Grower 101:
A Greenhouse IPM Plan

Developing and implementing a greenhouse IPM plan is essential.

IPM scouts should be provided with the proper tools, such as a clipboard for writing down observations.

By Scott Ludwig

Greenhouse crop producers have been under increasing pressure to reduce their use of pesticides. The easiest way to reduce pesticide use and improve crop quality is to develop and implement an integrated pest management (IPM) plan.

PREPARATION

Before developing an IPM plan, it is important to understand the basics of an integrated pest management program. IPM is a strategy to avoid or prevent damage caused by insects, mites, diseases, weeds, etc. It strives to use a combination of pest control tactics to minimize risks to human health, environment and non-target organisms. IPM focuses on tactics that will prevent or avoid anticipated pest problems rather than trying to remediate problems only after they occur. IPM is a systematic, information-intensive approach that relies upon a basic understanding of the plant's requirements for normal growth, the pest's biology and status and how these are influenced by the production system. To properly implement an IPM program, you need to evaluate all control methods available.

Mechanical control employs labor and machinery to directly reduce pest abundance. Mechanical control practices include hand-pulling weeds that serve as pest reservoirs, insect screening on vents to exclude flying insects, soil cultivation and trapping.

Physical control (also known as environmental control) is the manipulation of a crop's environment to reduce the risk of damage due to pests. Practices include manipulation of temperature, light and humidity regimes through ventilation, irrigation timing, and method (sprinklers vs. drip irrigation) and soil treatment through solarization or steam pasteurization.

Cultural controls are modifications of normal plant care practices to limit pest problems. These include selection and use of locally adapted or pest-tolerant plant species or cultivars, crop rotation, changing planting times, adjusting the frequency and amount of irrigation and fertilization, and the use of adequate sanitation practices.

Biological control is the use of beneficial organisms to control pests. Natural enemies of pests include pathogens, predators and parasites. Biological control practices include the conservation of naturally occurring beneficial organisms through adequate selection and timing of least disruptive pest control alternatives, the mass release of commercially available natural enemies into crops and the importation of exotic natural enemies through federal and state government officials.

Finally, chemical control is the use of pesticides to control or repel pests. Chemical control options include the use of insect growth regulators, insect pheromones, biological pesticides and conventional chemical pesticides.

DEVELOP A PLAN

You can divide your IPM plans into three key parts: sanitation, pest monitoring program and pest managment.

Sanitation. It is critical to start with a weed-, pathogen- and arthropod-free greenhouse. In the development of your IPM plan, designate an individual who is responsible for ensuring that all weeds have been pulled from under the benches, benches are disinfested and any old media or plants are removed from the greenhouse before a new crop is started. Develop a policy that states what sanitary practices need to be followed during production. Foot baths and hand sanitizer can be used to reduce the likelihood of bringing pathogens into the greenhouse. Employees should understand that if they have been handling plants with an insect or disease problem, they are not to enter another greenhouse until they have changed clothes. Plastic bags should be available for the disposal of plants or plant debris infested with insects or plant pathogens. A compost or burn pile should be placed far way from the greenhouse air intakes to avoid reinfesting your greenhouse.

Monitoring. Monitoring, also known as scouting, is the regular, systematic inspection of crops and growing areas. Pest monitoring is the foundation of effective IPM programs. Monitoring involves quantitative sampling on a limited number of plants to estimate pest population size in the whole crop. Regular scouting helps eliminate potential problems before they happen, determine the specific cause and severity of pest problems, identify locations requiring immediate treatment, and evaluate efficacy of pest control tactics.

Develop clear and specific plans of how sampling will be done and who will do it. Scouting should be done at least weekly on a regular schedule and by a trained employee or professional. Designate and map contiguous areas of a similar crop for which pest management needs are similar and for which monitoring results are summarized individually (typically 2,000-10,000 feet^2. Plants and growing areas need to be inspected carefully, taking into account where on the plants pests are likely to be found and under which environmental conditions. Scouts need to be provided with sampling tools including a hand lens or magnifying glass (10-15¥) and a clipboard or notebook to record observations and management actions.

The most common monitoring technique is visual inspection of plants, checking all plant parts and the upper and lower leaf surfaces, especially on new growth. There are no set guidelines on how many plants to sample, but the more plants you check, the less likely it is that you will miss a potential problem. Sampling may be done on a predetermined number of plants or by spending a predetermined amount of time per unit area. Plants selected for sampling may be chosen at random and from those expected to have problems, such as plants surrounding hot spots, plants from pest-prone cultivars or pest-prone areas. Quantification can be done by counting the number of pests per plant or plant part (such as number per leaf), by measuring the percentage of infested plants, or by recording the number of pests on sticky traps. Whatever the method chosen, it is critical to conduct sampling using the same methods each time so results can be compared between sampling dates. This will also enable you to plot and visualize population trends in time and space to make the best pest management decisions. It is critical the greenhouse scout have a designated person to whom they report the findings. If a control is needed this will ensure that it will be implemented as soon as possible.

Management. The final component of your IPM plan should address how to manage arthropod pests and plant pathogens. By determining in advance how you plan to manage common pest problems, you can be assured you have chemicals or biological control agents available when needed. It is important to update your chemical management program every year because new products enter the mar-

ket all the time. Many of the new pesticides available are compatible with IPM programs in that they have a very narrow spectrum of pest susceptibility and are compatible with biological control agents. It is important to consider the plant's stage production. For example, you would not want to apply a pesticide to control a pest occurring on new foliage in a crop that is about to be pinched or pruned. The pinching will most likely remove part of the insect population. It will also be easier to reach the insects after the plant canopy has been thinned out.

IMPLEMENT THE PLAN

It will be important to keep constant communication with your employees. At the end of the season, a meeting should be held to discuss the effectiveness of the IPM plan and make any changes for next year's crops.

A recent IPM demonstration trial conducted with cooperation from a Cherokee County, Texas, plant farm demonstrated that IPM cannot only reduce pesticide usage and still control insect pests, it can save greenhouse managers money. Bobby Murray, owner/operator of Murray Plant Farms near Jacksonville, Texas, operates 17 greenhouses, with 60 percent of his sales consisting of tropical hibiscus and the remainder in bougainvilleas. The 60 percent hibiscus represents 5,000 12-inch pots of hibiscus and 11,000 1-gal. containers of both hibiscus plants and hibiscus trees. Specialization means Murray can concentrate on doing what he does very well. But, specialization also means the outbreak of one plant disease or pest can be devastating. Consequently, when Murray began his business, he was spraying every two weeks. Later, his practice evolved to spray as needed, although "as needed" was based on observation. If a few insects were found in one greenhouse, it was procedure to spray all the greenhouses, just to be on the safe side. The "as needed" program worked. No crops were lost to insect infestation, but when the Texas IPM Program advanced the idea that there was a way to use less chemicals but still achieve good control, Murray was interested.

"Using chemicals is not one of my favorite things, so I was ready to try it," Murray said.

Murray was cautious, as are many plant farm operators. We began an IPM program in two of the plant farm's greenhouses. An IPM plan was developed, which relied on regular scouting to determine if pesticide applications were needed. The number of insects on sticky cards and the plant foliage was monitored once a week. Murray found the insect control in the two IPM greenhouse to be better than those in his other greenhouses. In one IPM greenhouse, Murray sprayed once in a three-month period, while in the other house he sprayed twice. In comparison, Murray sprayed his conventionally managed greenhouses six times over the same period. This resulted in the IPM houses having a 24 percent savings over the conventionally managed houses. But there were other savings to which it's hard to attach a dollar figure — labor and human health issues and an impact on the environment using IPM. But that's for another article… GPN

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