NC STATE EXTENSION

Pollinator Best Management Practices (BMPs) in Turfgrass

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Insects are the most common and abundant pollinators in our world today. Although bees are the most recognizable insect pollinators, there are many other different insect species, including butterflies, moths, wasps, flies and beetles, that can also play an important role in plant pollination. It is estimated that insect pollinators contribute approximately $30 billion to farm income annually with the honey bee being responsible for the majority of commercial crop pollination. As research on insecticides continues to progress, changes in pesticide chemistry have resulted in the widespread use of more specialized insecticides. These new products are increasingly target-specific, environmentally friendly, and applied at rates much lower than products of the past. Insecticides commonly used in turfgrass today encompass a number of different classes. Older products (organophosphates, carbamates, pyrethroids, insect growth regulators (IGRs), neonicotinoids) and newer products (anthranilic diamides) (Table 1) are used in combination to effectively manage the wide range of insect herbivores in turfgrass. Unfortunately, two of these classes (pyrethroids, neonicotinoids) used to effectively control turf pests such as white grubs and caterpillars are also highly toxic to insect pollinators. These products were specifically developed to control insect pest populations, and since bees and other pollinators are insects, they can also do them harm.


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However, it is possible to manage pest populations in turf while minimizing the impact on pollinating insect populations. When applying insecticides to any turfgrass landscape, consider the following:

1. Remove all flowering weeds before application

As a general rule of thumb, if a plant produces a flower, it is attractive to an insect pollinator. Be sure to remove flower heads of weeds either by hand, herbicide application or mowing the turf prior to making an insecticide application. The goal is to minimize the likelihood of an insect pollinator coming in contact with any plant material that is externally coated with an insecticide.

2. Create a buffer zone

Create or maintain a 2-3 foot buffer zone (mulch, pavers, landscaping stone) between flowering ornamental plants and treated turfgrass in the landscape.

3. Follow label application timing/conditions

It is important to decrease the likelihood of insect pollinators encountering treated foliar tissue whenever possible. Since preventive (spring and early summer) applications are more likely to coincide with flower bloom in most plants, wait until petal fall before treating flowering ornamentals or turfgrass surrounding ornamental plants. Monitor the turfgrass landscape for pests to determine if an insecticide application is necessary. Curative applications later in the summer can be effective if applied when immature insects are feeding but before they have caused significant damage. When possible, avoid using neonicotinoids around flowering shrubs and trees. Soil drenches of these products can result in flower (nectar and pollen) expression of toxic levels of pesticide concentrations up to nine months following application. Be sure to assess the environmental conditions before making an application. Avoid applying insecticides when winds are blowing more than 5 miles/hour.

4. Choose the best formulation

Granular applications are usually the safest formulations to pollinating insect populations to avoid drift into a non-targeted area. Granules are also less likely to directly contaminate flowers. Avoid spray, dust and wettable powder applications since these formulations are most likely to drift into areas where pollinators are frequenting. If a spray formulation is necessary, water soluble products are

generally safer than emulsifiable concentrates and fine droplet sprays are safer than diluted sprays.

5. Choose a less-toxic insecticide class

Newer products tend to be less toxic to pollinating insects than some of the older chemistries. For example, the active ingredient chlorantraniliprole provides good control of a number of insect pest species but has a much lower toxicity to pollinators when compared to neonicotinoid products.

6. Post-application irrigation

Unless label indicates turf should not be irrigated following application, rinse pesticide residues from flower surface and dilute the active ingredient with post-application irrigation. Irrigating may also dilute residues of insecticides present in dew and guttation water. Note, however, that some pollinators (especially honey bees) can also collect water, particularly in the heat of the summer to keep their hives cool, so be sure rinse water drains properly and does not pool for extended periods.

7. Notify beekeepers

Identify and notify beekeepers in the area (within 2 miles) and at least 48 hours prior to pesticide applications.

In addition to these key items, be sure to employ general good practices when managing pest populations in turfgrass: use IPM strategies to monitor pests and determine if an insecticide application is necessary and always follow the label. With good pesticide stewardship and a sound knowledge of the turf/pest complex, it is possible to balance turfgrass pest management with the preservation and promotion of beneficial insect pollinator populations.

References

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Table 1. Common turfgrass insecticide active ingredients and corresponding toxicity to honey bees, represented as the amount of active ingredient required to kill 50% of the population (LD50) expressed in µg/bee. Active ingredients are listed in decreasing order of toxicity. Products with lower LD50 values are more toxic to honeybees. Note: All products listed have been classified as acutely toxic to bees (LD50 <11 ug/bee).

Active Ingredient	Product Name	Insecticide Class	Target Pest	Honey Bee LD50 (ug/bee)
Beta-cyfluthrin	Tempo	Pyrethroid	Ant, Armyworm, Chinch bug, Cutworm, Mole cricket, Sod webworm	0.001
Deltamethrin	Deltagard	Pyrethroid	Ant, Armyworm, Billbug, Chinch Bug, Cutworm, Fire ant, Mole cricket, Sod webworm	0.0015
Zeta-cypermethrin	Demon, Triple Crown*	Pyrethroid	Billbug, Chinch bug, Mole Cricket, White grubs,	0.002
Imidacloprid	Merit, Allectus*	Neonicotinoid	Billbug, Mole cricket, White grub	0.0037
Clothianidin	Arena, Aloft*	Neonicotinoid	Billbug, Chinch Bug, Sod webworm, White Grub	0.004
Fipronil	Chipco Choice, Top Choice, Taurus*	Phenylpyrazole	Ant, Fire ant, Mole cricket	0.004
Thiamethoxam	Meridian	Neonicotinoid	Billbug, White grub	0.005
Dinotefuran	Zylam	Neonicotinoid	Armyworm, Billbug, Cutworm, Mole Cricket, Sod webworm, Sugarcane beetle, White grub	>0.023
Spinosad	Conserve	Spinosyn	Armyworm, Cutworm, Fire ant, Sod webworm	0.024
Lambda-cyhalothrin	Battle, Cyonara, Scimitar	Pyrethroid	Ant, Armyworm, Billbug, Chinch bug, Cutworm, Fire ant, Mole cricket, Sod webworm	0.038
Chlorpyrifos	Dursban	Organophosphate	Ant, Armyworm, Billbug, Chinch bug, Cutworm, Fire ant, Sod webworm, White grub (GJB only)	0.059

Active Ingredient	Product Name	Insecticide Class	Target Pest	Honey Bee LD50 (ug/bee)
Indoxacarb	Provaunt, Advion	Oxadiazine	Armyworm, Cutworm, Fire ant, Mole cricket, Sod webworm	0.094
Bifenthrin	Talstar, Aloft*, Allectus*	Pyrethroid	Annual bluegrass weevil, Ant, Armyworm, Billbug, Chinch bug, Cutworm, Fire ant, Mole Cricket, Sod webworm, Sugarcane beetle, White grub	0.1
Cyantraniliprole	Ference	Diamide	Annual bluegrass weevil, Armyworm, Billbug, Chinch bug, Cutworm, Sod webworm, White grub	0.116
Carbaryl	Sevin	Carbamate	Ant, Armyworm, Chinch bug, Cutworm, Mole Cricket, Sod webworm, White grub	0.14
Permethrin	Astro	Pyrethroid	Chinch bug, Sod webworm	0.29
Trichlorfon	Dylox	Organophosphate	Armyworm, Cutworm, Sod webworm, White grub	>0.4
Acephate	Orthene	Organophosphate	Armyworm, Chinch bug, Cutworm, Fire ant, Mole cricket, Sod webworm,	1.2
Chlorantraniliprole	Acelepryn	Diamide	Armyworm, Billbug, Chinch bug, Cutworm, Sod webworm, White grub	>4

*Denotes combination products