GROWERTALKS

Pest Management

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Multiple Pest Complexes: Dealing With More Than One Insect or Mite Pest

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Greenhouse producers, in general, and depending on the types of horticultural crops being grown, usually contend with a multitude of insect or mite pests, not just one, which may be referred to as multiple pest complexes.

The major insect and mite pests of greenhouse-grown horticultural crops are aphids, thrips, fungus gnats, whiteflies, shore flies, leafminers, mealybugs and spider mites. Many articles written in trade publications and presentations given at educational gatherings focus primarily on one insect, mite or disease when, in fact, growers commonly deal with multiple pests. Therefore, consideration needs to be taken when selecting and using pesticides (insecticides and miticides) in order to deal with multiple pest complexes.

For example, pesticide label rates can vary depending on the given insect or mite pest. However, using lower label rates or less than the recommended label rate may result in sub-lethal effects, which may increase the potential for resistance developing in pest populations. The development of resistance may not only occur to pesticides targeting a specific insect pest [e.g., Western flower thrips (*Frankliniella occidentalis*)], but also to pesticides used against other pests (insects or mites). Furthermore, targeting a spray application for one pest may directly or indirectly affect another pest or pests.

Broad-spectrum pesticides can significantly impact the dynamics of multiple pest complexes. For example, broad-spectrum pesticides may disrupt management of Western flower thrips or whiteflies, and they may also negatively impact the management of other pests, including the two-spotted spider mite (*Tetranychus urticae*) and leafminers by eliminating natural enemies (e.g., parasitoids and predators) of these pests. Consequently, the use of broad-spectrum pesticides may create a problem associated with a “secondary pest.”

Broad-spectrum pesticides may also reduce or disrupt competition among insect and mite pests. For instance, Western flower thrips will feed on populations of the two-spotted spider mite. So suppressing Western flower thrips populations with a pesticide application may lead to increased problems associated with two-spotted spider mites. Therefore, suppression of Western flower thrips using a broad-spectrum pesticide may result in increased problems with a “secondary pest.”

Broad-spectrum insecticides, including pyrethroids, when applied for control of whiteflies and Western flower thrips, may be responsible for increasing populations of non-target pests, such as two-spotted spider mites and leafminers.

Pictured: Mealybugs and whiteflies on the underside of a poinsettia leaf.

The management of one insect or mite pest may interact with and influence the management of other insect or mite pests. Many crops—including annual bedding plants, vegetables and potted crops, such as chrysanthemum (*Dendranthema x grandiflorum*)—are typically attacked simultaneously by several insect and/or mite pests, including the green peach aphid (*Myzue persicae*), Western flower thrips and two-spotted spider mite. Consequently, a pesticide program developed for one pest must not directly affect the management strategies used to suppress populations of another pest. Therefore, emphasis should be placed on multiple pest complexes (including diseases) instead of simply concentrating on individual pest species.

A factor to consider involving multiple pest complexes is pesticide resistance. For instance, pesticide resistance may be exacerbated when Western flower thrips populations are exposed to pesticide applications intended to target other pests. Botanical insecticides, such as pyrethrins used against other pests, may lead to outbreaks of Western flower thrips populations because resistant individuals survive and any natural enemies are eliminated. Also, many Western flower thrips populations are resistant to certain pyrethroid insecticides. The development of resistance may not only occur to pesticides targeting Western flower thrips, but also to those used against other insect and/or mite pests.

Another factor to be aware of is when a pesticide has different label rates for two different insects (e.g., Western flower thrips and leafminers) or different insect and mite (e.g., Western flower thrips and two-spotted spider mite) pests. As an example, the label rate may be higher for one insect or mite pest than for another insect or mite pest. So if the higher label rate is used for one insect or mite pest, the pesticide application may place selection pressure on the other insect or mite pest population, possibly increasing the rate of resistance. For example, the label rate of spinosad (Conserve) for thrips is 11.0 fl. oz./100 gal., but the label rate for leafminers is 22.0 fl. oz./100 gal.

Another example is chlorfenapyr (Pylon), where the label rate for mites is 2.6 to 5.2 fl. oz./100 gal. and the label rate for thrips is 5.2 to 10.0 fl. oz./100 gal. Consequently, always use pesticides that have a similar label rate for two or more insect or mite pests.

Targeting individual insect or mite pests should be avoided and understanding the entire pest complex needs to be considered. Another means of dealing with multiple pest complexes is by mixing two pesticides together, thus creating a pesticide mixture in order to broaden the spectrum of pest activity. Pesticide mixtures are widely used to alleviate problems with multiple pest complexes; however, there may be concerns regarding resistance, although the mechanisms required to resist the pesticides in the mixture may not be wide-spread or even exist in the pest populations, making it difficult for individuals in the population to develop resistance to several modes of action simultaneously (delayed resistance). The pesticides used in a mixture must have similar persistence (residual activity) and there cannot be any cross resistance (based on a single mechanism conferring resistance to pesticides in the same chemical class and/or having similar modes of action) in the pest population.

In theory, insect or mite pests in the population resistant to one or more pesticide would likely succumb to the other pesticide in the mixture. Again, when using pesticides against multiple pest complexes, always use pesticides with a similar rate for specific insect or mite pests.

The type of multiple pest complexes that may occur in greenhouses depends on the horticultural crops grown. Below are examples of commonly grown horticultural crops and associated pests:

- Poinsettia—Whiteflies and fungus gnats
- Chrysanthemum—Aphids and thrips (flowers)
- Geranium—Spider mites and aphids
- Gerbera (transvaal) daisy—Whiteflies, leafminers, mealybugs and thrips (flowers)
- Marigold—Spider mites and thrips

Many horticultural crops are attacked simultaneously by several insect and/or mite pests including aphids, thrips, whiteflies and spider mites. Therefore, if a biological control or pesticide program is developed for one pest, there shouldn't be any interference with the management practice used to suppress populations of another pest. The use of biological control may be an option when dealing with certain multiple pest complexes, as there are a number of predatory mites that attack more than one prey type.

For instance, the predatory mite Amblyseius swirskii has been reported to feed on thrips and whiteflies when present concurrently. In addition, certain varieties of ornamental pepper (*Capsicum annuum*), when used as banker plants, support populations of Amblyseius swirskii, which provide adequate suppression of populations of the silverleaf whitefly (*Bemisia tabaci* biotype B), Western flower thrips and chilli thrips (*Scirtothrips dorsalis*) under greenhouse conditions.

Greenhouse producers need to be aware of multiple pest complexes when dealing with insect and mite pests, and even diseases on greenhouse-grown horticultural crops, because decisions associated with management will be dictated by the presence of multiple pest complexes. **GT**

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