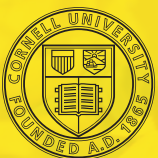


Best Management Practices for Pollinators on New York State Golf Courses



Cornell University

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Acknowledgements

As the caretakers for the state's golf courses, golf course superintendents are dedicated to protecting New York's natural resources and embrace the responsibility to maintain these facilities in harmony with the natural environment. Golf course superintendents and member associations throughout the state united in partnership with professional and recreational golfers to take a leadership role in establishing Best Management Practices (BMPs) for golf courses in New York State. These BMPs are helping golf industry professionals to work in concert with lawmakers and regulators throughout the state, in a shared commitment to water quality protection and sound environmental stewardship.

Since the New York State's golf course BMPs were first published, pollinators have emerged as an issue of concern. Therefore, with funding from the Golf Course Superintendents Association of America (GCSAA) and the participation of Cornell University scientists and educators, the BMP project has developed and published BMPs specifically for pollinators in New York State. These continued efforts demonstrate the on-going commitment of the state's golf industry to implement BMPs and expand the knowledge base when needed.

The NYS BMP Executive Committee would like to thank GCSAA for funding this effort, Cornell University for providing their scientific expertise, the superintendents across the state who provided input, and the NYS Department of Environmental Conservation for reviewing the BMPs prior to publication.

Pollinator Protection

Most flowering plants need pollination to reproduce and grow fruit. While some plants are pollinated by wind, many require assistance from insects and other animals. Most people are aware of managed honey bees, but there are also 450 wild pollinator species in New York State, including bees, wasps, beetles, flies, ants, moths, and butterflies. In the absence of these pollinators, many plant species, including the fruits and vegetables we eat, would fail to reproduce. These include economically important crops in the state, such as apples, blueberries, cherries, tomatoes, squash, and peppers, all of which are pollinator-dependent for good yields.

Both wild and managed bees are facing threats that can alter their health, abundance, and distribution. According to the [New York State Pollinator Protection Plan](#), “Over the past several years, the loss of managed pollinator colonies in the state has exceeded 50%. This is coupled with losses in the native pollinator community and the habitat that sustains them.” Research indicates that some pesticides can be harmful for pollinators and can have negative effects at the sub-individual level (such as gene expression or physiology), individual level (such as mortality, foraging, or learning), or even the colony level (such as colony growth, overwintering, or honey production).

Because of the potential for non-target effects of products used in golf course management, pesticide applicators need to be mindful of the impact that pesticides have on pollinator species and their habitat. In addition to adhering to best management practices related to pesticide applications, golf course managers can protect and enhance habitat on the course in a number of ways to help both wild pollinators and managed bees (including both hives on the course or from surrounding areas).

For more information, see the following:

- New York State Integrated Pest Management (IPM): <https://nysipm.cornell.edu/environment/pollinators>
- Pollinator Network @ Cornell: <https://pollinator.cals.cornell.edu/>
- New York State Pollinator Protection Plan: http://www.dec.ny.gov/docs/administration_pdf/nypollinatorplan.pdf



Figure 1. Both domestic honey bees (left) and any one of the 400+ species of wild pollinators in New York State (right) may forage on flowering plants on or near golf courses.

Regulatory Considerations

Pollinator protection language is a requirement for pesticide labels. Following the label is mandatory (Figure 2). Pesticide applicators must be aware of honey bee toxicity groups and be able to understand precautionary statements. In addition, they should be aware of the behavior of honey bees, wild bees and other pollinators that may visit golf courses and avoid applying pesticides when and where these insects may be present. They should also understand the effects of pesticides on bees and other pollinators, as well as the routes of exposure. The United States Golf Association (USGA) publication [Making Room for Native Pollinators](#) provides the basics of pollinator biology useful for pesticide applicators. The Pollinator Partnership has published visual depictions of [honey bee](#), [solitary bee](#), [colony](#), and general [pollinator](#) life cycles that are useful as well.

Recordkeeping may be required by law in order to use some products. IPM principles include keeping records of both pest and pest control activity so that records may be referred to for information on past infestations and effectiveness of controls to better inform future management actions.

THE NEW EPA BEE ADVISORY BOX
On EPA's new and strengthened pesticide label to protect pollinators

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 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/tribe, go to: www.aapco.org. Pesticide incidents can also be reported to the National Pesticide Information Center at: www.npic.orst.edu or directly to EPA at: beekill@epa.gov

Alerts users to separate restrictions on the label. These prohibit certain pesticide use when bees are present.

The new bee icon helps signal the pesticide's potential hazard to bees.

Makes clear that pesticide products can kill bees and pollinators.

Bees are often present and foraging when plants and trees flower. EPA's new label makes it clear that pesticides cannot be applied until all petals have fallen.

Warns users that direct contact and ingestion could harm pollinators. EPA is working with beekeepers, growers, pesticide companies, and others to advance pesticide management practices.

Highlights the importance of avoiding drift. Sometimes, wind can cause pesticides to drift to new areas and can cause bee kills.

The science says that there are many causes for a decline in pollinator health, including pesticide exposure. EPA's new label will help protect pollinators.

Read EPA's new and strengthened label requirements: <http://go.usa.gov/jHH4>

Figure 2. Following the pesticide label is a regulatory requirement and includes following instructions in the Bee Advisory Box added to pesticide labels in 2013.

Pest Management Practices that Reduce Impacts on Pollinators

It is important to minimize the impacts of pesticides on bees and beneficial arthropods. Pesticide applicators must use appropriate tools to help manage pests while safeguarding pollinators, the environment, and humans. As detailed in the NYS Pollinator Protection Plan, the state has committed to IPM on state lands “by managing pests on turf and ornamental plants solely through mechanical, sanitary, cultural or biological means to the maximum extent practicable” while recognizing that pesticide use is necessary under certain circumstances.

Superintendents can utilize [IPM best management practices for turf](#) that protect pollinators by following these simple steps:

- Identifying what is truly a pest (i.e., while solitary ground nesting bees and wasps might be alarming, most are harmless).
- Setting higher weed thresholds in low-use areas.
- Monitoring bee activity to avoid applying pesticides during peak activity times.

When the use of pesticides is necessary, being mindful of pollinators requires focusing on minimizing exposure to non-target pollinators in play and non-play course areas.



Figure 3. Flowering weeds should be mowed before pesticides are applied to avoid impacting pollinators.

Best Management Practices

- ✓ Follow label information directing the application of pesticide when the plant may be in bloom and follow all BMPs to avoid impacting pollinators.
- ✓ Inform nearby beekeepers in advance of applying pesticides so they have the option of moving their hives.
- ✓ Use [drift reduction methods](#) to stay on target by using the latest spray technologies, such as [drift-reduction nozzles to prevent off-site \(target\) translocation of pesticide](#), use backpack sprayers when possible, and monitor wind to reduce drift.
- ✓ Do not apply pesticides when pollinators are active (spray at night, or in early morning/late evening and when air is calm).
- ✓ Before applying a pesticide, scout the area for both harmful and beneficial insect populations, and use pesticides only when populations present exceed a damage threshold.
- ✓ If flowering weeds are prevalent, mow or remove them before applying pesticides.
- ✓ Use pesticides that have a lower impact on pollinators.
- ✓ Avoid applications during unusually low temperatures or when dew is present or forecast.
- ✓ When possible, use spray or granular formulations of pesticides that are known to be less hazardous to bees (e.g. wettable powders).
- ✓ Reduce planting dust from treated seeds: use wax treated seeds, use deflectors on

- ✓ machinery, and be aware of dry/windy conditions.
- ✓ Follow irrigation instructions carefully to ensure pesticides are washed from foliage into soil. In addition, nonionic surfactant can help reduce the potential for drift.
- ✓ Consider the use of biologicals (e.g. entomopathogens) and bio-based lures, baits, and pheromones as alternatives to insecticides for pest management.

Preserving and Enhancing Habitat on the Course

Habitat for pollinators includes foraging habitat and nesting sites. Pollinator-friendly habitat contains a diversity of blooming plants of different colors and heights, with blossoms throughout the entire growing season. Native plants are best, providing the most nutritious food source for native pollinators. Even plants we consider weeds provide important habitat. For example, red clover provides an important nectar and pollen source. Providing nesting sites for native species can be accomplished by taking simple steps in out-of-play areas, such as leaving stems and coarse woody debris and leaving exposed patches of well-drained soil, or by creating nesting areas such as wooden nesting boxes for hole nesting bees (Figures 4 and 5).



Figure 4. Bamboo sticks are an easy to create nesting site for bees.

Pollinator habitat on the golf course includes both areas renovated specifically with pollinators in mind and existing out-of-play areas. For example, one of the most effective BMPs for protecting water quality also protects pollinator habitat: leaving a low/no management buffer strip around water courses and bodies of water. Opportunities for renovation can be used to enhance the habitat for pollinators with native plants, wildflowers, and flowering trees and shrubs (Figures 5 and 6). [Part 2 of our video case study](#) describes the process used to establish native areas during renovations at Rockville Links Club in Rockville Centre on Long Island



Figure 5. Wood box nesting plans are included in the Making Room For Native Pollinators publication.

For more information see:

- *Making Room For Native Pollinators*, Matthew Shepherd. http://www.xerces.org/wp-content/uploads/2008/10/making_room_for_pollinators_usga1.pdf
- *Specialist bees of the Mid-Atlantic and Northeastern United States*, Xerces Society for Invertebrate Conservation and United States Geological Society, lists host plants preferred by northeast bee species. http://jarrodfowler.com/specialist_bees.html
- Recommendations regarding pollinator plants, native plant nurseries and seed companies, conservation guides and policies: <http://xerces.org/pollinators-northeast-region/>



Figure 6. First summer of a newly established native wildflower area.



Figure 7. Established wildflower area in mid-summer.

Best Management Practices

- ✓ Utilize native species when renovating out-of-play areas.
- ✓ Choose flowers of different shapes, sizes, and colors.
- ✓ Choose species that bloom at different times of the year.
- ✓ Include both perennials and annuals in native plant areas.
- ✓ Choose south-facing sites whenever possible for establishing native areas.
- ✓ Leave stems and coarse woody debris in native areas for pollinator nesting.
- ✓ Leave exposed patches of well-drained soil in native areas for pollinator nesting.

Managed Bee Hives on the Course

Hosting honey bee hives on the golf course provide bees with valuable green space, especially in urban areas, and can be a positive public-relations tool (Figure 6). If embarking on this effort, consider:

- Partnering with an experienced local beekeeper. Proper beekeeping is time and knowledge intensive. A list of beekeeper organizations in New York is available at https://www.agriculture.ny.gov/PI/Beekeeping_Club_Contacts.pdf. If not partnering with an experienced beekeeper, superintendents or other responsible staff should attend a beekeeping course.
- Ensuring enough food sources are available for both honey bees and wild pollinator species.
- Placing hives away from areas where golf course workers or golfers are active to avoid stings.
- Facing the hive exit in a direction away from in play areas of the course.
- Educating golfers via explanatory signs, newsletters, and sales of honey and other bee products.
- Calling in an experienced beekeeper if disease or parasites are suspected to identify and mitigate any health issues.

For more information on how managed hives have been integrated at a golf course and related communications with club members, see Part 3 of the videotaped case study at Rockville Links Club (https://www.youtube.com/watch?v=PQd6KvjEr3g&list=PLoNb8IODb49sB9TlZP_YDbQm1djDrgQ15&index=4).



Figure 8. Managed hives at Rockville Links Golf Club on Long Island.