CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

FACT SHEET

Use of Neonicotinoids in the Home Landscape

Dr. Richard S. Cowles
Valley Laboratory
The Connecticut Agricultural Experiment Station

Neonicotinoids are a class of insecticides that have achieved prominence because they are highly selectively toxic to insects, meaning that they have relatively low toxicity to people, pets, and birds; and they are systemic, which means that they can move upward within xylem sap to reach the entire aboveground part of the plant following an application to the soil or stem. This combination of properties permits a single application of a neonicotinoid to provide long-lasting protection of plants from various insect pests, which decreases the need for potentially more environmentally disruptive foliar sprays.

The fact that systemic insecticides can reach all above-ground parts of plants also means that there is concern that they could poison pollinators that feed on pollen or nectar. Concerns about toxicity of neonicotinoids to bees from their use in agricultural crops are mostly unfounded: crops growing from treated seeds contain minute quantities of insecticides in their nectar or pollen, and colonies surrounded by large expanses of these crops are observed to be unaffected by these low exposure levels. The exception has been when bees encounter dust liberated from insecticide-treated seed at the time of planting, a problem that is being addressed for the affected crops. The other exception has been misapplication of these insecticides to crops in bloom, a practice prohibited by the pesticide label because such misuse results in a nearly immediately lethal exposure to bees.

There is the potential for higher concentrations to be present in nectar or pollen of landscape plants treated with these insecticides, relative to their use in agriculture, because label directions permit relatively high dosages to be used. Therefore, special care is needed to protect pollinators when using these insecticides in the landscape. Chemical common names are given in this document, as some active ingredients are found in products with multiple trade names. Read the active ingredient portion of the label to find the common name. Here are specific guidelines to protect pollinators when using neonicotinoid insecticides in the home landscape:

(1) Plants that are not sources of nectar or pollen pose no exposure risk to pollinators and may be treated according to label directions without concern. A good example is in the use of these products to protect eastern hemlocks from hemlock woolly adelgids and armored scales. Care should be taken when doing soil application or basal stem treatments to avoid exposing nearby flowering plants, such as rhododendrons. Although ash tree pollen is sometimes collected by honey bees, use of imidacloprid or dinotefuran to protect ash trees from emerald ash borer is unlikely to pose a significant risk, partly because competing blooming plants are favored as a source of pollen by bees. To minimize the risk from dinotefuran, it can be effective when applied immediately following ash tree bloom.

(2) For plants that are attractive to pollinators, and for which the use of a systemic insecticide is necessary, risk to pollinators

can be minimized by (a) applying a product after bloom, if it can be effectively used at that time to target the pest, (b) choosing the shortest-residual products (dinotefuran or acetamiprid), so the product can move to where it is needed quickly, and yet its presence will be minimized when the plant blooms the following year, and (c) using the product with the lowest toxicity to pollinators. Acetamiprid is ~3,000 times less toxic to honey bees than imidacloprid or dinotefuran; so use of acetamiprid (as a foliar or bark spray, it is not labeled for use in a soil drench) improves safety for bees. Application of imidacloprid or dinotefuran as a foliar spray after bloom presents little risk to pollinators when plants bloom the following year. However, foliar sprays are toxic to beneficial predatory and parasitic insects. Use of these products as a soil drench following bloom can also be safe for bees, if the application rate is reduced to be equivalent to the amount per unit area used in agricultural crops. This approach provides the full benefit of the systemic properties of the insecticide (presenting it from within the plant protects beneficial insects, relative to using these products in a foliar spray), and is especially suitable for targeting pests especially sensitive to these insecticides, such as scale insects, aphids, lace bugs, leaf beetles, and certain sawfly larvae. Such an approach would be inadequate for managing borers affecting trees or shrubs.

(3) For linden trees and plants being grown for their value to insects (e.g., butterfly garden plants, bee forage plants, and milkweeds in particular), avoid systemic insecticides and use alternative products. European lindens contain nectar toxic to bees, and application of systemic insecticides to these trees has proven especially harmful. For milkweeds, application of systemic insecticides can be expected to create conditions that will harm the development of monarch butterfly caterpillars. Alternative insecticides that should be considered would include (a) insecticidal soap to target aphids, (b) horticultural oils to target scale insects and many other sucking insect pests, mites, and the overwintering eggs of many pests, (c) *Bacillus thuringiensis* var. *kurstaki* products for targeting lepidopteran caterpillar pests, (d) spinosad-containing products to target most chewing insect pests (leaf beetles, and both lepidopteran and sawfly caterpillars). Spinosad insecticides should not be applied directly to open flowers, however.

(4) Use of neonicotinoid insecticides to manage white grubs in lawns can harm bees if liquid products are sprayed when there are weeds in bloom (this is a misapplication, as the label prohibits application to flowers being visited by bees). The same spray can safely be applied if the lawn is mowed before spraying. Granular white grub products do not expose bees to hazardous quantities of insecticide, but lawns containing blooming weeds should still be mowed before application. Because imidacloprid applications failed to control many oriental beetle populations in 2013, changing to a different active ingredient to avoid insecticide resistance is sensible. White grub insecticides containing chlorantraniliprole or *Bacillus thuringiensis* var. *galleriae* can be effective and are not toxic to pollinators.

Neonicotinoids are not uniquely hazardous to pollinators: many other pesticides can be toxic to bees, especially when applied during bloom. Always read and follow label directions, and specifically check for label language regarding protecting bees before applying pesticides. The label is a legal document and not following label directions can lead to substantial penalties.

The mention of a product does not constitute an endorsement by the Connecticut Agricultural Experiment Station.
March, 2015

Dr. Richard S. Cowles
The Connecticut Agricultural
Experiment Station
Valley Laboratory
PO Box 248
153 Cook Hill Road
Windsor, CT 06095

E-mail: Richard.Cowles@ct.gov
Phone: (860) 683-4983 or
(860) 683-4977
Website: www.ct.gov/caes

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875