GROWERTALKS

Pest Management

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New Pesticides for Use in Greenhouse Production Systems

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Greenhouse producers rely on pesticides (in this case, insecticides and miticides) to manage insect and mite pest populations below plant-damaging levels. Before the 1990s, greenhouse producers could expect the introduction of two or three new active ingredients each year for use in greenhouse production systems. However, there have been substantial increases in the cost and time to develop and register a new active ingredient, with costs being approximately $300 million and a development time of five to 10 years.

Consequently, fewer new active ingredients are being registered for use in greenhouse production systems. The new pesticides that are being registered are more selective, meaning the pesticides target fewer types of insect or mite pests than broad-spectrum pesticides. In addition, the new selective pesticides are less toxic to humans, may have minimal direct or indirect effects on biological control agents (e.g., parasitoids and predators), and are less harmful to the environment due to their short residual activity.

What constitutes a new pesticide? Well, in general, the pesticide active ingredient should have a different mode of action (the means by which a pesticide negatively affects the target insect or mite pest) than currently available pesticide active ingredients. However, all of the recent pesticide introductions are really not new because they have similar modes of action to currently available pesticides.

Below are descriptions of the new pesticides that are registered for use in greenhouse production systems.

Altus (Bayer Environmental Science) contains the active ingredient flupyradifurone. The insecticide is registered for use in greenhouses (ornamentals and vegetables) and outdoors (fruit and nut trees). The restricted entry interval (REI) is four hours; except in California where the REI is 12 hours.

Targeted insect pests that the insecticide is labeled for include: aphids, leafhoppers, mealybugs, plant bugs, psyllids, certain scales and whiteflies. The mode of action is a nicotinic acetylcholine receptor modulator [Insecticide

Resistance Action Committee (IRAC) designation—4D], which is very similar to the neonicotinoids (IRAC designation—4A).

The label states the following regarding bee activity: toxic to adult bees in laboratory studies via oral exposure; however, not toxic to bees through contact exposure, and field studies conducted with this product show no effects on honeybee colony development.

In our research at Kansas State University, we found foliar applications of Altus effective (over 80% mortality) against the citrus mealybug, Planococcus citri. However, Altus is directly harmful to insidious flower bug, Orius insidiosus, adults under laboratory conditions with no survival after 24 hours of exposure.

Pycana (OHP, Inc.) contains two active ingredients: pyrethrins and canola oil. The pesticide is registered for use in greenhouses, shadehouses, nurseries, hoophouses and container-grown nursery crops (ornamentals and vegetables). The REI is 12 hours.

Targeted insect and mite pests on the label include: aphids, mealybugs, spider mites, thrips and whiteflies. There are two modes of action: prolong opening of sodium channels (IRAC designation—3A) and suffocation or membrane disruption.

Regarding bee activity, the label states that the product is highly toxic to bees when exposed to direct treatment on blooming crops and weeds.

We found Pycana to be directly harmful to rove beetle, Dalotia coriara, and insidious flower bug adults under laboratory conditions with 40% and 60% survival, respectively, after 96 hours of exposure.

Notavo (OHP, Inc.) isn't a new pesticide, but has undergone several changes associated with the trade name (Ovation, then Applause and now Notavo). The active ingredient is clofentezine. The pesticide is registered for use in greenhouses, saran and shadehouses, outdoor containers, and field-grown nursery stock. The REI is 12 hours.

The pesticide is strictly a miticide with activity only on mites, including the twospotted spider mite, Tetranychus urticae. The mode of action is a growth and embryogenesis inhibitor (IRAC designation—10A), which is the same mode of action as hexythiazox (Hexygon). The miticide has demonstrated minimal direct negative effects on certain predatory mites.

Ventigra (BASF) contains the active ingredient afidopyropen. The insecticide is registered for use in greenhouses, shadehouses, interiorscapes and can be used on vegetable transplants. The insecticide has translaminar properties with activity against insect pests primarily by means of ingestion (stomach poison). The insecticide is registered for use against aphids, mealybugs, scales and whiteflies. The REI is 12 hours.

The mode of action is a selective feeding blocker/chordotonal organ TRPV channel modulator (IRAC designation—9D), which is similar to pymetrozine (Endeavor—9B), pyrifluquinazon (Rycar—9B) and flonicamid (Aria—29). Plants sensitive to the insecticide include: coleus, poinsettia (in bract), and impatiens and petunias (in flower).

Regarding bee activity, the label states that although Ventigra isn't acutely toxic to bees, the use of the maximum single application rate may have some short-term behavioral effects on adult bees. However, no long-term impacts on bees and colony health are expected.

In our studies, Ventigra wasn't directly harmful to rove beetle or insidious flower bug adults under laboratory conditions with 100% survival after 96 hours of exposure.

Velifer (BASF) contains an entomopathogenic fungus as an active ingredient: Beauveria bassiana strain PPRI 5339. The pesticide is registered for use in enclosed commercial greenhouses on ornamentals, fruits, vegetables,

herbs and spices, including vegetable, fruit, herb and spice transplants. The pesticide has contact activity only. The REI is 12 hours.

Targeted insect and mite pests include: aphids, mealybugs, mites, thrips and whiteflies. The mode of infection is associated with spores physically contacting the pest, germinating and secreting enzymes that degrade the cuticle (skin), which then allows entry of the fungus inside the body of the insect or mite pest.

The pesticide is potentially pathogenic to beneficial insects and honeybees. Consequently, do not apply when bees or other pollinating insects are foraging in the treated area.

In our studies, Velifer wasn't directly harmful to rove beetle or insidious flower bug adults under laboratory conditions with 100% survival after 96 hours of exposure.

Sarisa (OHP, Inc.) contains the active ingredient cyclaniliprole. The insecticide is registered for use in greenhouses, shadehouses and nurseries. Targeted insect pests include: caterpillars, mealybugs, thrips and whiteflies. The REI is four hours.

The mode of action involves selective activation of ryanodine receptors (IRAC designation—28), which is the same mode of action as chlorantraniliprole (Acelepyrn) and cyantraniliprole (Mainspring).

The insecticide is highly toxic to bees and other pollinating insects associated with direct exposure or residues in/on blooming crops and weeds.

In our studies, spray applications of Sarisa are effective against western flower thrips, Frankliniella occidentalis, adults with over 80% mortality. However, Sarisa is directly harmful to rove beetle and insidious flower bug adults under laboratory conditions with 0% and 45% survival, respectively, after 96 hours of exposure.

Pradia (OHP, Inc.) contains two active ingredients: cyclaniliprole and flonicamid. The insecticide is basically a combination of Sarisa (cyclaniliprole) and Aria (flonicamid). The insecticide is registered for use in greenhouses, shadehouses and nurseries. Targeted insect pests include: aphids, caterpillars, mealybugs, thrips and whiteflies. The REI is 12 hours.

The mode of action involves selective activation of ryanodine receptors (IRAC designation—28) and selective feeding blocker/chordotonal organ modulator (IRAC designation—29).

The insecticide is highly toxic to bees and other pollinating insects after direct exposure or when exposed to residues in/on blooming crops or weeds.

In our studies, Pradia is directly harmful to rove beetle and insidious flower bug adults under laboratory conditions with 20% and 45% survival, respectively, after 96 hours of exposure. **GT**

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