Five tips for successful insecticide resistance management

By Michael E. Rogers

The development of insecticide resistance in psyllid populations is a very real threat for the Florida citrus industry. As part of an ongoing Florida Citrus Production Research Advisory Council (FCPRAC)-funded research project, it has been shown that psyllid populations in Florida are already showing shifts in their susceptibility to some of the insecticides commonly used by Florida citrus growers (see *Citrus Industry*, September 2009).

As these shifts in susceptibility increase in magnitude, there will ultimately come a time when these insecticides fail or no longer provide control of pest populations. While we have yet to document any control failures in Florida, there have been failures reported in other countries such as China and India where repeated use of insecticides has resulted in the loss of effectiveness of products for use in psyllid control programs.

The threat of pesticide-resistance development is being taken very seriously in Florida as several University of Florida-IFAS research projects are under way with the goals of managing pesticide-resistance development in citrus psyllid populations. First, as mentioned above, ongoing studies are monitoring for the development of insecticide resistance in psyllid populations in commercial citrus groves throughout the state. Additionally, laboratory studies are also being conducted to better understand the mechanisms of resistance development in the psyllid and the genetic basis for this resistance. With a better understanding of how insecticide resistance develops in citrus psyllids, more effective insecticide resistance management (IRM) programs can be developed for Florida citrus growers should pesticide resistance be identified and action is required.

While we currently don't have all the answers needed to respond most effectively should product failures due to insecticide resistance occur, there are a number of things that can and should be done now to help prevent the development of pesticide resistance, not only in psyllid populations, but other pests as well. Below are five tips citrus growers should consider implementing now for effective IRM of citrus pests.

1 ROTATE BETWEEN PRODUCTS WITH DIFFERENT MODES OF ACTION

Rotating between products with different modes of action is the most important thing growers can do as part of an IRM program. It is important to remember that there can be multiple products with the same mode of action, and thus choosing a product for rotation requires choosing a product from a different mode-of-action group, not just a different chemical name.

To determine which products have similar or different modes of action for pesticide rotation, see ENY-734 "Asian citrus psyllid and citrus leafminer" in the 2010 Florida Citrus Pest Management Guide. In the table of recommended products, a column titled "IRAC MOA" (short for Insecticide Resistance Action Committee Mode of Action) is provided to help differentiate products with different modes of action. When choosing a product for rotation, select a product from the table with a different MOA number. In other words, do not apply products with the same MOA number back to back.

2 USE PRODUCTS AT THEIR FULL RECOMMENDED RATE

It is always best to use the rate of the product recommended on the label. By reducing the rate of a product applied, less pressure is imposed on the pest population, and those individuals which can tolerate reduced amounts of the applied pesticide will survive and pass on those traits to their offspring. Thus, the development of pesticide resistance has begun. Applying a product at higher than label rates can also lead to rapid resistance development and product failures by imposing excessive selection pressures and thus creating "superbugs" which can tolerate greatly increased levels of insecticides.

3 PROPER SPRAY COVERAGE IS IMPORTANT

Psyllid populations are typically not that hard to control with insecticides. Psyllids are usually located in the outer part of the tree canopy, particularly when new flush is present and thus are an easy target for pesticide applications. However, if coverage of the parts of the tree where psyllids reside is reduced, this could facilitate resistance development by exposing psyllids to suboptimal residue levels. Thus, the use of good application practices is important. Avoid spraying when the winds increase and off-target drift is more likely. This is particularly important for aerial applications with reduced spray volumes. For low-volume applications made using truck-mounted sprayers, treating every other row (versus

all rows) can result in suboptimal pesticide coverage on the skipped row.

4 TIME SPRAYS FOR PERIODS OF MOST EFFECTIVE CONTROL.

Psyllid control is best achieved by targeting adult psyllids using broad-spectrum insecticides prior to the presence of new flush. This approach is currently being used by most citrus growers in Florida since it is much easier to manage psyllid populations when overall psyllid numbers are low compared to waiting until populations are rapidly increasing. This approach also has value from the standpoint of managing insecticide resistance. By waiting until pest populations have exploded to attempt psyllid control, not only are there more pests to target, but there is a greater chance for a portion of those individuals to possess some form of resistance (such as a genetic mutation) that could facilitate development of insecticide-resistant populations.

5 THINK AREA-WIDE RESISTANCE MANAGEMENT

Because psyllid movement between groves makes control difficult to achieve, area-wide or coordinated grove sprays have been adopted by many Florida growers. They have begun working together to coordinate their sprays to greatly improve upon the level of psyllid control that can be achieved, compared to individual growers attempting to manage psyllids on their own. While these area-wide applications may happen one or more times per season, there will still be the need for additional psyllid control sprays made by individual growers throughout the year.

As growers implement their individual programs, the movement of psyllids between groves can result in repeated exposure to a given pesticide mode of action. By working together to not only time pesticide applications, but also coordinate when the different pesticide modes of action will be used — perhaps on a month-by-month basis — such an area-wide approach, while difficult to develop, would be of value for growers in maintaining the effectiveness of the currently used psyllid control tools.

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