

Features

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Alternatives to Neonics

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We all know bees are pretty important and I think we can all agree that we need to try to protect them. However, how we go about doing that has been the subject of debate for a while, and will likely continue to be a major topic in hort and ag for a long time.

Retailers play an especially important role because they (you!) are trying to educate the consumer and homeowner about the products they use. It can get rather difficult, though, as consumers hear about studies suggesting neonicotinoids play a role in honey bee decline. The EPA is in the process of studying this class of pesticides and findings are coming in slowly (I reached out to EPA officials, but they were unable to get back to me before publication). Throw growers into the mix who are marketing the fact that they grow flowers without neonics, and two states that have banned consumer use (Connecticut banned use between March and November) and consumer sales (Maryland—by 2018), and the result is a very confused public.

What can you do? First, understand the facts: neonics are a class of insecticides that includes a handful of different formulations important to the green industry. According to Jill Calabro of Horticultural Research Institute (who gives us an update on HRI studies on neonics in the sidebar), the one that has the least toxicity is acetamiprid. The most ubiquitous is imidacloprid, which is one of the most widely used insecticides in the world. This is the one you'll probably be looking at replacing, if you're looking for alternatives. Some others are clothianidin, thiamethoxam and dinotefuran (this is the one that resulted in that large bee kill at a Target in Oregon that made nationwide news a couple of years ago).

The next step is to research your local laws to make sure you're within the confines of local regulations in terms of what you sell. If neonics have been banned or restricted, we've got some alternatives for you, with a caveat. Many of these are also toxic to bees, although they have different modes of action. Neonics are systemic, which means they enter the plants and travel to other parts. Contact mode of action means the insecticide doesn't get absorbed into the plant and stays put on the surface, so it dissipates faster.

"There are many alternatives to neonicotinoids for insect pest management," notes Daniel C. Peck, product development manager and entomologist at BioWorks Inc. "Be aware that some of those alternatives are not necessarily bee friendly. So, it is one thing to ask for a non-neonicotinoid, but another thing to ask for a non-neonicotinoid that is bee friendly."

We'll start with the list, then we'll get to how to talk with customers about it. In the end, though, you have to decide what products work best for your customers and with your product mix.

Replacing Neonics

Insecticidal Soaps—These are made of potassium salts of fatty acid. “(It) can be used indoors, outdoors and in greenhouses, and disrupts or degrades the outer membrane of listed pests,” says Lance Walheim, spokesperson for Bayer Advanced, who has an insecticidal soap in its NATRIA line. The insects targeted include adelgids, aphids, mites, leafhopper and psyllids.

Insecticidal soaps have a contact mode of action, but still have a high toxicity to bees, Daniel says. However, it's a low risk if applied when bees aren't active.

Horticultural Oils—This includes neem oils, where the mode of action is contact and the insect suffocates when breathing spiracles get obstructed. It also can deter egg-laying and feeding by some insects. Again, these are for softer-bodied insects like aphids, mealybugs, mites, psyllids, scales, thrips and whiteflies. It also can have high toxicity to bees, but is low risk if applied when bees aren't active. Bayer has the Multi-Insect Control in its NATRIA line with the active ingredient of canola oil.

Bt (*Bacillus thuringiensis*)—The most common consumer products are based on Bt subspecies *kurstaki* that specifically targets caterpillars, with a mode of action through ingestion where the toxins attack the gut lining. This is non-toxic to bees.

Azadirachtin—These are made from extracts of neem tree seeds, not to be confused with neem oil. Their mode of action is through ingestion, Daniel says, where they act as an insect growth regulator, disrupting the molting process, which prevents an immature insect from moving to the next stage of life. It can be used to control aphids, thrips, whiteflies, fungus gnats, beetles, mealybugs, leafminers and gypsy moths, among others.

Spinosad—This may be a product you're already carrying as it's the active ingredient in Bonide's Captain Jack's Deadbug Brew. It has modes of action through contact and ingestion, where normal function of nerve cells is disrupted. Insects targeted include bagworms, borers, beetles, caterpillars, codling moths, gypsy moths, loopers, leafminers, spider mites, tent caterpillars and thrips. It can be highly toxic to bees, Daniel says, adding “but all studies have shown that there are negligible effects after the spray has had three hours to dry.”

Fungal entomopathogens—Say what? These are spores of the fungus *Beauveria bassiana*, which are applied to the plant when the insect is on it. The spores germinate on the insect's cuticle (its external surface or skin), penetrating into it and reproducing within the body cavity, killing the insect. BioWorks offers BotaniGard 22WP as a consumer product, targeting aphids, thrips, whiteflies and other soft-bodied insects. It can be toxic to bees, but is a lower risk if applied when bees aren't active. It can require multiple treatments if insect presence is heavy.

Pyrethrum/pyrethrins—Made from certain chrysanthemum species, this mode of action is through contact where the nerve cells are disrupted. It can be highly toxic to bees, but has a lower persistence and sunlight

can cause it to dissipate quickly. Foxfarm has a pyrethrin spray called “Don’t Bug Me” and Bonide has a Pyrethrin Garden Insect Spray.

Carbaryl—Many garden centers have carried Sevin for ages. It’s a synthetic insecticide that works on contact where nerve cells are disrupted and it impacts a broad range of insect pests. It’s highly toxic to bees and other beneficial insects.

Speaking About Neonics

As we’ve mentioned several times, just because it’s not a neonic doesn’t mean it’s bee friendly. That’s why it’s important to educate consumers on how to use them properly. To that end, Daniel says, “Overall best practices to avoid bee issues (are): Select the least toxic (to bees) insecticides for control; select the least persistent insecticides for control; avoid spraying when flowers are in bloom; and avoid spraying when bees are present (e.g. spray at the end of the day).”

For lawn care products, which we haven’t gotten into here, it’s important to mow to remove clover, dandelion and other weed flowers before spraying to reduce the chance of impacting bees.

There are some instances, though, where the neonic is virtually the only option, and one of those situations is Emerald Ash Borer, Lance from Bayer notes. “For customers who ask about neonicotinoids, explain that they can be very beneficial in protecting trees from invasive pests like EAB that are devastating the ash tree population in the U.S, but all lawn and garden products must always be used responsibly and according to label instructions to ensure that bees and other pollinators are protected,” he adds.

Update on HRI Research

I reached out to Jill Calabro, science and research director at the Horticultural Research Institute, to get an update on industry studies related to neonics. All the studies HRI has funded are concluded and information is available at growwise.org, including the “Best Management Practices for Bee Health in the Horticulture Industry” guide and a list of bee-friendly woody plants.

“One area that’s left unclear is at what level these products in a plant are going to be considered dangerous to a honey bee,” Jill says, noting the EPA has established a level of 25 parts per billion (ppb) for imidacloprid only in food crops. “Neonics are different from one another in terms of properties, so the residue levels would presumably be as well, and plants in a landscape situation may be different still, as compared to food crops.”

One neonic in particular, acetamiprid, has a very, very low toxicity to honey bees if used per label instructions and should not be included in the overall discussion.

One study from Dan Potter at the University of Kentucky identified which woody ornamental plants are attractive to different types of bees, not just honey bees. Retailers can use this information to help sell specific plants that DO attract bees and are relatively pest-free to build pollinator gardens that don’t need to be treated with pesticides.

“It’s a much healthier way to approach the conversation,” she adds. “Let’s talk about building bee

-supporting habitats rather than talking about what's killing bees. Let's talk about pest-free plants that attract bees."

She mentioned there's a collaborative study with USDA NIFA headed up by Cristi Palmer at IR-4 that involves multiple universities conducting pesticide residue analysis and additional surveys of plants to find ones that are bee-attractive that should provide more answers in the coming years. But in the end, we may never get a definitive answer to all these questions and it comes down to common sense.

"Don't treat right before flowering; if a plant's in bloom don't treat with a neonic or systemic product ... especially if it's bee attractive," Jill says. "Take time to identify the pest and what products are available for control." **GP**