

Managing turf insects in turf and bee lawns

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Identification: Properly identify the insect or disease thru morphology or type of damage

Detecting the presence of an insect is the first step in good insect control. When you find the insect, examine it closely to identify it to species.

Damage: Distinguish between insect and pathogen damage

If the turf looks damaged, wilted, and water-starved, then an insect **may** be involved. During **root feeding**, insect species that feed on roots detach the thatch and blades from the roots and permit the sod to peel off the soil without any root attachment. In addition, some insects defoliate or suck the grass blades. You must search in the blades and thatch to find these insects. **Blade defoliation** damage appears as brown scars where the blades are clipped off by the insect. **Blade sucking** damage appears as brown lesions where the blade's sap was removed by the insect. Many times an area of turf is brown and damaged, but damaging insects cannot be found. Search for the insects along the margin of brown and green grass.

When turf damage is noticed and before applying pesticides, make sure insects and not diseases or some abiotic factor are the cause of the damage. Turf damage may be caused by fungal diseases, abiotic conditions, and improper maintenance. For pathogen identification, contact the Plant Disease Clinic at the University of Minnesota, 1519 Gortner Ave, 105 Stakeman Hall, 612.625.1275, pd@umn.edu

Be sure to examine an area of turf that contains living as well as damaged grass. The most serious insects of turf feed on living turf and are not found in dead areas. Insects found in completely dead patches generally are not responsible for the damage. Methods are available for discovering insects in turf. Cutworms, sod webworms, aphids, chinch bugs, and other **blade defoliating and blade sucking** insects can be detected by the flotation method. Use a large coffee can with both ends removed and sink it into the turf. Mix one ounce of liquid dish washing detergent into one gallon of water and pour the soapy water into the container. In a few minutes, the soapy water will irritate the insect, the insect will release its grasp, and the insect will float.

Root-feeding insects such as white grubs and billbugs will not respond to the flotation method. Grubs feed by separating grass blades. Billbug larvae are legless and live inside the grass sheath and do not separate blades from roots until the last larval stage (instar). Sample grubs and billbugs by looking for insects in grass roots and in the soil layer beneath the roots. If infestations are heavy, the grubs will have removed most of the grass roots and the turf will roll back like a carpet.

Integrated Pest Management (IPM) is a decision-making process that includes scouting, damage threshold, control options, and timing of insecticide application. IPM practices conserve beneficial insects and promote pesticide usage at the vulnerable stage in the pest's life history.

Steps in IPM:

1. Routinely inspect or scout the turf. Identify insects, diseases, and damage.
2. Determine changes in cultural practices that can increase turf health and vigor.
3. Determine what is an acceptable threshold of pest damage.
4. Time the pesticide application to the vulnerable stage in the insect's life history.
5. Keep records of the damage location, date, and chemical. Return to step 1.

Identification of insect or disease. This is called scouting. Look for discoloration, defoliation, and separation of grass from roots. When investigating turf damage, pay particular attention to whether the damage spreads.

After detecting insects, the next step is to determine if the insects are pests, harmless, or beneficial. Only pest insects warrant treatment. Thresholds have been established for some turf insects. Thresholds are the maximum number of insects per specified area that can be tolerated without obvious turf injury. Often thresholds are general and not specific guidelines, because other factors influence damage, such as drought, grass cultivar, and traffic and compaction of the grass. For example, heavily fertilized golf courses usually contain the most insects.

In Minnesota, most home lawns fungi cause more damage than insects.

After locating the damaging insect, time insecticide usage to the vulnerable stage of the pest. Insects are often more susceptible to treatment in a certain stage in their development, often when the immatures are actively feeding. Also, the judicious use of conventional insecticides helps preserve beneficial insects that naturally regulate pest insects. Applying scheduled sprays, without determining if the insect is present, can lead to expensive pesticide applications, create pest populations resistant to the pesticide, and disrupt the natural control by beneficial insects in the turf.

White grubs: a general name for the larvae or grub stage of scarab beetles, Order Coleoptera, Family Scarabaeidae. All six legs of the grub are located under the head, and the diameter of the abdomen increases slightly towards the end. In general, the grub's head capsule is an orange-black color and the end of the abdomen can be darker than the rest. Remember all grubs start small and increase in size as they molt or shed their grub skin and change into larger instars (larval stage). Do not treat for grubs in the fall because grubs move down into the soil for the winter. An expert can determine the species of white grub by examining the hairs and sutures on the last abdominal segment on the grub's body. In the field, identification of the grub is more difficult. However, the color and form of the adult scarab beetles are distinctive and species identification is easy. Adults often feed on leaves and many adults do not feed at all, but remain hidden in the turf. Both males and females return to the turf for egg laying.

Damage, scouting, and management: Identify a grub problem by examining a square foot sample of lawn along the border where dead or damaged grass meets healthy grass. When grub densities are high, the blades pull away from the roots and the turf rolls back like a carpet. Skunks and moles are known to use grubs for food. However, in Minnesota night crawlers account for a sizable portion of the diet of those mammals. Therefore, grub control often will not correct damage to lawns by skunks and moles. Remember the grubs turn into adult beetles that emerge from the soil and fly to trees, shrubs, and roses to feed on the leaves before returning to the turf to lay eggs. In some species, control of adults is warranted if they are damaging ornamental plants.

May/June beetles, *Phyllophaga* spp, Order Coleoptera, Family Scarabeidae

Identification: All species of *Phyllophaga* are called May or June beetles. Adults are about 1 inch long and a chestnut brown color and fly to lights in the early summer. The adult scarab beetle feeds on foliage and lays eggs in the turf in early summer (May beetles) and summer (June beetles). The grubs are whitish with brown heads and are usually found curled in a "C" shape and range from 1/2 to 1 inch in length. These are the largest grubs found in turf.

Damage, scouting, and management: Grubs feed on the roots of the grass and heavy infestations will loosen the sod so that it can be rolled back. The damage will appear as irregular patches of yellowed or dead grass. In Minnesota,



June beetle

May/June beetle grubs feed on grass roots for three years before becoming adults. The first year grubs grow up to 1/2 inch long and produce little damage. The second year, they range from 1/2 to 3/4 inch in length, and damage becomes more apparent. This second year is the best time to control grubs since damage usually is not extensive, and an insecticide will be effective. Control for grubs is desirable when there are more than 4 grubs/ft². The third year, the grubs grow to 1 inch long and damage becomes very apparent, particularly in July and August. In late summer the grubs become adults in pupal chambers in the soil and emerge the following spring as adults.

Northern masked chafer, *Cyclocephala borealis*, Order Coleoptera, Family Scarabeidae

Identification: Adults are shiny brown scarabs around 1/2 inch in length with a dark brown mask across the head and a dark spot on each side of the thorax.

Damage, scouting, and management: After overwintering in the soil, adults emerge in late June and females lay egg clusters on top of the soil. Adults are nocturnal and do not feed. Northern masked chafers have a one-year life cycle. Damage is more severe in late summer when the grubs are third instar. The larvae feed on roots, separating crown from roots. The larvae reach maximum size in September and then move down deeper in the soil to overwinter. Healthy turf can tolerate greater than 20 grubs/ft²; while stressed turf can tolerate less, around 10 grubs/ft².



Annual white grubs or masked chafers

Black turfgrass Ataenius, *Ataenius spretulus*, Order Coleoptera, Family Scarabeidae

Apodius, *Aphodius granarius*, Order Coleoptera, Family Scarabeidae

Identification: The adult is a small, black scarab beetle around 1/5 inch in length that is common around high maintenance golf courses, especially highly watered and fertilized areas. Larvae are very small, around 1/4 inch in length. It is a native insect that has emerged as a turf pest in the last 20 years.

Damage, scouting, and management: The larvae feed and develop over two months with peak damage in late July and early August. Most root injury occurs near the soil-thatch interface. Larvae pupate in the soil and start emerging in August. High levels of infestation of this pest can be tolerated. Control when greater than 10 grubs/ft² are found.



Aphodius beetle

Green June beetle, *Cotinus nitida*, Order Coleoptera, Family Scarabeidae

Identification: Green June beetle is not established in Minnesota, but may be transported on nursery stock. The green June beetle is green in color trimmed with brown along the edge. The underside is also green, but has a very shiny, metallic look. The adults are attracted to manure for oviposition and grubs can be found in many crops and ornamentals that have manure added to the soil. Adults reach a length of 3/4 - 1 inch. Larvae have typical scarab characteristics and reach 2 inches in length.

Damage, scouting, and management: The larvae feed on the roots of turfgrass as well as corn, oats, sorghum, alfalfa, and nursery stock, especially where manure has been added to the soil. Adults feed on a variety of ripening fruits such as apples, pears, and grapes. Tolerance levels for this species have not been set.



Green June beetle

Japanese beetle, *Popillia japonica*, Order Coleoptera, Family Scarabeidae

Identification: Japanese beetle is not established in Minnesota, but may be transported on nursery stock. This insect is a quarantine pest and not established in Minnesota as of 1999. As a quarantine pest, there is no threshold because the presence of the insect alone is enough to warrant treatment of the area. Report any sightings to the Minnesota Department of Agriculture at (651) 296-8388. The Japanese beetle is an exotic scarab originally established in New Jersey. Japanese beetles are approximately 7/16 inch long. The front of the beetle is dark metallic green and the wing covers are dark tan. There are five small, white patches of short hairs along each side of the dorsal abdomen on the beetle. These white patches are a key characteristic for identification. If it does not have these white hair patches, it is the False Japanese beetle and not the quarantine pest.



Japanese beetle

Damage, scouting, and management: One of the favored foods of adult Japanese beetles is rose foliage and flowers, although adults feed on over three hundred species of plants. Larvae feed on the roots of grasses. Inspect your plants for skeletonized leaves and the presence of adult beetles. Pheromone traps are not recommended as they will attract the adult beetles to the site. One of the easiest ways to remove Japanese beetles from small plants is to shake them off into jars filled with soapy water. Removing beetles by hand may provide adequate protection for backyards, especially when beetle numbers are low. The presence of beetles on a plant attracts more beetles. Thus, by not allowing beetles to accumulate, plants will be less attractive to other beetles.

False Japanese beetle, *Strigoderma arvicola*, Order Coleoptera, Scarabeidae

Identification: This native scarab resembles the Japanese beetle. False Japanese beetles are native to Minnesota, but are less of a problem species. The adult beetles are about 7/16 inch (10-12 mm) in length and are a dark tan to brown color with a slight metallic green color on the front third of the body. However, there are no white tufts along the dorsal abdomen edges as found on the Japanese beetle.



False Japanese beetle

Adults are found feeding on buds and flowers of wild and cultivated roses and other plants. Control is not necessary. Information on the false Japanese beetle is given so this species can be distinguished from the Japanese beetle, a major turf pest and quarantine pest in Minnesota. False Japanese beetles are found feeding on potatoes and soybeans.

Oriental beetle, *Exomala orientalis*, Order Coleoptera, Family Scarabaeidae

Identification: Oriental beetle is not established in Minnesota, but may be transported on nursery stock. Introduced into Connecticut as early as 1920, this scarab beetle has spread across the mid-Atlantic states. The adults are similar in size to Japanese beetles (7/16 inch), however the adult beetles do not have any green, but vary in color from light brown to black, often with darker mottling on the wing covers.

Damage, scouting, and management: Larvae feed on the roots of turf grasses and adults feed on roses, phlox, and petunias, although they are active at night and more cryptic compared to Japanese beetle. A pheromone trap is available.



Bluegrass billbug, *Sphenophorus parvulus*, Order Coleoptera, Family Curculionidae

Identification: Adult billbugs are long-snouted, 1/4 inch long, gray-to-black beetles with a strongly tapered abdomen. They can be found walking on hard surfaces in spring prior to depositing eggs in grass sheaths. The plump, legless white larvae first feed inside stems and then on roots.

Damage, scouting, and management: Infested lawns have off-colored, irregularly shaped areas that rapidly yellow and finally turn brown. Areas of advanced infestation contain turf offering little resistance when pulled. Larvae complete feeding in late July and emerge as adults in August to overwinter in protected locations.



Bluegrass beetle

Billbugs are best controlled in May as the females are laying eggs. Application of an insecticide is suggested about 10 days after adults are sighted. The immature stage can also be controlled when they are feeding on the roots. Scout for larvae by inspecting a square foot sample of lawn along the margin where dead or damaged grass meets healthy grass.

Treatment is not suggested after mid July because the larvae complete their feeding and move 1 to 2 inches into the soil to pupate. Watering and moderate fertilization of grass will help reduce the damage caused by billbugs and may eliminate the need for insecticide treatment. Thresholds vary depending on turf health and vigor.

Sodwebworms, *Crambus* spp, Order Lepidoptera, family Pyralidae

Identification:

The adults of sod webworms are frequently called lawn moths. They are light-colored moths, which make short, erratic, darting flights above the turf and are attracted to lights at night. When resting they fold their wings back closely against their bodies, which gives them a very narrow appearance. Also, their heads appear to have a long snout. The moths lay their eggs in the lawn. The older larvae are a dirty white to light brown with darker spots and are about 3/4 inch long with a black head.

Damage, scouting, and management: The larvae feed at night on grass blades. During the day the larvae hide in silk-lined tunnels or burrows at or slightly into the soil surface. Some species damage plant crowns or roots as well as blades. Two generations can occur in Minnesota. Heavy infestations of the second generation may seriously damage large areas of turf. Although webworm adults are commonly seen, larval damage is uncommon in Minnesota. Look for dew sparkling on the webs in the early morning or at dusk. Use the flotation method to force the caterpillars to the surface, where they can be counted. In the flotation method, a soapy solution is poured inside a topless and bottomless can. The soapy solution is made by adding one ounce of mild dishwashing detergent to one gallon of water. It is best to scout for sod webworms in June and again in early August, since sod webworms have two generations per year. Tolerance is around 12 larvae/ft². Water the lawn thoroughly a day before applying an insecticide.

Cutworms, Order Coleoptera, Family Noctuidae

Black cutworm, *Agrotis ipsilon*,

Bronze cutworm, *Nephelodes minians*,

Variegated cutworm, *Peridroma saucia*

Identification: Full-grown cutworm larvae are about 1-1/2 inches long. The variegated cutworm's color ranges from brown to gray. The black cutworm larvae are dark gray above and light gray below with black dots along the side of the body. The bronze cutworm's color is a mottled burgundy brown. When disturbed cutworms roll into a ball.

Damage, scouting, and management: Black cutworm adults arrive in summer on southerly winds and larvae cannot overwinter in Minnesota. In golf courses, they are often found on greens surrounded by dense rough. The larvae feed on the grass blades or cut the grass off at the soil surface at night. During the day they hide in the soil or under debris. Aeration holes in greens are often utilized by cutworms as burrows. However, the presence of these aeration holes does not increase the number of cutworms. It is possible to have 1-3 generations per year.



Sod webworm adult



Sod webworm larvae



Cutworm hiding in ball



Bronze cutworm



Variegated cutworm

Armyworms, *Pseudaletia unipunctata*, Order Lepidoptera, Family Noctuidae

Identification: These caterpillars feed on a variety of grasses including agricultural grass crops such as small grains and corn. Turf grasses are not commonly infested. Mature larvae reach 1-1/2 to 2.0 inches in length. Larvae are a dull yellow to gray with stripes running lengthwise along the body.



Armyworm

Damage, scouting, and management: Populations arrive as annual flights from overwintering southern populations. Populations of armyworms are typically kept in check by drought and beneficial insects. Thresholds not developed.

Fall armyworm, *Sproptera fugiperda*, Order Lepidoptera, Family Noctuidae

Identification: These caterpillars feed on a variety of grasses. Mature larvae reach 1-1/2 to 2.0 inches in length. Larvae have a black stripe down the middle of the back and on each side; four black dots on the dorsal side of each abdominal segment; and the face with a yellow inverted Y-marking.

Damage, scouting, and management: Populations arrive as annual flights from extreme southern populations. They are similar in size to armyworms. Populations of fall armyworms are typically kept in check by natural means, though population booms can occur, generally after a drought. Thresholds are not well developed.

Leafhoppers, Order Hemiptera, Family Cicadellidae

Identification: A number of species can be found in turf. During some seasons these very tiny green or gray insects become so numerous that when disturbed into flight, they rise like a cloud of dust. Most of the grass-infesting leafhoppers are less than 1/4 inch long, narrow, and tapered from head to tail.



Leafhopper

Damage, scouting, and management: Populations arrive as annual flights from southern populations. Eggs are inserted into leaf tissue. Adults insert their beak into leaf tissue. Damage usually appears as irregular patches in which the grass has yellowed or bleached-out lesions. Established lawns are seldom seriously damaged. Eggs hatch in one to two weeks, and the young nymphs begin to suck on grass blades. Control is suggested for new lawns only and thresholds

Aphids, Order Hemiptera, Family Aphididae

Identification: Greenbugs are aphids that can damage established turf. The insects are small and yellow to green, and they can be found by sweeping your hand over suspected areas.

Damage, scouting, and management: Greenbugs are carried into Minnesota by southerly winds, so they can show up overnight. Aphid suck the sap from blades and the damage appears as pale areas often with yellow streaking. Damage is almost always near areas of the lawn shaded by trees or shrubs. Bluegrass is a prime target for greenbug attacks. Control is suggested when damaging greenbug populations are first noted, as they reproduce very quickly. Greenbugs are usually first found in late July or August.



Aphid

Chinch bugs, *Blissus* spp, Order Hemiptera, Family Lygaeidae

Identification: Chinch bugs on turf are rare in Minnesota. Obtain positive identification before attempting control. Immature bugs are red, but become dark as they mature. Adults are 1/5 inch long, have a head that is narrower than the thorax (shoulder), and have light colored forewings with a conspicuous black triangle midway along the outside margin. Immature chinch bugs (nymphs) are similar in appearance to adults except smaller with the wings absent or only moderately developed.

Damage, scouting, and management: Chinch bug populations of 20 to 25/ft² can cause damage and may warrant treatment.



chinch bug

Non-damaging turf insects

False chinch bug, *Nyssius*, Order Hemiptera, Family Lygaeidae

Identification: False chinch bugs (*Nyssius*) are small gray bugs resembling true chinch bugs. They are more frequently encountered on herbaceous plants, although they can feed on turf when the preferred food is not available. False chinch bugs are approximately 1/4 inch long, brown, and generally found in dead areas of the turf. They can be distinguished from the true chinch bug by the absence of a conspicuous black triangle on the outer wing margin and by a head that is about the same width as the thorax (shoulder).

Predator, big-eyed bug, *Geocoris*, Order Hemiptera, Family Gelastocoridae

Identification: Big-eyed bugs are predators and often confused with the true chinch bug. However, the head of the big-eyed bug is as wide as the thorax(shoulder) and the eyes are very noticeable. The big-eyed bug is a predator and feeds on other insects.



false chinch bug



big-eyed bug

Ants, Order Hymenoptera, Family Formicidae

Ants are to be expected in lawns. Some ants nest in thin areas of the lawn. These are small ants, which make small mounds approximately 3 inches in diameter. Their preference for nesting in areas of sparse vegetation can lead to the assumption that the ants are causing the poor lawn development. This is not true. Ants do not feed on turf and so pose no threat to lawns. Control is not justified on the basis of protecting the lawn. However, another ant, the field ant, can nest in areas of the lawn which are growing well. These ants can build raised mounds of more than a foot in diameter. These large, high mounds can harm the grass.

Earthworms, nightcrawlers, Phylum Annelida

Exotic Nightcrawlers are beneficial as they provide natural aeration of soil allowing water and oxygen to penetrate more easily into the ground. Their feeding and excrement helps recycle nutrients and fertilize the soil. Nightcrawlers also feed on thatch, a layer of live and dead plant material that can accumulate at the soil surface and reduce the penetration of water and fertilizer. However, nightcrawlers leave behind a waste product called castings. Nightcrawlers can deposit castings at their burrow entrances forming conical mounds at the soil surface. Mounds do not harm turf but this lumpiness can be unsightly and a nuisance to home lawns, athletic fields, golf courses. These mounds are most common in early to mid-spring when nightcrawlers are first active. During late spring and summer, when weather becomes warmer, nightcrawlers move deeper into the soil and are not normally seen. Despite the nuisance of these mounds, tolerate night crawlers whenever possible. Treating them with an insecticide is strongly discouraged. The value nightcrawlers have in keeping soil healthy far outweighs any problems their mounds create. If nightcrawler populations are low, turf will suffer in the long run.

Jumping worms, *Amyntas* spp., Phylum Annelida

Exotic, invasive Jumping worms were first identified in Minnesota in 2006 and in Wisconsin in 2013. Native to Eastern Asia, they were imported for use as fish bait. The worms thrash violently when disturbed. Jumping worms grow more rapidly, reproduce more quickly, and consume more nutrients than other earthworms. Besides consuming nutrients that plants, animals, fungi and bacteria need to survive, the resulting soil, which resembles large coffee grounds, provides poor structure and support for many understory plants. Invasive plant species will move in when native plants die. Jumping worms can be identified by their behavior, and morphologically by the clitellum, the swollen section

on the worm. The clitellum of jumping worms is depressed and swollen and the clitellum of nightcrawlers is saddle like.

Pesticides

Spread insecticide granules uniformly over the lawn. A fertilizer spreader may be used if it is calibrated properly. Follow the pesticide label directions. Use a compressed air sprayer to apply at least 2 or 3 gallons for each 1,000 square feet. The hose-on type sprayer, which delivers a coarse droplet spray, may be used. Most wettable powders don't work well in the hose-on sprayers. For blade feeding insects, do not water for two to three days following treatment. Allow the lawn to dry after treatment before letting children and pets play on it. **Read the pesticide label and follow the instructions as a final authority on pesticide use.**

To control root feeding insects such as grubs and billbug larvae, thoroughly water the lawn immediately after treatment. A microbial insecticide, *Bacillus thuringiensis galleriae*, GrubGone, can be used to manage grubs in bee lawns where pollinators need to be protected. Chlorantraniliprole (Scott's Grub-Ex), is an outstanding grub control and can be used in bee lawns and on foliage for Japanese beetle. Although it is bee friendly, it is highly toxic to butterfly adults and larvae

The neonicotinoids clothianidin, thiamethoxam, and imidacloprid are slow acting in soils, but have long residual activity against grubs and other pests all summer. However, the neonicotinoids can kill ground nesting bees, and can be move systemically into pollen and nectar of clover and other lawn flowers causing sublethal effects on behavior or lethal effects on survival.

Neonicotinoids or herbicides are not recommended for managing insects in bee lawns.



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