An Integrated Approach to Insect Management in Turfgrass: Black Cutworm

Fact Sheet FS1013

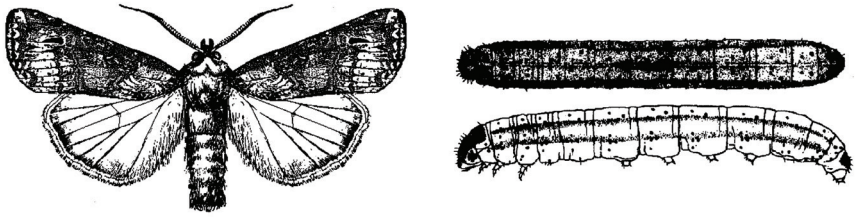

Figure 1

Cooperative Extension

Richard J. Buckley, Director, Plant Diagnostic Laboratory
Albrecht M. Koppenhöfer, Extension Specialist, Turfgrass Entomology
Sabrina Tirpak, Senior Lab Technician, Plant Diagnostic Laboratory

Introduction

Cutworm is the popular name given to several species of caterpillar in the family Noctuidae. The name cutworm refers to the feeding habit of the larva, which severs the stems of host plants at or near the soil surface. They often do no more feeding on that plant, and move on to the next one. This feeding behavior contributes greatly to the highly destructive nature of the insect. Common species of cutworm in New Jersey include the black cutworm [*Agrotis ipsilon* (Hufnagel)], the variegated cutworm [*Peridroma saucia* (Hubner)], and the bronzed cutworm [*Nephelodes minians* (Guenee)].

The primary hosts of these cutworm species are grasses, but they can also feed on many other plants and are serious pests of certain agricultural crops. The variegated cutworm and the bronzed cutworm are sometimes encountered in lawns and golf roughs, but rarely cause severe damage. In contrast, the black cutworm (BCW) is a major perennial pest on golf courses throughout North America because of its fondness for close-cut creeping bentgrass. BCW also feed on other grasses but the damage is only apparent on tees and greens.

Symptoms of Infestation

Cutworms are semisubterranean pests that dig a burrow in the soil or thatch and emerge at night to chew off leaves and stems just above the grass crown. They are serious pests of golf greens where the feeding results in linear or irregular sunken spots. In some cases the chewed turf areas could be mistaken for ball marks. These depressions interfere with ball roll and consequently, golfers and golf course superintendents have little tolerance for the injury.

Damage from cutworm is evident from spring to mid-fall. Damaged areas are attractive to foraging birds, which probe the turf by pulling up tufts of grass. Adult cutworm moths feed on the nectar of flowers and are not a direct threat to the turf.

Insect Description

BCW eggs are half the size of a pinhead, oval- or barrel-shaped, slightly wider than tall and flat on the bottom. They are laid singly or in small clusters on weeds or grass blades, usually near the tips of the blades. But like other cutworms, BCW will also lay eggs on the ground and sometimes on objects around the turf area. In field crops, BCW has a preference for egg-laying on curly dock and yellow rocket mustard, probably because of their low growth habit.

Cutworm larvae are rather thick-bodied, hairless caterpillars that are often marked with stripes, but are never spotted like sod webworms. They have three pairs of true legs and five pairs of fleshy prolegs on the abdomen. Each abdominal segment has a pair of black spiracles (breathing holes), one on each body side. When fully grown, the larvae range in length from about 1-1/4 to 1-3/4″ (30–45 mm) and in maximum width from 3/8 to 5/8″ (4–9 mm). The general color and location of stripes for each species is diagnostic

The most cryptic coloration among the cutworm larvae belongs to the BCW. BCW is nearly uniform in color above the spiracles, ranging from light gray-green to black. The lower half of the body, below the spiracles, is a lighter gray. A pale and indistinct line runs down the middle of the back.

RUTGERS
New Jersey Agricultural Experiment Station

Rutgers, The State University of New Jersey
88 Lipman Drive, New Brunswick, NJ 08901-8525
Phone: 732.932.5000

Under magnification, the skin has a pebble-like surface and a generally greasy appearance. Both characteristics are unique to the species.

BCW pupae are torpedo-shaped, tan to dark brown, and ½ to 7/8″ (13–22 mm) in length. The wings, legs, and antennae are fused, but the abdomen is free to move when the insect is disturbed.

Adult BCW are robust, dull-colored, hairy moths with wingspans of 1 to 1-3/4″ (35–45 mm). The hindwings are mostly dull gray. The forewings are gray-black to dull brown with a distinctive black dagger-shaped marking in the center. The wings fold flat over the body when at rest, unlike the sod webworms' that wrap around the body when at rest.

Life History

Black cutworms overwinter as larvae or pupae where conditions are suitable. In colder areas where soils freeze, infestations begin with the arrival of migratory adults from southern areas. In New Jersey, this normally occurs in mid to late April.

The night-flying moths deposit eggs on the foliage of turfgrasses and weeds. A single female can lay 300 to 2,000 eggs over 5–10 days. Nearly all of the eggs deposited by BCW on bentgrass putting greens are laid singly on the tips of the leaf blade. The eggs hatch in 3–6 days, resulting in larvae (caterpillars). BCW are highly cannibalistic and significant mortality can be observed in large localized populations.

The larvae pass through 6–7 growth stages called instars. The larvae are the destructive life phase of the insect. Early instars feed on the leaf blades and stay above ground. Older larvae form burrows or tunnels in the turf and feed from the burrow. In contrast to the sod webworm, the burrows are not lined with silk. BCW larvae can move considerable distances in a single night (on putting greens up to 70′ = 21 m) and can quickly reinfest treated areas from surrounding areas.

When they are almost mature, the last instar larvae burrow into the thatch or soil to pupate. Pupation, the transformation from larva to adult, takes 10–14 days. After pupation the adults emerge to mate and lay eggs.

Each generation of BCW takes about 40–50 days to pass from egg to adult. In New Jersey BCW typically produces three generations per year. Developmental times are shorter during warm weather and longer in the cooler periods.

Scouting and Monitoring

BCW moths can be monitored with commercial pheromone traps that attract the male moths only. While the trap catches are poor predictors of ensuing larval densities, they help with timing of larval monitoring and treatments. Scouting for larvae should start two weeks after the first sustained capture of males in the traps. Larval damage can be expected to start showing up about two weeks after the peak flight.

The best method for sampling BCW larvae is to use an irritant or flushing solution that moves the larvae out of the soil/thatch to the surface where they can be counted. Mix one ounce (30 ml) of a lemon-scented dishwashing detergent in two gallons (7.6 L) of water. One ounce (30-ml) of a commercial insecticide containing 1–2% pyrethrins is also effective. Apply the solution over one yd^2 (0.83 m^2). Medium- to large-size cutworms will come to the surface in 2–3 minutes but smaller cutworms may take 5–8 minutes. Other insects may also surface. Make sure to water the turf after soap-flushing to minimize the risk of sun scald or phytotoxicity to the turf.

Flushing may be most effective shortly after sunrise when most larvae are settling down after feeding all night. Treatment threshold obviously will vary with turftype, management and tolerance levels. On lawns or fairways, 5–10 larvae per yd^2 may warrant control, but on high priority areas such as greens and tees, tresholds may be much lower.

Management

A healthy, vigorous turf with balanced fertility and irrigation during dry periods will be more tolerant to BCW feeding. Endophyte-enhanced (infected with Neotyphodium/Epichloë endophytes) perennial ryegrasses and fescues apparently are not resistant to BCW. In laboratory studies, BCW survived poorly on certain Kentucky bluegrass varieties and preferred bentgrass to Kentucky bluegrass. Accordingly, greens or tees surrounded by Kentucky bluegrass may be at a lesser risk from BCW damage.

BCW larvae are active during the night with the highest activity between 1:30 a.m. and 5:30 a.m. Most larvae cease feeding and burrow back into the turf around dawn. Since most golf greens must be mowed at sunrise ahead of the golfers, significant mechanical control of BCW larvae could be attained if crews began the mowing operation an hour or so before sunrise.

BCW like to use aerification holes as burrows, but research has shown that aerification does not increase BCW numbers. Research has also indicated that BCW densities are lower in plots that have been topdressed with sand.

Because BCW adults lay eggs singly on the tips of bentgrass leaf blades, mowing removes most of the eggs. However, up to 90% of the eggs on the grass clippings survive the mowing process. BCW populations can be significantly reduced by the mowing process only if the clippings are removed from the site.

Natural enemies

Various species of parasitic wasps and flies and predatory insects such as ground beetles, rove beetles, and ants, and many bird species prey on BCW eggs, larvae, pupae, and adults. Predators and parasites often keep BCW populations at tolerable levels. Treating turf areas preventively will "control" the parasitic and predatory insects and may encourage BCW outbreaks later in the year.

Chemical Control

BCW are fairly easy to control on a curative, as-needed basis. Always confirm potentially damaging BCW infestations through sampling or inspection before considering control measures. Controls have to be directed against the feeding larvae, not the moths.

Effective insecticides for cutworm control include the neonicotinoid clothianidin (Arena®); the oxadiazine indoxacarb (Provaunt®); the anthranilic diamide chlorantraniliprole (Acelepryn®); the pyrethroids bifenthrin (Talstar®), cyfluthrin (Tempo®), deltamethrin (Deltagard®), lambda-cyhalothrin (Battle®, Scimitar®), and permethrin (Astro®); the organophosphates acephate (Orthene®/Address®) and chlorpyrifos (Dursban®; not for residential turf or where children may be exposed); and the carbamate carbaryl (Sevin®). Note that chlorpyrifos, deltamethrin and lambda-cyhalothrin are available only for commercial use.

Biorational insecticides are less toxic and more environmentally benign. Not only are they safer to use, but unlike most traditional insecticides, they have only minimal direct effects on beneficial insects including the predators and parasites of BCW and other turfgrass insect pests.

Biorational insecticides include the naturalyte spinosad (Conserve®, Bull's Eye™), the insect growth regulator (molt accelerator) halofenozide (MACH 2®), and the botanical azadirachtin (an extract from seeds of the neem tree) (e.g., Bioneem®, Azatrol®). However, the traditional insecticides chlorantraniliprole, indoxacarb, and chlothianidin also have excellent risk profiles and can be considered least toxic and safer on beneficial insects.

Chlorantraniliprole, indoxacarb, spinosad, and halofenozide are just as effective as the other insecticides.

Be aware that products containing azadirachtin are effective only if applied against young larvae. A considerable quantity of azidirachtin must be eaten by larvae in the 1st to 3rd instars to get the best control. Application when BCW damage shows up is often too late. A vigorous monitoring program, however, will help to properly time the treatments and maximize control. Remember that as generations overlap later in the year, larval populations will be less uniform and control will be less effective because only the smaller larvae will be controlled at that time.

Optimizing Chemical Control

Try to apply treatments late in the afternoon or evening because the larvae feed at night and control materials may be broken down, especially during hot and windy days. Treating a 20′–30′ (6–9 m) buffer zone around greens and tees should delay reinfestations from the reservoir populations developing in roughs and fairways. Liquid sprays work better than granules for cutworm control. Apply in about 2 gal/1,000 ft^2 (8 L/100 m^2). Lower spray volumes are fine as long as uniform coverage is achieved.

It is paramount not to water treatments in, and withhold deep irrigation and mowing for 1–2 days to leave the residues on the grass. Therefore, do not tank mix the treatments with other pesticides that need to be watered in. Granular formulations have to be activated with a light post-treatment irrigation (1/8″= mm). Rotate materials of different chemical classes to reduce the chance for resistance problems. Always read instructions on insecticide label very carefully.

Biological Control

Products that contain the insect-parasitic nematode *Steinernema carpocapsae* (e.g., Ecomask™, Millenium®, Carpsanem) give good control of BCW. Nematodes need moist soil for optimal performance. Apply with sufficient water and then water in immediately (follow label instructions). To avoid heat and direct sunlight exposure of the nematodes, apply in early morning or late in the day. Because these nematode products contain living organisms, they have to be handled and stored with more care than chemical insecticides. They have the advantage of no reentry interval due to their non-toxicity to humans. In addition, the BCW larvae die in their burrows rather than on the soil surface as is common after chemical controls.

Figure Captions

Figure 1 (l-r): Black cutworm moth and larva.

Figure 1 courtesy of USDA (black cutworm moth) and D. Shetlar (larva).

For a comprehensive list of our publications visit www.njaes.rutgers.edu *Revised March 2010*

Cooperating Agencies: Rutgers, The State University of New Jersey, U.S. Department of Agriculture, and County Boards of Chosen Freeholders. Rutgers Cooperative Extension, a unit of the Rutgers New Jersey Agricultural Experiment Station, is an equal opportunity program provider and employer.

RUTGERS
THE STATE UNIVERSITY OF NEW JERSEY

Rutgers, The State University of New Jersey
88 Lipman Drive, New Brunswick, NJ 08901-8525
Phone: 732.932.5000