extension
ALABAMA A&M & AUBURN UNIVERSITIES

Protecting Pollinators in Urban Areas

Reducing Hazards from Pesticide Use

►The third in the Protecting Pollinators in Urban Areas series focuses on the safe use of pesticides. You will learn pesticide types and how they differ. You also will gain a handy list of common pesticides and their effects on pollinators.

Urban landscapes with plants that flower throughout the season can be great resources for native bees, such as bumble bees, to gather nectar and pollen. Unfortunately, ornamentals and turfgrass are prone to pest outbreaks that require the use of pesticides to prevent severe damage. Improper use of pesticides can contribute to pollinator declines. Knowing what to look for in buying and applying pesticides is important to the preservation of pollinators.

All Pesticides Are Not Created Equal

Pesticides comprise a group of chemicals formulated to kill pests of many kinds. They include insecticides to control insects, herbicides for weeds, and fungicides for plant diseases.

Pesticide use in any outdoor landscape (yards, farms, nurseries) may create hazards for pollinators that visit treated plants. Direct contact with many common herbicides or fungicides does not cause immediate mortality of bees (called acute mortality). Many insecticides, on the other hand, do cause acute mortality. One example is the insecticide imidacloprid, found in many consumer products. A 2015 report by the Environmental Protection Agency found seventeen reported pollinator kills over a seven-year period related to the use of the insecticide, mostly in urban areas or on ornamental plants.

This does not mean that pesticides, including imidacloprid, cannot be used safely; rather, they must be used in a way that prevents pollinators from being exposed to excessive levels of the active ingredient.

Just as smoking can cause long-term health problems in humans, certain pesticides can cause problems for pollinators when the insects are exposed to small amounts over time. These doses are called chronic exposures. Exposure can come from pesticides on plants or in their food (pollen or nectar). The levels of these toxins are not lethal immediately but can cause problems with behavior, reproduction, and survival. Some studies

How Insecticides Work

Pesticides are grouped by the chemical nature (called chemical class) and how they provide control (mode of action). Active ingredients in pesticides are the portion of the product that provides control.

Insects must be exposed to insecticides to be controlled. Some insecticides simply cover the leaves, while others enter plant sap.

For direct contact to work, the pest must walk or crawl on the treated surfaces. Insecticides that penetrate the plant affect either the leaves (called translaminar) (figure 1) or the plant as a whole (systemic) (figure 2). The pest is exposed to the toxin during feeding. These varieties of pesticides are popular because they protect plants from certain pests for several weeks or even months.

Translaminar Systemic

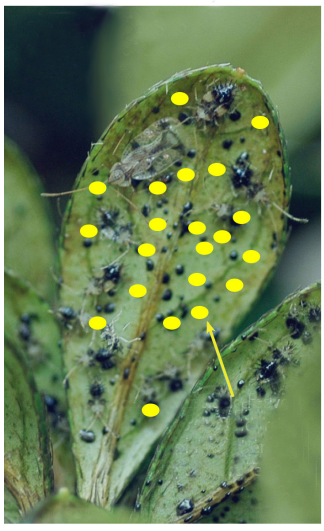


Figure 1. Spray applied only to the top side of the leaf. Pesticide moves to the underside of leaf where pests are feeding.

Whole Plant Systemic

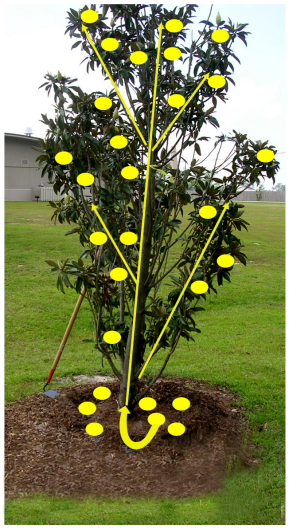


Figure 2. Insecticide applied to the soil or leaves moves into the plant sap and travels to leaves and branches.

have shown that a queen bumble bee exposed early in life to flowers on pesticide-treated plants can result in the colony being less able to produce new queens later.

Read the Label Before You Buy

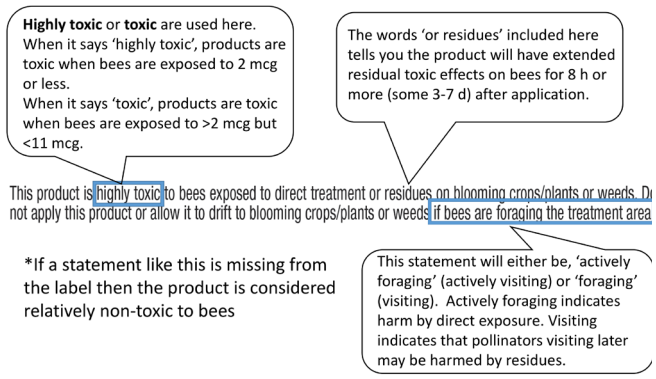
Before you buy any pesticide, read the label. Many pesticides labels are concealed under a flap, but it is acceptable to open the flap in the store to read the label.

Every label is required to have a special section called "Precautionary Statements" (figure 3). It includes key words indicating the toxicity of the product to bees and how long an application will remain a hazard to them. Look for the word "residues" in the first sentence (figure 4). Residues indicate a lasting effect of a treatment for plant protection. While these residues can be beneficial for protecting plants from pests, it is also one route where pollinators could be exposed to pesticides. Choose products that list your target pest but also have minimal impact on bees. The key word here is "actively," usually listed before the words 'foraging' or 'visiting'. Foraging or visiting refers to flower visits by pollinators, usually to the flowers but sometimes the treated plant also. Be aware that some products for use on ornamentals may not have a bee precautionary statement.

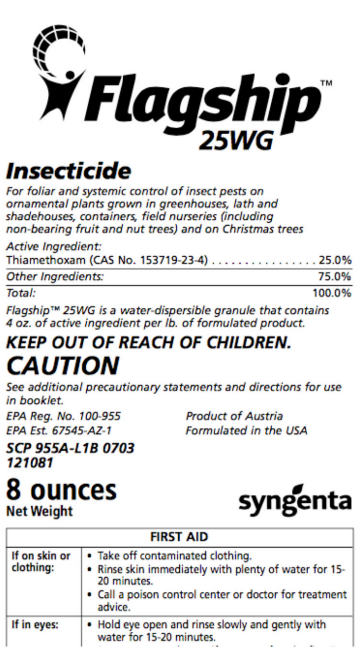
Monitor Application Method, Rate, and Frequency

The pesticide formulation and method of application can influence the hazard level of different active ingredients.

Pesticides are applied in a number of ways. The delivery method depends on the chemical nature of the pesticide. Some are applied to aboveground plant parts as sprays (the most common method). Others are added to the soil in the form of granules or liquid



Toxicity: Statements on labels like these contain terms that indicate the relative toxicity of the product, how long a treatment may affect pollinators, and the conditions under which the product should not be applied.


Flagship™ 25WG

Insecticide

For foliar and systemic control of insect pests on ornamental plants grown in greenhouses, lath and shadehouses, containers, field nurseries (including non-bearing fruit and nut trees) and on Christmas trees

Active Ingredient:
Thiamethoxam (CAS No. 153719-23-4) 25.0%
Other Ingredients: 75.0%
Total: 100.0%

Flagship™ 25WG is a water-dispersible granule that contains 4 oz. of active ingredient per lb. of formulated product.

KEEP OUT OF REACH OF CHILDREN.

CAUTION

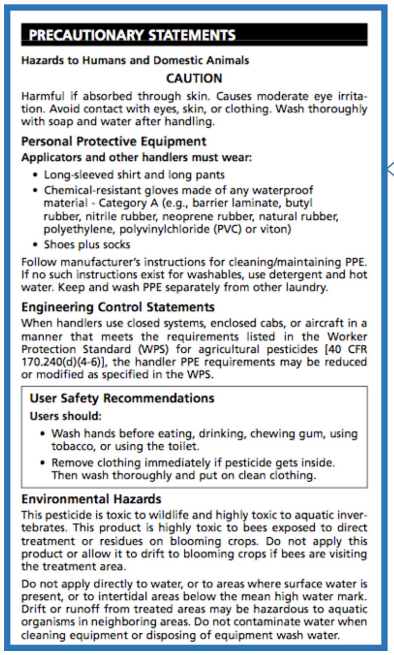
See additional precautionary statements and directions for use in booklet.

EPA Reg. No. 100-955 *Product of Austria*
EPA Est. 67545-AZ-1 *Formulated in the USA*
SCP 955A-L1B 0703 121081

8 ounces
Net Weight

syngenta

FIRST AID	
If on skin or clothing:	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
If in eyes:	• Hold eye open and rinse slowly and gently with water for 15-20 minutes.


PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

CAUTION

Harmful if absorbed through skin. Causes moderate eye irritation. Avoid contact with eyes, skin, or clothing. Wash thoroughly with soap and water after handling.

Personal Protective Equipment

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Chemical-resistant gloves made of any waterproof material - Category A (e.g., barrier laminate, butyl rubber, nitrile rubber, neoprene rubber, natural rubber, polyethylene, polyvinylchloride (PVC) or viton)
- Shoes plus socks

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions exist for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

Engineering Control Statements

When handlers use closed systems, enclosed cabs, or aircraft in a manner that meets the requirements listed in the Worker Protection Standard (WPS) for agricultural pesticides [40 CFR 170.240(d)(4-6)], the handler PPE requirements may be reduced or modified as specified in the WPS.

User Safety Recommendations

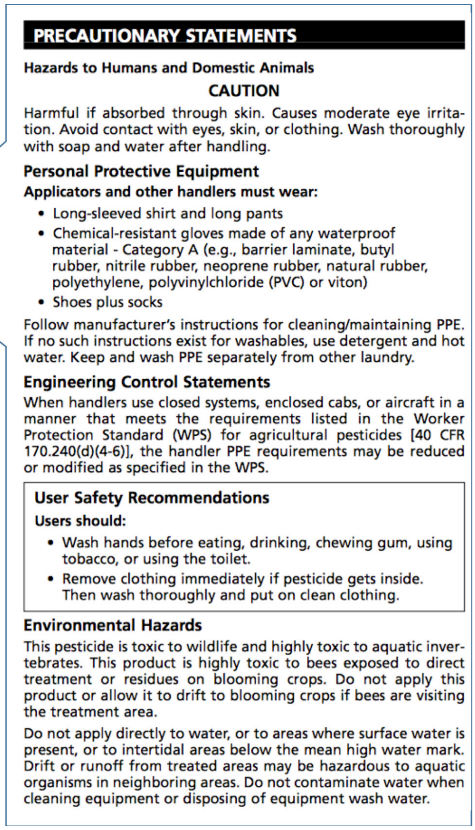
Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

Environmental Hazards

This pesticide is toxic to wildlife and highly toxic to aquatic invertebrates. This product is highly toxic to bees exposed to direct treatment or residues on blooming crops. Do not apply this product or allow it to drift to blooming crops if bees are visiting the treatment area.

Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Drift or runoff from treated areas may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when cleaning equipment or disposing of equipment wash water.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Label and precaution: The precautionary statements on the label list the potential hazards to the person applying the pesticide as well as environmental hazards.

(sometimes called drenches). Still others are injected into the plant trunk (professional use only).

A granular formulation of imidacloprid applied to a weedy lawn is less hazardous to pollinators than the same rate of that material applied as a foliar spray. This may explain why the precautionary statement can read differently for products that contain the same active ingredient.

Insecticides applied by trunk injections, soil applications, or sprays are designed to remain active on leaves, stems, or even flowers (residual activity), but these residues can be hazardous to pollinators. Direct contact with foliar residues is one of two precautions on the bee advisory box on pesticide labels (figure 5). The second precaution concerns ingestion of residues in pollen and nectar. Use of systemic insecticides applied to soil (granular or liquid formulations) or as trunk injections will move into the plant and possibly into the flowers.

Precise rate and frequency of application are crucial. Never guess the amount of pesticide you are applying.

Two concerns with application methods are use rate (amount) and frequency. Most people are unaware that systemic insecticides are applied at a much higher rate to ornamentals and turfgrass than to all other agricultural crops.

A study from the University of Minnesota illustrates the damage that can be done to valuable insects. A systemic insecticide was applied in water to the soil of butterfly weeds at the label rate and at double the label rate. Following application, researchers sampled flowers for pesticide residues and evaluated the impact on lady beetles and caterpillar larvae. The flowers from the double-rate plant had approximately 58 percent more residue. And the residue levels from both application rates were significant enough to negatively impact lady beetles and reduce survival of caterpillars of the Monarch and American painted lady butterflies. The study additionally found that plants treated 7 months after the first application using the same rate had up to 4 times more insecticide residues in their flowers.

What does this mean to you as a consumer?

When you buy an insecticide, the product label will tell you how many pesticide applications you can make per year. But you may not know if, when, or with what insecticide the plant may have already been treated. New labeling on plants at certain large retail garden centers may indicate the use of systemic insecticides, but they often will not list when or which insecticides were used. Be mindful of overusing them, particularly if applying in the same year.

This product is highly toxic to bees exposed to direct treatment or residues on blooming crops/plants or weeds. Do not apply this product or allow it to drift to blooming crops/plants or weeds if bees are foraging the treatment area.
This chemical demonstrates the properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

PROTECTION OF POLLINATORS

APPLICATION RESTRICTIONS EXIST FOR THIS PRODUCT BECAUSE OF RISK TO BEES AND OTHER INSECT POLLINATORS. FOLLOW APPLICATION RESTRICTIONS FOUND IN THE DIRECTIONS FOR USE TO PROTECT POLLINATORS.

Look for the bee hazard icon  in the Directions for Use for each application site for specific use restrictions and instructions to protect bees and other insect pollinators.

This product can kill bees and other insect pollinators.
Bees and other insect pollinators will forage on plants when they flower, shed pollen, or produce nectar.
Bees and other insect pollinators can be exposed to this pesticide from:

- Direct contact during foliar applications, or contact with residues on plant surfaces after foliar applications
- Ingestion of residues in nectar and pollen when the pesticide is applied as a seed treatment, soil, tree injection, as well as foliar applications.

When Using This Product Take Steps To:

- Minimize exposure of this product to bees and other insect pollinators when they are foraging on pollinator attractive plants around the application site.
- Minimize drift of this product on to beehives or to off-site pollinator attractive habitat. Drift of this product onto beehives or off-site to pollinator attractive habitat can result in bee kills.

Information on protecting bees and other insect pollinators may be found at the Pesticide Environmental Stewardship website at: http://pesticidestewardship.org/PollinatorProtection/Pages/default.aspx.
Pesticide incidents (for example, bee kills) should immediately be reported to the state/tribal lead agency. For contact information for your state, go to: www.aapco.org/officials.html. Pesticide incidents should also be reported to the National Pesticide Information Center at: www.npic.orst.edu or directly to EPA at: beekill@epa.gov

Bee box: Pesticide labels contain a section specifically listing potential hazards to pollinators. This is referred to as the "bee box."

Insecticides and miticides used in turfgrass or ornamentals and their relative hazard to pollinators	
Active ingredients	**Example products**
Abamectin	Avid, Minx
Acephate*	Orthene
Azadirachtin	Neem, Bioneem, Azatin,Molt-X
Bacillus thuringiensis kurstaki	Dipel, Thuricide
Bacillus thuringiensis galleriae	beetleGone, grubGone
Bifenazate	Floramite
Bifenthrin	Talstar, Ortho Bug-B-Gone Insect Killer
Buprofezin	Talus
Carbaryl	Liquid Sevin, Sevin dust
Chlorantraniliprole*	Acelepryn
Chromobacterium subtsugae strain PRAA4-1	Grandevo
Clothianidin*	Arena
Cyflumetofen	Sultan
Cypermethrin	Cynoff, Cyper
Deltamethrin	Deltagard, Hi-Yield Turf Ranger Insect Control
Dicofol	Kelthane
Dinotefuran*	Zylam, Safari
Emamectin-benzoate	Arbormectin
Etoxale	TetraSan
Fenazaquin	Magus
Fenbutatin oxide	ProMite
Fipronil*	TopChoice, Chipco Choice
Fluvalinate	Mavrik
gamma-Cyhalothrin	Spectracide Triazicide Insect Killer
Insecticidal soap	M-Pede
Imidacloprid*	Merit, Bayer Advanced Tree and Shrub
Indoxacarb*	Advion-brand products, Provaunt
Isaria fumosorosea Apopka strain	Preferal
Lambda-cyhalothrin	Scimitar, Bonide Caterpillar Killer
Milbemectin	Ultiflora
Mineral oil and horticultural oils	Suffoil-X, Dammoil, Volk oil
Permethrin	Astro, Hi-Yield 38 Plus Turf, Termite, and Ornamental
Pyriproxifen	Distance IGR
Pyrometrozine	Endeavor
Spinosad*	Conserve, Entrust
Spiromesifen	Forbid
Thiamethoxam*	Meridian, Flagship
Trichlorfon	Dylox, Fast acting grub control
Zeta-Cypermethrin	

Some products listed here are only available for sale or use by professionals with a valid pesticide license. Read and follow all label directions relative to use of your product.

Blue: active ingredients considered highly toxic or hazardous
Black: active ingredients considered moderately hazardous
Green: active ingredients considered relatively nonhazardous
* product with systemic properties

Protecting Pollinators in Urban Areas Series

- "Pollinator Ecology, ANR-2409
- "Use of Flowering Plants," ANR-2419
- "Reducing Hazards from Pesticide Use," ANR-2420
- "Safe Use of Integrated Pest Management," ANR-2387

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New August 2017, ANR-2420

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