

Pest Management for Retail Greenhouses and Garden Centers

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Introduction

Successful pest management is more challenging for retailers compared to producers for a number of reasons. Retail operations are open 7 days a week to the public, making it difficult to apply pesticide treatments. Plants in bloom or with tender growth are more susceptible to spray injury. Plants may be displayed with hard goods, making it necessary to move those plants outside or into a production area before spraying.

Retailers purchase plants from many different suppliers, making it difficult to track down potential sources of insects or diseases without careful record keeping. Employees with multiple responsibilities have limited time to inspect incoming plants for potential pest or cultural problems or to apply needed treatments.

Due to the seasonal nature of the business, there is often rapid turnover of employees from year to year. Employees may have limited knowledge of the potential insect, disease and cultural problems to look for on incoming and established plants.

To be competitive, retailers offer a wide range of plant material; spring bedding plants, specialty annuals, herbaceous perennials, tropicals, edible herbs, vegetable bedding plants, woody ornamentals, foliage plants, small fruits and tree fruits. Very few products are labeled for use on all of these crops. For example, only a limited number of pesticides are labeled for use on edible crops compared to ornamentals due to the requirement for crop tolerances and days to harvest on edible crops.

Foliage plants may remain in retail greenhouses for long periods of time. This increases the probability that mealybugs, viruses and other long-term problems become established on these plants. Plants of different ages are often mixed together, increasing the likelihood of pests moving from older plants to younger plants. Retail displays may contain hard goods and other products with plant material, so that the plants need to be moved to another location to be treated.

Integrated Pest Management

The basic principals of successful integrated pest management (IPM) for retail greenhouses are similar to production greenhouses. These principals include:

- Inspecting incoming plants
- Regular, consistent monitoring
- Sound cultural practices
- Accurate identification of insects, diseases and cultural issues
- Prompt, timely pest management decision-making
- Good communication between all members involving in this decision-making process including scouts, pesticide applicators, managers, owners etc.

Inspecting incoming plants

Inspecting incoming plants is the **most important method** to prevent problems from developing in retail operations. In the spring, inspect incoming plants for key insects, diseases, weeds and cultural problems. Inspect the entire plant – leaves, stems and roots for signs of pest activity and for general health. Roots should be white with vigorous growth – brown, decayed roots are evidence of root rot disease or root death due to other causes such as overwatering or high salt levels.

If at all possible, do not accept plant shipments with serious insects or diseases with wide host ranges, and are difficult to treat. For example, incoming plants may be infested with resistant insects, mites or Botrytis spores that will be more difficult to treat. Do not accept plant material infected with incurable diseases, such as viruses, bacterial leaf spot diseases, or foliar nematodes. If you need confirmation, isolate a few plants showing symptoms and send them to a diagnostic laboratory.

Troublesome weeds such as chickweed, bitter cress and liverworts may also be introduced on incoming plant material. Liverworts are branching, ribbon-like plants that lack distinct roots, stems and leaves. They reproduce by spores and vegetatively and thrive with high fertility, moisture, and humidity. Liverworts lack true roots, so allowing the media to dry between watering, helps to reduce their vigor. The use of coarse textured mulch also helps to reduce surface moisture levels. Topdressing slow release fertilizers contribute to increased fertility levels on the media surface and to their growth.

If you find isolated evidence of some insect activity, for example, aphids, and decide to keep the shipment, identify an isolated, quarantine area in which to keep the plants. Treat immediately and hold the plants in this area until you are sure that they are healthy, salable and free of pest problems. Ask workers to enter this quarantine area at the end of the day to avoid moving pest problems throughout your garden center.

Prevention

Selecting resistant varieties can help prevent many disease and insect problems. Keep records of what varieties did well for you and your customers. Attend variety trials to see how different varieties performed in the Northeast. Penn State Horticulture Trial Gardens conduct yearly trials of annual and perennial plants submitted by plant breeders, distributors and selectors from around the world. Trial results are published each year. Contact the Penn State Flower Trails, 102 Tyson, University Park, PA 16802 (\$10.00 for a hard copy).

Sanitation

Remove any pet plants and weeds. Pet plants are unmarketable plants that cannot be sold. Retailers may be asked to overwinter your customer's tender plants that may be infested with aphids, whiteflies, mealybugs, rusts, powdery mildew etc. If you decide to provide this service, have a separate greenhouse in which to overwinter these plants.

Thoroughly clean and disinfest your greenhouses between crop cycles. This helps prevent many insect and disease problems. For more information, see the fact sheet, “Disinfecting the Greenhouse” on the UMass Floriculture website at www.umass.edu/umext/floriculture

Weeds can be a source of infestations of aphids, mites, whiteflies, and other pests as well as diseases. They also present an unprofessional image. Regular removal of weeds before they go to seed is needed in and around the greenhouses and retail areas. For more information on weed control, see “Greenhouse Weed Control” on the UConn IPM web site at www.hort.uconn.edu/ipm

Monitoring

Have a weekly, monitoring program in place to detect problems early. The use of sticky cards, random plant inspections, and indicator plants are the basis of a monitoring program. Indicator plants are those plants more likely to become pest infested; for example, lemon balm may become infested with two-spotted spider mites. Train all employees to look for potential problems – even while they are watering.

This past season, some of the more common insect problems I observed at retailers included **aphids, two-spotted spider mites, thrips, shore flies** and **fungus gnats**. **Lily leaf beetles** have been found in Connecticut at retailer and in home gardens. Nuisance pests such as **spittlebugs** can be easily removed with a gloved hand or a forceful jet of water. Some of the more common diseases I observed included **Botrytis blight, powdery mildew, downy mildew, impatiens necrotic spot virus, daylily streak, septoria leaf spot**, and **white smut** on gaillardia.

Sticky Cards

Sticky cards are used to trap winged insects including western flower thrips, whiteflies, aphids, fungus gnats, leaf miners and shore flies. Change and check cards weekly to detect early infestations and better track population trends. Sticky cards may be more difficult to use in retail areas – unless you let your customers know why you are using the cards. It is also helpful to place the cards on separate stakes, so they are not moved with the plant when it is sold. Some growers use yellow sticky ribbons placed directly under the benches to mass trap adult shore flies. For more information on using sticky cards and for color pictures to help identify the insects caught on the cards, see the fact sheet, “Using Sticky Cards to Monitor for Insects” on the UConn IPM website.

Plant Inspection

Plant inspections can be done when watering or grooming plants. Random plant inspections are needed to look for diseases, two-spotted spider mites, immature stages of whiteflies and thrips, scale insects, and mealybugs. Many greenhouse insects and mites are small, so additional magnification is often helpful. A 16x hand lens is available from many IPM suppliers including Great Lakes IPM (<http://www.greatlakesipm.com/>) or 1-800-235-0285), Gemplers (<http://www.gemplers.com/>) or 1-800-382-8473).

Record keeping

Keeping good records of the information obtained from sticky card counts, and plant inspections helps you make appropriate pest management decisions. Keep track of approximate pest numbers (estimates based upon your tolerance levels), and their location. An estimation of plant root health, and overall plant health is also important. Record keeping forms can be found on the UConn IPM website. Keeping accurate records of monitoring efforts helps you determine if pest numbers are increasing or decreasing, whether a particular treatment was effective, or if it needs to be repeated and how extensive a problem is. For example, are black vine weevil larvae coming in on incoming plants or are they already established in the unsold perennials that you keep over from year to year?

Proper Diagnosis

Accurate diagnosis is needed to determine if the cause of the problem is a disease (fungal or bacterial), an insect or mite, cultural error or nutritional disorder in order to make the best management decisions. Contact your local diagnostic laboratory for information on how to best submit samples.

UConn Home and Garden Center and <http://www.canr.uconn.edu/garden/> or call 1-877-486-6271

CT Agricultural Experiment Station - <http://www.caes.state.ct.us>, phone: New Haven: 1-877-855-2237, Valley Laboratory, 860-683-4977

Management Options

Cultural Controls

Cultural errors are the most common problems in production, in retail greenhouses and in the landscape. Retailers often rely on hand watering. New or poorly trained staff may not know how to properly water plants. Overwatering plants leads to root rots, root and plant death. Overwatering also leads to algae growth on the media surface that is an ideal breeding ground for fungus gnats and shore flies. Placing mildew susceptible varieties of bee balm and phlox in damp, humid areas with little air movement encourages the development of powdery mildew. Placing mite susceptible species in the hottest, driest locations of the greenhouse encourages the development of spider mite populations.

Watering late in the day encourages the development of foliar diseases. Over fertilization with high nitrogen fertilizer encourages lush, succulent growth increasing susceptibility to aphids, mealybugs, whiteflies, two-spotted spider mites, powdery mildew, botrytis blight and pythium root rots. Growing crops in colder than ideal temperatures, favors damping off diseases, Botrytis blight and root rot diseases as well as increasing production time.

Failure to properly groom plants to remove spent blossoms, and dead leaves is unsightly, reduces sales and encourages the development of Botrytis blight. *Botrytis* is a saprophyte that can grow on dead tissue as well as spent flowers. *Botrytis* spores are easily spread by water splash and by air currents. Clean up spent blooms before a period of cloudy, overcast weather. Treat plants before grooming to protect the rest of the crop from the

Botrytis spores that will be released as you groom the plants. Water early in the day, so foliage dries rapidly to prevent favorable conditions for the development of Botrytis blight. Proper placement of horizontal airflow fans in greenhouses helps to increase airflow, keeping leaves dry and improving plant growth.

It is difficult to control pests, once they are established. Discard unsold, unmarketable plants as often as possible, so they do not serve as a reservoir for pest problems. Closely monitor any plants that are held over from year to year. The longer you keep the plants, the more likely it becomes that susceptible plants develop problems.

Physical Controls

If only a few plants are infested, some retailers will move the plants outside (weather permitting) and treat them outdoors or move them into a production house for treatment. Sometimes, a small infestation of aphids and mites can be hosed off with a forceful jet of water. Promptly remove heavily infested and diseased plants by placing them directly in a garbage bag, tying up the bag and placing the bag in the dumpster. Mass trapping of shore flies with yellow sticky tape may be possible in certain areas.

Chemical Controls

Choosing an insecticide or fungicide is much more difficult. Here are a few questions to ask before selecting a material:

- 1) Do I need to treat? Is it cost effective?
- 2) Is it effective? How fast acting?
- 3) What is the REI? Is it under 12 hrs?
- 4) Will it damage blooms?
- 5) Will it leave an unsightly residue?
- 6) Will it leave an odor?
- 7) What crops are listed on the label?
- 8) What is the container size?
- 9) How does it work? What is its mode of action? Is it in a different chemical class than other products I have on hand?
- 10) What is the labeled rate? Can it be used in small quantities? 1 gal? 25 gal?

See tables 1 and 2 for a listing of some selected insecticides and fungicides labeled for ornamentals with an REI of 12 hours or less. If products with longer REI's are desired, it may be possible to move the plants to a production greenhouse for treatment. Carefully read labels for information on plant safety, consult current recommendation guides, talk to company technical representatives, and other growers before treating plants in bloom or close to sale. If unsure, spot treat one or two plants and observe for any symptoms of plant damage or unsightly residues, before treating a large number of plants.

Follow all resistance management guidelines that are listed on the label. Avoid tank mixes that increase the possibility of phytotoxicity and may select for insects that are resistant to both types of insecticides used in the tank mix. Follow long-term rotations, using the same insecticide for two to three generations before switching to a pesticide with a different mode of action. If possible, use pesticides with non-specific modes of

action, such as insecticide soaps or horticultural oils when it is safe to do so. See “ Tips on Managing Insecticide Resistance in the Greenhouse “ on the UConn IPM web site for more information.

When selecting fungicides, try to select materials with a low risk of developing resistance such as Alude or Daconil into your rotational schedule. Carefully use materials with a higher risk of developing resistance, such as Subdue, Cleary’s, Heritage, Cygnus and Compass O. More information on fungicide resistance is listed in *the New England Greenhouse Floriculture Guide – A Management Guide for Insects, Diseases and Growth Regulators*.

Biological Control

Biological control may also be an option in retail greenhouses. Natural enemies are living organisms that need to be released when pest populations are low. They do not work as quickly as pesticides; so natural enemies can’t be used as a rescue treatment.

Releasing natural enemies such as predatory mites, ladybird beetles, green lacewings or host specific parasitic wasps is best started in a small area, after you have a regular scouting program in place. Retailers in Massachusetts have successfully used a small parasitic wasp (*Eretmocerus sp.*) for control of silver leaf whitefly on poinsettia. Entomopathogenic nematodes (insect-killing beneficial nematodes) can be easily applied with a watering can or in a small sprayer (with the screens removed). Different species work against specific soil dwelling insect pests. For example, *Heterohabditis bacteriophora* (Heteromask, Cruiser) or *H. megidis* (Nemasys H) are effective for black vine weevil larvae. *Steinernia feltiae* (Nemasys, Scanmask, Nemashield) are effective against fungus gnat larvae.

Many insecticide residues can adversely affect natural enemies for up to three months after application. Check with your supplier or go to Koppert’s and Syngenta’s web sites for information on pesticide compatibility before beginning a biological control program.

Pesticide Application Methods

Pesticide application methods will depend upon the size of the greenhouse, and whether there is a separate production area. For small operations, hand-pump hydraulic sprayers, ranging in size from 1 to 5 gallons are often used. Spray coverage may not be as uniform as desired when using a small sprayer, especially if the pressure changes.

Total and timed release (TR) aerosols contain an insecticide plus propellant to disperse the pesticide when released. They require no special equipment and can be used to treat small and large greenhouses. Several insecticides or combinations of insecticides are available, but there are no available fungicides. Some products also have 24 hr REI. Research at Ohio State University regarding TR aerosols demonstrated that pesticides were deposited on the upper and lower leaf surfaces at a 60% upper to 40% lower ratio.

With dense plant canopies, lack of adequate coverage to the lower leaf surface is of concern especially when targeting pest life stages found on the lower leaves.

For many retail growers, a small 12 to 25 gallon hydraulic sprayer on a cart, with a long hose that can be rolled up, may provide more uniform application, better coverage and ease of use.

Table 1 Some Selected Insecticides for Ornamentals Labeled for Retail Greenhouses

Insecticide	Target Pests	Container Size	Comments
Avid (abamectin) 12 hr. REI G, N, L	Spider mites, cyclamen mites, broad mites, thrips, leafminers. Aphids & whiteflies (suppression)	8 oz, 1 qt.	Translaminar. Do not apply to Shasta daisy and ferns. Resistant mite populations have been observed.
Botanigard (<i>Beauveria bassiana</i> GHA) 4 hr. REI G, N, L	Whiteflies, aphids, thrips, psyllids, weevils, mealybugs	1 qt.	Works by contact. Repeated applications may be needed. Do not apply with fungicide or apply a fungicide within 4 days of an application.
Conserve (spinosad) 4 hr. REI G, N, L	Lepidopterous larvae, sawflies, chrysomelid leaf feeding beetles, gall midges, thrips and dipterous leafminers	1 qt.	Works by ingestion & direct contact. Resistant thrips populations have been reported.
Distance (pyriproxyfen) 12 hr. REI G, N, L	Whiteflies, aphids (suppression), scales mealybugs, fungus gnats, shore flies	1 qt.	Translaminar. Insect growth regulator. Can be applied as a srench (heavy soil surface spray) or drench against fungus gnat larvae.
Endeavor (pymetrozine) 12 hr. REI G, N, L	Aphids, whiteflies	6 – 2.5 oz. water soluble packets	Translaminar, systemic insecticide. Aphids stop feeding within hours.
Floramite (bifenazate) 12 hr. REI G, N, L	Two-spotted spider mites	1 qt.	Works by contact. Quick knockdown and long residual control.
Insect parasitic nematodes Nemasys, ScanMask (<i>S. feltiae</i>) G	Fungus gnat larvae, western flower thrips pupae	5 pk/50 million nematodes/ 25 gallons of water treats 1000-1700 ft of greenhouse area.	Treat new plants in propagation areas as they are introduced. Agitate during application.

Insecticide	Target Pests	Container Size	Comments
Insect parasitic nematodes Heteromask, Cruiser (<i>Heterohabditis bacteriospora</i>) Nemasys H (<i>H. megidis</i>)	Black vine weevil larvae	5 pk/ 50 million nematodes treats 5500 square feet	Treat in mid to late August. Apply as a drench or spray. Infected larvae turn red. More effective in container production than in the landscape.
Ornazin 3% EC (azadirachtin) 12 hr. REI G, N, L	Aphids, caterpillars, fungus gnats, leafminers, mealybugs, soft scales, thrips, whiteflies	1 qt.	Insect growth regulator. Repeated applications may be needed.
Pedestal (novaluron) 12 hr. REI G, N	Thrips, whiteflies leafminers (suppression)	1 qt.	Insect growth regulator. Ingestion, some contact activity. Do not use on poinsettias.
Preclude TR (fenoxycarb) 12 hr. REI G	Aphids, leafminers, mealybugs, scale, thrips, whiteflies	Micro Total Release, 2 oz. and 6 oz. cans	Insect growth regulator for immature stages.
Safari (dinotefuram) 12 hr. REI G, N, L	Aphids (drench preferred), scale, fungus gnats, leafminers, mealybugs, scale, thrips (suppression), whiteflies	3 lbs.	Systemic insecticide. Do not rotate with Tristar, Marathon, or Flagship.
Synergy Super Fine Spray Oil Emulsion (petroleum oil) 4 hr. REI G, N, L	Aphids, fungus gnat adults, leafminers, mealybugs, mites, black spot, powdery mildew, rust, plant bugs, sawfly, scales, thrips, whiteflies	2.5 gal.	Works by contact. Micro emulsion with smaller droplet size reducing potential for phytotoxicity. Not labeled for herbs.
TetraSan 5 WDG (etoxazole) 12 hr. REI G, N, L	Two-spotted spider mites	Water-soluble packets containing 2 oz. Do not break open packets. Low use rates are 1 to 2 packets per 25 gal.	Translaminar. Mite growth regulator. Inhibits molting process on eggs & nymphs. Do not use on poinsettia bracts.

Table 2 Some Selected Fungicides for Ornamentals for Retail Greenhouses

Fungicide	Target	Container Size	Comments
Alude (Phosponate Fungicide) 4 hr. REI G, N, L	<i>Pythium</i> , <i>Phytophthora</i> , Downy Mildew, bacterial leaf spot on ivy	2.5 Gal.	Systemic fungicide. Stimulates plants' natural defense mechanism. Make applications before disease development.
Chipco 26019 Sextant (iprodione) 12 hr. REI G, N	<i>Alternaria</i> , Botrytis Blight, Rhizoctonia stem, root and aerial web blight	½ Gal. – Chipco 1 Gal. – Sextant	Contact fungicide with preventative and curative properties. Do not use as a drench on impatiens or pothos or spathiphyllum.
Companion (<i>Bacillus subtilis</i> GBO3) 4 hr. REI G	Suppresses diseases such as <i>Rhizoctonia</i> , <i>Pythium</i> , <i>Fusarium</i> , <i>Phytophthora</i>	1, 2.5 or 5 gal.	Preventative, biological fungicide. Increases root vigor. Repeated applications may be needed. Can be used in combination with reduced rates of chemical fungicides.
Cleary 3336 OHP (thiophanate – methyl) 12 hr. REI G, N, L	Anthracnose, black spot, leaf spots & blights, powdery mildews, rusts, twig blights, stem, crown and root rots	1 qt., 1 gal., 2.5 gal.	Systemic fungicide. Several reports of widespread resistance to <i>Botrytis</i> .
Compass 0 50WDG (trifloxystrobin) 12 hr. REI G, N	Anthracnose, black spot, botrytis, downy mildew, leaf spot, powdery mildew, rust, scab, myrothecium, rhizoctonia root rot	8 oz., 1 lb.	Translaminar, localized vapor movement and re-deposition on plant. Do not rotate with Heritage or Cygnus.
Daconil Weather Stik	Leaf spots, foliar blights, Botrytis,	2.5 gal.	Broad-spectrum protectant fungicide.

(chlorothalonil) 12 hr. REI G, N, L	powdery mildew, rusts, scab.		
Fungicide	Target	Container Size	Comments
Decree (fenhexamid) 12 hr. REI G	Botrytis Blight	1 lb., 2. 5 lbs.	Protectant fungicide. Follow resistant management guidelines on label.
Milstop (potassium bicarbonate) 1 hr. REI G, N, L	Powdery Mildew	5 lbs.	Works by contact. See label for plant safety information. High rates may result in phytotoxicity. Spot test first.
Plantshield (<i>Trichoderma harzianum</i> T-22) No REI G, N, L	<i>Pythium</i> , <i>Rhizoctonia</i> , <i>Fusarium</i> , <i>Cylindrocladium</i> and <i>Thielaviopsis</i> . Suppression of botrytis and powdery mildew	1 lb., 3 lbs.	Preventative, biological fungicide. Becomes active when soil temperatures are above 50F.
Rhapsody (<i>Bacillus subtilis</i> QST 713) 4 hr. REI G, N, L	Powdery mildew, anthracnose, black spot, Botrytis, fungal and bacterial leaf spots	1 gal.	Preventative, biological biofungicide. Use as a protectant or at first sign of disease. Re-apply at 3 to 10 day intervals depending upon disease pressure.
Strike 50WDG (triadimefon) 12 hr. REI G, N	Flower blight, leaf blight, spots, powdery mildew, rusts, tip blight	½ lb.	Systemic fungicide. Good coverage needed. Do not rotate with Rubigan or Eagle.
Truban 25EC, 30WP (etridiazole) 12 hr. REI G, N	<i>Pythium</i> , <i>Phytophthora</i>	25 EC, 1 qt. 30 WP, 2 lb. jar	Protectant fungicide. Should not be mixed with other pesticides unless adequately

			trialed first.
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Mention of particular materials is for educational purposes only and is not to be interpreted as an endorsement, nor is criticism implied of any materials not mentioned.

Consult and follow labels for registered uses. To avoid any potential phytotoxicity problems, spot test first before widespread use.

Most products require full compliance under the Worker Protection Standards. The official version of the WPS- How to Comply Manual as Revised 2005, can be downloaded directly from the EPA's website at <http://www.epa.gov/agriculture/htc.html>

Adapted from: Smith, T. Pest Management in Retail Greenhouses. UMass Fact sheet. Available on line at: www.umass.edu/umext/floriculture

References

Some Distributors of Pesticides

Griffin Greenhouse and Nursery Supplies, www.griffins.com, 203-699-0919

Helena Chemical Company, 413-247-3126

W. H. Milikowski, 800-243-7170

Some Distributors for Biological Control Products

Some suppliers of natural enemies include:

Greenspot, www.greenmethods.com

IPM Laboratories, www.ipmlabs.com

Koppert, www.koppert.com

Syngenta, www.syngentabioline.com

The California Department of Pesticide Regulation has available a listing of suppliers of natural enemies:

Suppliers of Beneficial Organisms in North America –

<http://www.cdpr.ca.gov/docs/ipminov/bensuppl.htm>

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Selections on-line at:

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2005-2006 UMass Extension Management Guide for Woody Ornamentals. Professional Management Guide for Insects, Diseases, Weeds of Trees and Shrubs in New England. \$40.00 Available from UMass Outreach Bookstore, 413-545-2717, email books@outreach.umass.edu

Updates on pest activity related to greenhouses

New England Greenhouse Update -

http://www.negreenhouseupdate.info/greenhouse_update/

University of Connecticut IPM web site <http://www.hort.uconn.edu/ipm/>

Northeast Greenhouse IPM Notes – A Publication of Cornell and Rutgers

<http://rcewebserver.rutgers.edu/pubs/greenhouseipmnotes/>

Michigan State – Greenhouse Alert

<http://www.ipm.msu.edu/greenhouseAlert.htm>

University of Maryland Cooperative Extension

Weekly Reports for Greenhouse, Nursery and Landscape Industries

<http://www.agnr.umd.edu/ipmnet/>

Some selected web sites on biological controls:

A Grower's Guide to Using Biological Control for Silverleaf Whitefly on Poinsettias in the Northeast United States:

http://www.umass.edu/umext/floriculture/fact_sheets/pest_management/slwf.html

Greenhouse IPM with an Emphasis on Biocontrols –

<http://paipm.cas.psu.edu/pdf/ghmanual/entire.pdf>

Biological Control of Insects and other pests of Greenhouse Crops – North Central Regional Publication 581. 108 pp.

<http://cecommerce.uwex.edu/pdfs/NCR581.PDF>

A Guide to Natural Enemies of North America – www.nysaes.cornell.edu/ent/biocontrol

Biological Control and Pesticide Compatibility

See www.koppert.com and go to side effects database.

See www.biobest.be and go to side effects database

Some selected web sites related to organic solutions

Northeast Organic Farming Association – NOFA – CT. Published a list of standards and can help answer questions. See their web site:

<http://www.ctnofa.org/> or call 203-888-5146

Standards for Organic Land Care: Practices for Design and Maintenance of Ecological Landscapes. Copies for Organic Land Care are available for \$20.00 (including shipping and handling).

Organic Materials Review Institute (www.omri.org), who publish a list of pesticides and fertilizers approved for use in organic production. This list is available from their web site or you may call 541-343-7600 for more information.

Suppliers have products reviewed for a fee, and OMRI doesn't screen all available products. Other organic options may be available.

National Sustainable Agricultural Information Service – www.attra.org or call 800-346-9140, PO Box 3657, Fayetteville, AR 72702

Resource Guide for Organic Insect and Disease Management – Available on line at www.nysaes.cornell.edu/pp/resource guide/

Some selected web Sites for pest management information relating to homeowners

UConn Home and Garden Center - <http://www.canr.uconn.edu/garden/>

UConn Plant Database – <http://www.hort.uconn.edu/plants>

CT Agricultural Experiment Station - <http://www.caes.state.ct.us>, click on "Plant Pest Handbook"

University of Connecticut IPM - <http://www.hort.uconn.edu/ipm/>

Gardening Resources - Cornell University, Department of Horticulture - <http://www.gardening.cornell.edu/>

Cornell Fruit Resources –

<http://www.hort.cornell.edu/extension/commercial/fruit/index.html>

Perry's Perennial Pages - <http://www.uvm.edu/~pass/perry/>

University of Rhode Island - Landscape Horticulture Program Fact Sheet Index - <http://www.uri.edu/ce/factsheets/index.htm>

Ohio State Plant Facts – <http://plantfacts.osu.edu>

Mid-Florida Research and Extension Center – <http://mrec.ifas.ufl.edu/other.htm>