

Top-Ranking Solutions

By Richard Lindquist

Don't feel listless if pests keep attacking: Here are two lists to help you determine why you have a problem and why your current methods aren't working.

Most pests that attack and damage plants in greenhouses are likely to be hard to control. If controlling them were easy, they would not be pests. If we look at the most important pest insects and mites on greenhouse crops in the recent past, many of the names are very familiar to those dealing with them today, so these species did not just appear yesterday.

And there are good reasons for this.

We like to make lists of things, from seven (just seven?) habits that make us more effective, 25 things you can do to make her/him be more/less [whatever] and, yes, even the five or 10 most important insects and mites. It is comforting to have such lists, perhaps because lists make things seem more organized than they actually are. So here's the top six reasons certain insects and mites are problems.

Pest Power

- 1** Most of the major insect and mite pests have a large host plant range and can survive on numerous plant species inside and outside of greenhouses. Examples include green peach and melon/cotton aphids, western flower thrips, Liriomyza leafminers, several mealybug species and two-spotted spider mites.
- 2** Being able to survive and reproduce on many host plants gives these pests more options to increase their numbers. The ability to survive and reproduce on a variety of plants means that these pests are able to overcome a range of chemical and physical plant defenses.
- 3** If they can overcome the plant defenses, maybe they can more easily overcome chemical pesticide applications.
- 4** The large host plant range means that the most difficult pests are probably exposed to numerous chemical pesticide active ingredients and modes of action in many production areas. This creates high potential for resistance development, which leads to more pest problems.
- 5** Outdoors, growers can practice crop rotation to minimize pest or pathogen populations. Growers may even participate in an area-wide coordinated pest management program to deal with a problem. In a greenhouse, crop rotation might mean moving production to a different bench or separate greenhouse. In the North, we have this glorious season called winter, which suspends pest development for a few months. Dormant periods do occur in some greenhouses here on the frozen tundra, but this is not the normal practice in many areas of the country.
- 6** Insects and mite pests in nice, warm greenhouses are away from their natural predators and parasitoids (unless they are introduced). Generation times are short, so numbers can increase rapidly. Further, greenhouse crops are irrigated and fertilized to maintain plant quality. Not a bad deal if you're an insect or mite. ▶

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Troubleshooting



Despite the above reasons, we do have effective chemical and biological controls for nearly all of them. So why is it sometimes so difficult to control these insects and mites? I do not want this to read like the troubleshooting sec-

tion of a computer manual (i.e., "Is the computer plugged in, and is the power on?"); however, the following might seem similar. So here's the top five potential problems in dealing with insect and mite management.

1 Not identifying the problem correctly

No pesticide or biological control will be effective against all pests, so proper identification is a no-brainer. Compared with plant diseases, identifying the insect or mite culprit is relatively easy. Most growers who have survived in the greenhouse business for a few years will either know what the pest problem is or have someone on site who does. Usually either the pest itself or injury caused by the pest can be seen (such as leaf mines, chewed leaves or flowers, or leaf stippling). Symptoms might also include honeydew (and black, sooty fungus) produced by some sucking insects, and cast-off skins on the leaves. Broad and cyclamen mites are very small and are not easily seen without magnification higher than in a hand lens, but the plant injury symptoms will be visible. Fungus gnat larvae feed on roots, but the adults fly around. The same with shore flies, although the larvae feed on algae, not roots. Sticky traps are also useful for gathering and identifying some flying adult insects, including the just-mentioned fungus gnat and shore fly adults — if you check the traps more than once every six months.

There are numerous pictorial guides available that will help with identification. If you don't have at least one of these, please order one. You can always drop the book on the pests as a control method. Of course, university extension specialists or private consultants are also available to help identify pests.

2 One-dimensional pest management programs

I guess a one-dimensional program — such as depending on pesticides alone to do the job — is not really a program at all. As mentioned, we still have products that are very effective, but any help in minimizing pest pressure will ensure better performance. There are other things that should be done, including weed management, sanitation, exclusion screening, "quarantining" new plant arrivals, scouting and monitoring, and biological controls. Most new products are at least somewhat compatible with biological controls, making it easier to integrate biological and chemical controls. Use some or all of the above in a program.



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3 Waiting too long to begin a control program

Even the most effective products will control "only" 80 to 95 percent of an existing infestation, so it is always best to deal with fewer pests from the beginning. The math here is something even an entomologist can understand.

There's a saying among people who live along the west coast of Scotland: If you can see that island out there, it's going to rain. If you can't see it, it's raining. Much the same can be said of certain pests on certain crops. You're pretty darn sure that this pest is going to appear, and if it does, it will be difficult to control. In this case, why not use a preemptive application of an effective systemic product? I know this can be considered "anti-IPM," but if it prevents subsequent applications, this becomes more "IPM-ish."

The "banker plant" system of biological control — a kind of preemptive biological control application — can also be useful against some pest groups such as aphids. This technique should work even with drench/granular applications of some systemic insecticides. For more information on this technique, visit www.koppert.nl or Google "banker plants."

However, many growers just do not want to use preventive applications because of their



Not identifying the problem correctly in the case of an infestation is the first in a series of potential troubles you might have in addressing a pest-management issue.



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initial costs, so more importance must be placed on early pest detection. Scouting and monitoring are always very important to locate infestations before pest numbers increase to damaging levels, regardless of what man-

agement program you're using, but is more important if the "don't treat until you see them" approach is used.

4 Wrong technique, wrong product

There are products that are systemic (move up and down through the plant) and others that are translaminar (move within the treated leaves). These products will help overcome some poor spray coverage, especially

when pests are on leaf undersides or deep within the foliage canopy, but there is no real substitute for proper application with both spray and drenches.

High-volume sprays are used most often and can be very effective, probably moreso than low-volume sprays against pests such as two-spotted spider mites. There are several equipment options for low-volume sprays, and selection should be based on greenhouse configuration and size. Low-volume applications are as effective or more than high-volume sprays against many pests when using the correct pesticide and pest combination.

The product applied might be perfectly fine for certain life stages of a pest, just not the stages present when the application is made, or their location on the plants. It helps to know what pest development stages will be affected.

5 Pesticide-resistant populations

Resistance is certainly a possibility if you've followed all the other pest-management rules and control is still difficult. Nearly all major insect and mite pests have some resistance to one or more pesticides or mode-of-action groups. So far, at least, no pest is resistant to everything. Therefore, the goal of any control program should be to rotate or alternate products in several mode-of-action groups. A rule of thumb is to rotate mode-of-action groups with each pest generation. Depending on the pest and temperature conditions, a generation may be completed in as few as seven to 10 days, or as long as 45 to 60 days. Will pesticide rotation prevent resistance development? Not likely, but it should help delay it. Most labels will contain some resistance-management language — if you can stay awake long enough to read that far.

Mode-of-action classification information can be found online at www.irac-online.org. Labels for new products have the mode-of-action group number on the front.

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