



Neonicotinoid Insecticides – Pollinators, Plants and Your Garden

Many gardeners have heard of neonicotinoids - they've frequently been in the news in recent years - but what exactly are they? Why is there so much concern with bees, butterflies and other beneficial insects, and how long do these product stay active in plants? With the fall planting season just a few weeks away, it's a good time to talk about neonicotinoids and ornamental plants.



What Are They?

Often called “neonics”, this group of insecticides, introduced in the 1990s, is used on farms, but also on home and commercial landscapes and in greenhouse plant production. Active ingredients for products in this group labeled for use by homeowners include imidacloprid, clothianidin, thiamethoxam, acetamiprid and dinotefuran. Examples of common retail products containing these chemicals are listed in the publication *Neonicotinoids in Your Garden*, Xerces Society, <https://xerces.org/wings-archive/neonicotinoids-in-your-garden/>.

Neonics are systemic products, meaning they are taken in by plants primarily through roots and leaves and transported throughout all the plant's tissues, including flowers, pollen and nectar. They can be applied in a variety of ways including as a seed coating in agricultural seeds, as a soil drench, foliar application, granular soil incorporation and trunk injection. As the chemical moves throughout the plant and reaches a toxic level it is effective at killing sap-sucking insects, such as aphids and plant bugs, leaf chewing like caterpillars or beetles, and wood boring beetle larva.

Pollinators are exposed to the insecticide through pollen and nectar feeding, and through guttation water (drops of xylem sap exuded from the leaves of some plants). At high levels, approximately 142 ppb or higher for honeybees, insects are directly killed by exposure to neonics. But dosages below a killing rate also cause problems; sub-lethal effects occur down to as low as 10 ppb. Sub-lethal effects include problems impaired memory and foraging; queens laid fewer eggs; and workers are less efficient at maintain colony hygiene.

Ornamental Plant Production

Greenhouse producers of ornamental plants may use neonics to protect plants while they are being grown. Common formulations for commercial use include Marathon, Merit (imidacloprid); Flagship, Meridian (thiamethoxam); TriStar (acetamiprid) and Safari (dinotefuran).

However, awareness by plant growers of neonic effects on pollinators and the demand by customers of neonic-free plants have spurred many growers to discontinue or limit their use.

- Monrovia, a major national ornamental grower, boasts a 66% reduction in usage since 2014.



- In 2015, Lowes announced their plan to phase out neonicotinoid pesticides from its store shelves over a two-year period. They also planned to work with growers to eliminate neonic use in nursery stock by 2019.
- In 2015, Home Depot began requiring a label in the pot of each plant treated with neonics, with the goal of phasing out neonic-treated plants completely by 2018.
- In 2017, Walmart, Costco and True Value announced their intention to phase out neonic-treated plants.

Also, while seed coating with neonics is widely done with field crops like corn and soybeans it is not used on the seeds of ornamental plants. In greenhouses neonics are applied by granular soil incorporation, topical foliage sprays and as a liquid soil drench.

Toxic Levels & Residual Length

According to Vera Krischik, University of Minnesota Dept. of Entomology, the persistence and amount of pesticide in pollen and nectar depends on the specific chemical used, application method, concentration applied and binding capacity of the soil. In trees and shrubs, imidacloprid applied according to label directions has a listed residual of 12 months; dinotefuran applied to trees for borer control has a 24-month residual. How long plants retain a level above 10 ppb, the sublethal level for bees, is being studied.

Researchers are also studying neonic concentrations in treated annuals and perennials, and their length of residual effect. However, since doing tissue tests on plants in your landscape or plants you intend to buy is not realistic, following the steps below to minimize neonic impact on pollinators in your landscape is a better management strategy.

Important Points for Gardeners

Dave Smitley, Michigan State University Dept. of Entomology, has worked with the horticulture industry on insect pest problems, researching best management practices to control pests while growing annuals, perennials, trees and shrubs yet maintain safety for pollinators.

What can gardeners do to minimize the impact of neonic insecticides on pollinators in their landscape? Here are a few tips.

- Smitley says don't stop planting trees, shrubs and ornamentals. Creating habitat for pollinators and butterflies is critical to maintaining populations.
- One of the best ways for gardeners to know if plants they consider purchasing have been treated with neonics is to look for a cautionary plant label or ask garden center staff.
- Unsure if a plant has been treated with neonics? Removing flowers on perennials or shrubs for the first year after purchasing can be an effective way to minimize impact on pollinators. Smitley points out recent studies have shown cherry trees sprayed with imidacloprid after spring flowering was done, showed only 1-6 ppb concentration the following year; which is below the sublethal level.
- Do not spray neonics on blooming plants.
- Mow your lawn to remove weed flowers, like dandelions or clover, if a liquid neonic application is going to be made for white grub control.



- Neonicotinoid used in wind-pollinated trees for borer control poses little risk to pollinators, but follow label directions and make sure no blooming plants are growing beneath the trees. They will also take up the insecticide through their root system, so transplant them to a new location before treating the tree.
- Finally remember that although neonics have received a lot of press, they are not the only insecticides toxic to pollinators, butterflies or beneficial insects. Many other pesticides are toxic, even some products used in organic production. Minimize pesticide use – insecticides, fungicides and herbicides – as much as possible, use an integrated pest management approach for controlling problems and use low toxicity products if a chemical control option is needed.

For more information on plants to enhance pollinator habitat and low toxicity pesticides.

Protecting and Enhancing Pollinators in Urban Landscapes, Michigan State University,
http://msue.anr.msu.edu/uploads/236/78920/ProtectPollinatorsInLandscape_FINAL-HigherRes.pdf

Your Suggestions are Welcome!

Is there a lawn and gardening topic you would like to learn more about? Sarah Browning is an Extension Educator with Nebraska Extension and can be contacted by phone 402 441-7180, by mail at 444 Cherrycreek Road, Lincoln, NE 68528: or by e-mail sarah.browning@unl.edu.

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