenhouse growers have been relying on Conserve (active ingredient spinosad) to control thrips. Members of the University of Maryland Cooperative Extension have been advising growers not to rely on just one product to control this pest group because of the chance of resistance development. When populations are low (one to two adults per sticky card), good control can be obtained using one of the neem insecticides such as Azatin, Neemix or Aza-Direct mixed with BotaniGard or a neem insecticide mixed with Naturalis-O. Other control products that can be used on a rotational basis for small infestations include: abamectin, acephate, bifenthrin and chlorfenapyr. For high populations: rotate fluvalinate, kinoprene, methiocarb, novaluron, spinosad and pyridalyl.

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

Bamboo spider mite detected in Tennessee greenhouse. In December, Animal and Plant Health Inspection Service confirmed the detection of bamboo spider mite (*Schizotetranychus bambusae*) on dwarf bamboo (*Pleioblastus viridistriatus*) near a greenhouse in Summertown, Tenn. The bamboo spider mite can spread rapidly via a wide range of dispersal methods and, therefore, containing this pest is highly improbable. APHIS has determined that regulatory action would be ineffective in preventing the pest's spread. APHIS and state officials plan to support the bamboo industry to develop control strategies to mitigate the impact of mite infestations.

S. bambusae's host range consists of Poaceae, including *Arundinaria* spp., *Phyllostachys* spp. and *Pleioblastus* spp.

For more: *North American Plant Protection Organization, ian.mcdonell@nappo.org; www.pestalert.org.*