CT IPM
Integrated Pest Management Program
Department of Plant Science and Landscape Architecture
UConn Extension

Pest Management for Retail Greenhouses and Garden Centers

Introduction

Successful pest management is more challenging for retail growers compared to wholesale growers for many reasons. Due to the seasonal nature of the business, there is continual employee turnover from year to year. New employees may have limited knowledge of the potential **insect, mite, disease**, and **cultural problems** to look for on incoming shipments and existing plant inventory. It is difficult for employees with multiple responsibilities to find the time to inspect plant shipments when they arrive. Retailers purchase plants from many different suppliers, making it difficult to track down potential sources of insects or diseases without careful record keeping.

To be competitive, retail growers offer a wide range of plant material, including vegetable and herb bedding plants, specialty annuals & herbaceous perennials, tropical foliage plants, succulents, and small fruits. Very few products are labeled for use on all 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.

Plants of different ages are often placed together, increasing the likelihood of pests moving from older plants to younger plants. Foliage plants may be held in retail greenhouses from season to season, increasing the chances that **mealybugs, thrips, whiteflies, scale insects, viruses** and other long-term problems become established.

Retail operations are open to the public 7 days a week, making it difficult to apply pesticide treatments. Plants in bloom or with tender growth are more susceptible to spray injury. They may be displayed with hard goods, making it necessary to move those plants outside or into a production area before spraying.

Tips for developing a successful integrated pest management (IPM) program.

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

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 overwatering or high salt (EC) levels. Do not accept plant shipments with serious

insects or diseases with wide host ranges that are also difficult to treat. For example, incoming plants may be infested with resistant insects, and mites or Botrytis spores that will be more difficult to treat. Do not accept plant material infected with incurable diseases, such as viruses, or foliar nematodes. Isolate a few plants showing symptoms and send them to a diagnostic laboratory for diagnosis.

Troublesome weeds such as chickweed, bittercress 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 thriving with the high fertility, moisture, and humidity levels common in greenhouses. 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 insect activity, such as aphids, and decide to keep the shipment, identify an isolated, quarantine area in which to keep these infested 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 perform in your region.

Sanitation

- Remove any unsold “pet plants” and weeds. Pet plants are unmarketable plants that cannot be sold.
- Retailers may be asked to overwinter customer’s tender specimen plants that may be infested with aphids, whiteflies, mealybugs, spider mites, thrips, 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.
- Weeds can be a source of infestations of aphids, thrips, 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.

Monitoring

Have a weekly, monitoring program in place to detect problems early. The use of sticky cards, random plant inspections, and pest-infested indicator plants are needed for an effective 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 or pepper transplants may become infested with aphids. Train all employees to look for potential problems – even while they are watering.

Sticky Cards
Sticky cards are used to trap winged insects including t**hrips, 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.

Plant Inspection
Have your staff do plant inspections 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.

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. Keeping accurate records of monitoring efforts helps you determine if pest numbers are increasing or decreasing, whether a treatment (biological control agent releases or chemical) was effective, or if it needs to be repeated. Good communication is needed to share this information.

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

Management

Cultural Controls
Cultural mistakes are very common. 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. Placing mildew susceptible varieties of garden phlox in damp, humid areas with little air movement encourages the development of powdery mildew. Placing spider mite susceptible species in the hottest, driest locations encourages the development of spider mites.

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. If you are growing crops in colder than

ideal temperatures, these conditions favor damping off diseases, Botrytis blight and root rot diseases.

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 (HAF) 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 the plants outdoors. Sometimes, a small infestation of aphids or spider 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.

Biological Controls

It can be difficult to time pesticide applications in a retail operation. But there are no re-entry intervals for biological control agents! Even though natural enemies do not leave a spray residue they may leave evidence of their presence. Take time to educate your customers, explaining that “aphid mummies” have been parasitized by a small mini-wasp, leaving the outer shell of the aphid that often turns tan and papery.

As more wholesale growers are incorporating biological controls into their pest management programs, the lack of harmful pesticide residues makes it easier for retailers to continue using biological controls. Extra effort, education and commitment is needed for biological control programs to be successful. Start in a small area to gain experience. For many growers/retailers, releasing predatory mites for thrips, and spider mites are easier ways to begin using biological controls.

Here are a few questions to ask before starting a biological control program:

1) Have I reviewed pesticide use for the previous year and especially the past 3 or 4 months to ensure there are no harmful pesticide residues?

2) Do the incoming plants have any long-lasting pesticide residues that would adversely affect the viability and reproduction of the biological control agents? Talk to your plant supplier.
3) Check online pesticide side effect databases for more specific information on the effect of pesticides on specific biological control agents or talk to your biological control supplier.
4) Do I know the species of pests I have had problems with? Many biological control agents are host specific.
5) Is there a biological control agent commercially available for the specific pest (s)?
6) Am I familiar with the temperature, and relative humidity requirements of the specific biological control agents? Will they be fast acting enough to be effective?
7) Have I selected supplier (s) that I am comfortable with? Do they provide adequate technical support and answers to my questions?
8) Have I identified a responsible person within my company to handle and release the biological control agents as soon as they arrive?
9) Do I have a "scout" to evaluate their effectiveness?
10) Am I committed to making the program work?
10) Do I have an educational program to explain and promote my biological control program to my customers?

Chemical controls may still be needed

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 there a biological control agent that is effective and can be used instead?
3) Is it effective? How fast acting?
4) If I am releasing biological control agents, are they compatible?
5) What is the Re-entry Interval (REI)? Is it under 12 hrs.?
6) Will it damage blooms?
7) Will it leave an unsightly residue?
8) Will it leave an odor?
9) What crops are listed on the label?
9) What is the container size?
10) How does it work? What is its mode of action? Is it in a different chemical class than other products that I have on hand?
11) What is the labeled rate? Can it be used in small quantities? 1 gal? 25 gal?

Carefully read labels for information on plant safety, consult current recommendation guides, and talk to company technical representatives and other growers before treating plants in bloom. If unsure, spot treat one or two plants and observe for 7 to 10 days for any symptoms of plant damage or unsightly residues, before treating large numbers of

plants. Most products require full compliance under the Worker Protection Standards. For more information see the **EPA website.**

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. 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.

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.

Educational training videos for employees are available in both English and Spanish on the Greenhouse Channel (UConn) on identifying insects on sticky cards, checking fertilizer injectors, proper watering techniques, etc.

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