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# Responsible *Chemical* Use

*Growers should be aware of specific chemical issues so their employees apply insecticides in safe and environmentally sound ways.*

The best ornamental plant production programs often rely on the integration of pest management methods. Among them, the use of insecticides at appropriate times is considered critical. During the past few years, I have seen increased interest in developing sustainable management programs in greenhouses and nurseries. This requires the optimization of management techniques to provide effective control of the pests attacking the plants being grown, but also employing techniques that can be repeated time after time with minimum impact on our environment.

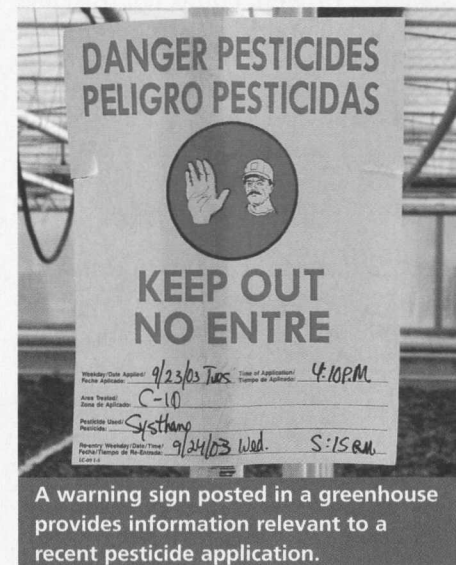
Therefore, the green industry needs to be mindful that although insecticides will continue to be an important tool to manage insects, practices need to be improved to prevent problems, such as insect resistance and environment pollution. In fact, it is quite possible that the development of such sustainable systems can be translated into value added for the plants being produced.

Here, I list a few of the components that growers need to take into consideration when applying insecticides in a safe and environmentally sound way. This means that it should be possible to have a top-notch management program, which includes insecticides with high efficacy that are less harmful to the environment.

*Text and photos by DR. LUIS CAÑAS*

**Application preparation and insecticide selection.** Every time a crop is going to be produced, detailed plans about how it will be grown need to be laid out. This includes preparing a detailed outline of the pest management methods that will be used against the most common pest that might attack a particular plant. As I mentioned already, insecticides will continue to be a critical component of any integrated pest management (IPM) program for the production of ornamental plants for years to come.

In fact, some researchers point out that the use of pesticides will continue to be a



A warning sign posted in a greenhouse provides information relevant to a recent pesticide application.

significant strategy when controlling pests of ornamentals. This makes it very important that the selection of the compound used takes into consideration how it might impact the environment. While efficacy of the compound should still be a critical factor for the decision of which compound to use, often different compounds with similar efficacy can be evaluated depending on other factors, such as cost and impact on the environment. If you are willing to do this, you could find information relevant to the impacts of particular compounds on the environment before these are purchased.

One excellent source of information is the Web site, [www.cdms.net](http://www.cdms.net), where it is possible to find the labels and material safety data sheets (MSDS). On the MSDS, it is possible to find information, such as LD50 and the potential effects of such chemistry on some environmental components. LD50 is the lethal dose at which 50 percent of the target population is killed. Although limited, the MSDS provides information that can be used to compare similar compounds. And, remember that the larger the LD50, the less toxic the compound will be for humans. In addition, information, such as the impact on aquatic species and other impacts on the environment, can be obtained from the MSDS (check toxicological and environmental information).

Once the compounds have been evaluated, you could make a decision in terms of how these tools fit in your management program. For instance, when controlling whiteflies, buprofezin is a growth regulator with an LD50 of greater than 5,000 milligrams and is considered safer than other broad-spectrum chemistries. Oftentimes, the selection of an insecticide delivery method might depend not just on its efficacy, but also on its environmental safety. For example, using a compound as a drench can allow the use of other techniques, such as the release of biological control agents.



A worker is applying a systemic insecticide as a drench. The insecticide is added to the irrigation water and taken up by the plant.

Selecting appropriate chemicals for rotation is also very important. This can be achieved by contacting the extension educator in your area and requesting information about recommendations for control while taking into consideration the cost of the compound, its toxicity and its environmental effect. Rotating compounds with different modes of action can lead to a reduced incidence of insect resistance. Furthermore, a proper rotation might help incorporate other techniques, such as the use of biological control agents. A good source of information to assess the different mode of action groups can be found at [www.irac-online.org/Crop\\_Protection/MoA.asp](http://www.irac-online.org/Crop_Protection/MoA.asp).

### Worker protection and training.

Worker protection is required by law, but when done well it also conveys the message that your employees' well-being is important. Proper training on how to use insecticides should include information about the consequences of overuse, from insect resistance to environmental effects of the compounds used. Efforts should be made to explain why such knowledge is important for the development of a good IPM program. The training program

should go beyond the usual pesticide credit training. It is very important that workers are proficient in the use of insecticides, but this needs to be done in the context of an IPM program. Sometimes, it is difficult to explain to someone with no IPM experience how the use of insecticides is only one component of the more complex system of IPM.

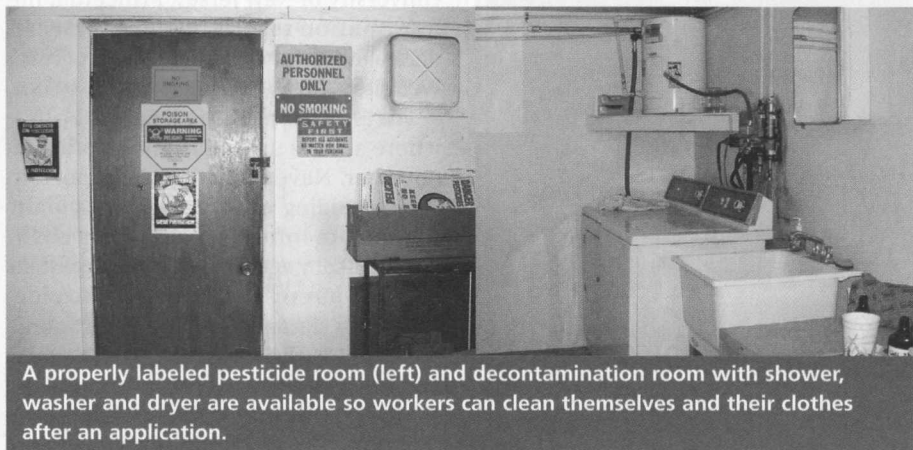
Currently in the Midwest, we have been offering personalized training to employees about integrating components that affect plant health — like plant nutrition, use of plant growth regulators and insecticides — as components of a plant health management program, which encompasses IPM programs for various insect pests and diseases. The idea here is that all workers need to be proactive in identifying potential problems before they occur. In turn, workers should be able to convey this information to supervisors so they can suggest the appropriate corrective measures.

One crucial component of this is to take a team approach where everyone is responsible to provide information relevant to the prevention of pest and disease problems. An example is The Ohio State University Web site, <http://pested.osu.edu/privatestudy.html>, which is dedicated to pesticide application training of workers.

### Appropriate application equipment and chemical storage.

Everyone working with insecticides knows that these chemicals have been designed to kill the insect target. However, many of them also are toxic to humans. Therefore, it is critical that they are applied in a safe way. For this to be achieved, several factors need to be considered.

The use of suitable spraying equipment is critical because its malfunction could lead to application failure, which results in repeated applications to control the pest.



A properly labeled pesticide room (left) and decontamination room with shower, washer and dryer are available so workers can clean themselves and their clothes after an application.

Proper training on how to use insecticides should include information about the consequences of overuse, from insect resistance to environmental effects of the compounds used.

In addition, properly maintained equipment will reduce the chances of contaminating unintended areas. Therefore, it is necessary to have a maintenance program in place for all the equipment used to deliver pesticides. A part of such a program should include calibration of the equipment every six months or, at the very least, once a season. Through this process, you need to follow the manufacturer's recommendation for equipment maintenance. However, maintenance needs to be done not only on the sprayer, but also on its hoses, nozzles and so on.

**Evaluation of efficacy.** A critical component that is often missed, or more often difficult to find, is how good a product is against a particular insect. Unfortunately, there is no single source of unbiased information available. Most often, for a particular state the best resource would be the extension educator in your county or an extension specialist who could provide such information for your commodity. And, here lies the problem because it is difficult to find that one person who has all this information at hand. Of course, there are ways some of this information can be found, such as pesticide education programs, workshops and so on. The USDA IR-4 Biopesticide Research Program, hosted at Rutgers, The State University of New Jersey, Princeton, has information regarding the latest tests done with some products. The program's Web site is <http://ir4.rutgers.edu>.

We are still missing a central place where all this information is available, however. Nevertheless, it is important when deciding which compounds to use to evaluate information about a pesticide's efficacy against a particular pest, its cost and its environmental impact. Ideally, when similar compounds are found, it would be important to consider their environmental impact. Again, your best source for this information might be the extension educator in your county.



An eye-safety sink is accessible for workers at a greenhouse facility in Ohio.

**Other IPM practices.** The combination of the use of selective insecticides that have high efficacy and pose reduced risk to the environment with techniques, such as biological control and proper plant growth, would result in improved plant health programs. Currently, the interest in the use of biological control agents has increased, and there are several large companies supplying biological control agents throughout the US. For a complete list of suppliers, please visit [www.anbp.org/members.htm](http://www.anbp.org/members.htm).

It is interesting to note that throughout the Midwest and during the past couple of years, several large companies producing ornamentals have adopted strategies that include selective use of insecticides in combination with the use of other techniques, such as the release of biological control agents. In my opinion, only a truly integrated approach can lead to the development of sustainable pest management programs. However, these programs would need to be tailored to each facility. This, of course, would require significant training and effort from managers to be successful. I believe that this will become more common as we strive to produce more sustainable plant production programs.

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**References.**

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