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Pesticide application tips: back to basics

The use of pesticides continues to be a critical element of IPM programs for the successful production of ornamental plants. These pesticides can be used to control insects, diseases and weeds. However, much care is needed to use these compounds effectively. Even when the application of pesticides is common on a given system, pest control depends on several factors in addition to the actual efficacy of the compound. In some instances, a product that is well-known for its activity against a certain pest can have ineffective results. When this happens, we need to go back to our basic ideas of how to apply a pesticide correctly.

Nowadays, pesticides are used in a lot of different systems, and while this practice is common and simple, there are many elements that need to be taken into consideration for a good application to happen. While the different components that play an important role in pesticide application can be summarized in various categories, there are several major elements that growers can manipulate to improve the chances of a successful application. I will briefly mention some of these elements and some of the major problems associated with them.

Chemistry selection. When deciding what pesticide to use, it is important to consider what group of organisms we are targeting. For instance, newer insecticides are selective to particular insect groups. In addition, successful control usually depends on selecting appropriate compounds (and formulations) to establish spray rotations. Currently, there are 28 different mode-of-action groups (the way chemicals kill insects). Ideally, rotations of three to five different compounds are necessary when multiple applications are needed to reduce insect populations.

Characteristics of spray tank mixtures. When a pesticide is mixed with water, we need to pay attention to the pH and alkalinity of the water. Usually, high pH (greater than 7.0) and high alkalinity (greater than 60 to 80 parts per million) will have severe impacts on pesticide performance. Most importantly, test the water used for pesticide applications periodically, and take appropriate action to correct any problems.

High water pH can be adjusted by injecting sulfuric or phosphoric acid to the irrigation lines. Using a buffering agent, such as Buffer PS., Buffer Extra Strength or pHase5, will help correct water problems for a pesticide mix (photo, above). Having a pH meter is also a good idea. Additional information can be found at: www.umass.edu/ umext/floriculture/fact_sheets/ greenhouse_management/ph_pesticides. htm and http: / /floriculture .osu.edu/archive/apr04/spraysolutionph .html.

A crew prepares to test the water for a pesticide application.

Atomization and delivery. Proper equipment selection and maintenance are critical for successful delivery of a pesticide. Currently, there are many different types of equipment that can be used to deliver pesticides, and most of them are quite good. Some of these include: hydraulic sprayers, air-assisted electrostatic sprayers and mist blowers. However, for the equipment to do its job, it needs to be constantly checked and properly maintained.

For any given piece of equipment, it is always best to follow the manufacturer's recommendations for maintenance. But the best way to make sure the equipment is working properly is to do periodic calibrations (photo, opposite). At a minimum, calibrate the equipment once per season. During calibrations, operators should only use water to measure the delivery of the equipment. In addition, water-sensitive paper can be placed in various locations to test deposition. Parts of the application equipment that need particular attention include: nozzle(s), hoses, gaskets and pressure gauge.

Deposition. Once the application starts, attention must be placed on the deposition of particles (the amount of droplets placed on a given leaf area). There are few insecticides that have systemic activity and can spread throughout the plant regardless of their place of contact. But a good number of available chemistries only have contact activity and need to touch the target organism. For these compounds to work effectively, good coverage is necessary. Thus, care needs to be taken to make sure particle deposition is optimal.

In some areas, such as greenhouses, equipment that produces small droplets might be best because there is no drift potential, and those smaller particles would allow for better foliage coverage. Some sprayers also create enough turbulence for the droplets to land on the underside of the leaf — where a significant number of insect species live. In the field, however, smaller particles would increase the chance of drift, and droplet size cannot be too small.

During the calibration process, water-sensitive paper can be placed in various locations and on various plant parts to evaluate the deposition achieved by the equipment. This can also be used to test new equipment. Particle deposition is also affected by the adjuvant used in the pesticide mix. Nowadays, there are many different types of adjuvants, including drift-control agents and rainfast agents.

The main concern with the use of adjuvants on ornamentals is the potential for phytotoxicity. Because no single adjuvant

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has been tested on every ornamental plant and cultivar, it is best to try a new adjuvant on a reduced area and check for phytotoxic effects.

Penetration and uptake. The last major elements to consider when using a pesticide are its penetration and uptake. Using different spray pressures and nozzles can control penetration. Of course, the type of equipment would play an important role in penetration, but how the equipment is used would also be important. Applicators need to be trained properly on how to use the equipment. For instance, operators of certain hydraulic sprayers need to have the spray nozzle placed a few feet from the target to get optimum penetration. The best way to test this is to do it during calibration and to use water- sensitive paper to evaluate the penetration.

A crew member takes a sprayer toward the service area for checkup and calibration.

Uptake, on the other hand, is more the result of the pesticide active ingredient and formulation. Thus, operators need to take into account the uptake properties of a particular chemistry when planning the applications. And remember that the best place to find information about the formulation and particulars of the active ingredient is the label.

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