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Exclusively for The Grower

Will cross-resistance affect the efficacy of future insecticides?

Could some insecticides of the future be losing efficacy before they even come out of the test tubes?

The fact that the question is even being asked adds a new twist to the search for strategies to control insects that damage treefruit crops and other high-value U.S. farm commodities.

“The issue is cross-resistance and there are indications we’ll be increasingly dealing with this phenomenon in the future,” says Alan Knight, research entomologist, Agricultural Research Service, United States Department of Agriculture, Wapato, Wash.

Such a disturbing possibility adds insult to injury for U.S. treefruit growers, who are still struggling to stay cost-competitive in an increasing global marketplace.

“With cross-resistance, it’s a double whammy,” Knight says. “Insects that may have developed resistance to conventional products may, as a result, also be unaffected by innovative compounds which have never been used before.”

“We need to understand these things, especially in view of the declining efficacy of organophosphates and carbamates to certain pests in the United States,” Knight says.

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In the meantime, Knight observes treefruit growers in the Pacific Northwest have made considerable progress in diversifying their control measures.

“For example, we have avoided mite problems by using mating disrupters and selective insecticides that conserve beneficials such as lady beetles and predator mites,” Knight says. “However, we often see insects which were minor pests or not present adapt to new systems and become major pests.”

These challenges, setbacks and progress are all part of the continuing search for the ultimate answers to managing insect problems which beset agriculture around the world, according to Charles Staetz, FMC Corp., Princeton, N.J.

Staetz is chairman of the global Insecticide Resistance Action Committee, a specialized group formed by the industry in 1984 to assess the threat of insecticide resistance and develop solutions.

“Insecticides we have depended on for years and even some newer products are experiencing significant control problems or are being phased out,” Staetz says. “Treefruit growers are being caught in an insecticide resistance crossfire and the industry is working hard to develop effective susceptibility management tactics to alleviate this problem.”

He points out that resistance to current products – some of which have been in use for as long as 30 years – has become widespread in some pests. At the same time, the pace of insecticide registration and re-registration has slowed dramatically at the U.S. Environmental Protection Agency.

“Crop protection chemicals have served the farming sector well since their introduction in 1914 and they will remain a vital tool for U. S. agriculture. But we emphasize that IRAC supports integrated pest management principles which focus a combination of strategies on the problem,” Staetz says.

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IRAC U.S. member companies include Abbott Laboratories, AgrEvo, American Cyanamid, BASF Agricultural Products, Bayer Corp., Novartis Crop Protection, Cotton Incorporated, Dow AgroSciences, DuPont, Elf Atochem, FMC Corp., Gowan Co., Monsanto, National Cotton Council, Rhone-Poulenc, Rohm & Haas, Uniroyal Chemical Co., Valent and Zeneca.

Composed of leading entomological experts from the industrial sector, IRAC acts through a series of committees representing each major crop and insecticide group where resistance problems occur.

The organization is implementing a comprehensive strategy to confront the growing dilemma of insecticide resistance:

- Identify the scope of resistance problems through surveys;
- Develop methods for detecting and monitoring resistance;
- Discover how resistance occurs;
- Devise programs to counter the loss of pest susceptibility;
- Develop susceptibility management strategies which incorporate all practical pest management methods into a crop management program;
- Disseminate information on management strategies; and
- Interact with regulatory authorities responsible for insecticide registration.

“Insecticide resistance is an issue that is not going to go away, so it’s imperative that growers, agrichemical companies and the land grant universities speak with one voice on this subject,” says Ray McAllister, director of regulatory affairs for the American Crop Protection Association, Washington, D.C. “IRAC’s members throughout the industry are offering a valuable service to U.S. agriculture by investing in new products and helping us defend those already in use.”

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IRAC recommends that growers try to minimize insecticide application by employing these basic strategies:

- Monitor groves and orchards through scouting to determine pest populations and trends, as well as presence of beneficial insects;
- Use insecticides only if target pests are numerous enough to cause economic losses greater than the cost of the materials plus application; and
- Take an integrated approach to pest management, combining as many different control mechanisms as possible, such as protection of beneficials, rotation of insecticide classes, use of transgenic crop varieties and crop rotation.

Grower awareness is a key to preventing resistance, says Larry Hull, professor of entomology, Pennsylvania State University Fruit Research and Extension Center, Biglerville.

“We are impressed by the willingness of Pennsylvania orchard managers to adopt IPM principles,” says Hull. “We also are excited to see the organized approach the industry is taking to the resistance issue. Agrichemical companies are proving themselves to be genuine team players and are doing a great deal to help us confront this problem.”

Even with the recent registration of new insecticide products and the strides in employing alternative strategies, complacency in U.S. commercial fruit production could be dangerous, says a University of California entomologist.

“A critical goal is rotating insecticides from different chemical classes on a regular basis,” says Beth Grafton-Cardwell, Kearny Agricultural Center, Parlier, Calif. “The threat of resistance sits out there like a bombshell, and I firmly believe these new compounds won’t be of value for very long unless we use them carefully and sparingly.”

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