Native Bees and Neonicotinoids

What are native bees and why are they important?

Bees are among the most important pollinators due to their abundance and ability to pollinate a wide variety of food crops and ornamental plants. There is a diverse array of over 4,000 native bee species in North America that are responsible for over three billion dollars in crop production each year.[7] Examples of native bees include the bumble bee, alkali bees, mason bees, and mining bees. Native bees differ from the honey bee (introduced from Europe) in a variety of ways. The honey bee lives cooperatively in colonies, or "hives," with a worker caste and one queen as the sole reproductive member. The honey bee is also known to sting in defense. Most native bees – except for the bumble bee – are solitary; there are no workers or a hive. Native bee queens lay their eggs in the ground or in cavities, such as holes in wood. Native bees are non-aggressive and either reluctant to sting, or incapable of stinging.

North America's native bees rely on local food and nesting habitat in both residential and agricultural areas to survive. Native bees are particularly important to the pollination of specialty crops, such as blueberries, grapes, cherries, apples, and cranberries.[6,7] Native bees are also important pollinators of flowers and gardens in urban and rural areas.[4] The wide variety of native bee species and their diverse biology makes them, as a group, more resilient to disease and parasites than managed honey bees. Pollination services from native bee species are increasingly the focus of innovative research and surveys.

What are neonicotinoids?

Neonicotinoids are a class of neurotoxic pesticides that kill insects by blocking nerve impulses, causing lethal paralysis. Six of the seven types of neonicotinoids in existence are used to control plant-feeding pests, such as aphids and mealybugs. Neonicotinoids may be applied to plant seeds, the soil, or sprayed directly onto plants. They are designed to be absorbed through the roots or the leaves, and move systemically throughout the plant. Some of the most toxic neonicotinoids translocate within a plant to the pollen or nectar. The consumption of this contaminated pollen or nectar is one way bees may be exposed to neonicotinoids. Bees may also be exposed to neonicontinoids by directly contacting sprayed plants before the pesticide has been absorbed. Research shows neonicotinoids can persist in the soil several years after the last application, affecting plants that were not the original targets.[3]

Neonicotinoids may be found in well over 50 products sold over the counter under various trade names. Many neonicotinoid products are designed for individual home and garden use. One of the most toxic neonicotinoids to our native bees – imidacloprid - is commonly applied to gardens, flowerbeds, shrubs, and trees in urban and residential areas. Neonicotinoids are also applied on a broader scale by farmers and greenhouses.

What is the Issue?

Current research suggests that neonicotinoids may be more harmful to native bees than originally presumed. Several neonicotinoids in regular use (imidacloprid, thiamethoxam, clothianidin) have been shown to be significantly toxic to native bees.[1,5,8,9,10] For example, the lethal effects of neonicotinoids on bumble bees were documented in western Oregon in 2013 when licensed commercial applicators applied excessive imidacloprid, resulting in bumble bee deaths up to three months later. In another 2013 Oregon case involving the application of a neonicotinoid on trees in bloom, over 50,000 bumble bees died while foraging. This single incident resulted in the loss of an estimated 150 bumble bee colonies.

Other, less obvious types of toxic effects ("sub-lethal" effects) from neonicotinoids also occur, causing significant changes in bee behavior. Sub-lethal effects from neonicotinoids include disorientation, impaired mobility, appetite loss, and neonicotinoid transfer to immature bees via adult-collected food stores.[1,2,10] Most research examining neonicotinoid effects on bees involves honey bees. However, research on native bees shows that sub-lethal effects of neonicotinoids vary significantly among native bee species, and also between native bees and honey bees. Unfortunately, the US Environmental Protection Agency does not require research on the lethal or sub-lethal effects to our native bees, nor effects on different life stages, when reviewing neonicotinoids for registration.

With declining pollinator populations across North America, neither our economy nor our ecosystems can afford to ignore the effects of neonicotinoids on our native bees.

What can you do?

There are several actions that anyone can take to protect North America's native pollinators from neonicotinoid pesticides:

1. Avoid pesticide products and plants containing neonicotinoids with the highest toxicity to bees. Active ingredients to avoid: imidacloprid, clothianidin, dinotefuran, and thiamethoxam.
2. Grow a variety of neonicotinoid-free flowering plants throughout the growing season to provide bees with a constant food source.
3. Contact your representative and ask them to support the Saving America's Pollinators Act, HR 2692, which would suspend the use of neonicotinoids until the Environmental Protection Agency can demonstrate that these pesticides do not adversely affect native bees. Visit http://www.pesticide.org/home/tell-us-about-your-call for more information.

For more information on neonicotinoids, products they are found in, and their effects on bees:

- How to Reduce Bee Poisoning from Pesticide. Pacific Northwest Extension Publication 591. http://bit.ly/OSU_ReduceBeePoisoning.
- Are Neonicotinoids Killing Bees? The Xerces Society for Invertebrate Conservation, http://www.xerces.org/pollinator-conservation/

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