

An Integrated Approach to Insect Management in Turfgrass: **Sod Webworms**

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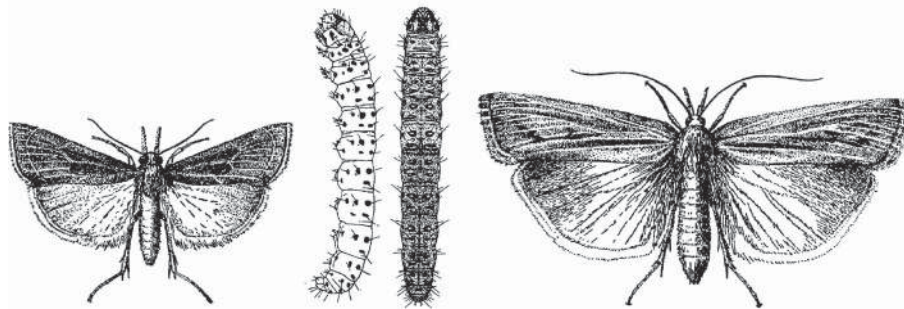


Fig. 1. Adult bluegrass webworm (left), sod webworm larva (side/top view), adult larger sod webworm (right) (Courtesy of D. Shetlar)

Introduction: Sod webworms (SWW) are small caterpillars that live in silk-lined tunnels in the thatch and soil below turfgrass. Adult SWW moths, also called ‘lawn moths’ or ‘snout moths’, are small, buff-colored moths that hover over turfgrass at dusk. More than 20 SWW species attack turfgrasses across North America but usually only 2 to 3 species are pests in a given area.

Common species in New Jersey include the bluegrass webworm [*Parapediasia teterrella* (Zincken)] and the larger sod webworm [*Pediasia trisecta* (Walker)]. SWW can damage all cool-season grasses including Kentucky bluegrass, most fescues, perennial ryegrass, and bentgrass.

Symptoms of Infestation: SWW chew off leaves and stems just above the grass crown. Healthy well-maintained turf will often tolerate and recover from this scalping. However, weak or drought-stressed grass may be killed by sun-

exposure of the crowns. Damage begins as general thinning, followed by small patches of brown, closely-cropped grass. A close look will reveal the typical silk-lined SWW tunnels, often with clumps of pinhead-sized, green fecal pellets around the mouth of the burrows. In severe infestations, the scattered patches may coalesce into large irregular areas. Damage is particularly common in sunny sites during hot, dry periods. Early symptoms of damage may be masked by dormancy in drought-stressed grass, but this grass will not recover after rains. Flocks of birds probing in the grass may indicate SWW infestation but the birds may also be feeding on other insects.

Insect Description: SWW eggs are tiny (size of dot on this “i”) and oval-shaped or barrel-shaped, with longitudinal ribbing on the surface.

SWW larvae are beige, gray, brown or greenish (depending upon species) with a brownish head.



Most species have characteristic dark, circular spots and coarse hair scattered over their body. Fully-grown larvae range from 5/8" to 1" (16 to 25 mm) in length.

SWW pupae are torpedo-shaped, tan to dark brown, and 3/8" to 1/2" (10 to 13 mm) in length. Pupae of most species are enclosed in silken cocoons in the soil. The cocoons are covered with bits of fecal matter, soil, and plant debris.

Adult SWW are small dull-colored moths (wing-spans 3/4" to 1"). The front wings are mostly whitish, dull gray or tan, with longitudinal stripes or other faint markings in silver, gold, yellow, brown and/or black depending on species. The hindwings are usually lighter with delicate fringes on the outer margins. Because the wings are typically rolled around the body, resting adults resemble slivers of wood or grass stems. A snout-like projection formed by the mouthparts extends forward from the front of the head (→ 'snout moths').

Seasonal History and Habits: SWW overwinter as partially grown larvae in silk-lined chambers in the thatch or soil. They resume feeding in spring, grow rapidly, and pupate. The moths emerge after 10 to 20 days, mate, and the females start laying eggs. Eggs are dropped individually during flight and settle in the upper thatch. A total of 30 to 500 eggs (depending on species) are laid during a life span of usually < 14 days. Depending on temperatures, eggs hatch in 4 to 20 days and the larvae develop through usually 6 to 8 larval stages in 4 to 7 weeks.

Young larvae feed by scraping surface tissue off the leaves, but soon drop to the ground and start feeding from their typical tube-like silk-lined tunnels made in the thatch or surface soil. The older larvae chew down foliage around their burrows, mainly at night. Most SWW have 2 (e.g., bluegrass webworm) or 2 to 3 (e.g., larger SWW) generations per year.

Monitoring: The best way to confirm a SWW infestation is to get on your hands and knees for

a close examination of the turf, part the grass and look for chewed blades, small green fecal pellets, silk-lined burrows, or the larvae themselves. Check the interface between damaged and healthy grass.

If SWW are suspected but cannot be found, use an irritant solution to flush up the larvae. Mix 1 oz. of liquid dishwashing soap (e.g. Joy®) in 2 gal of water and apply over 1 square yard of turf. Most SWW, other caterpillar pests, chinch bugs, and billbug adults will come to the surface within 5 to 10 min (small SWW might take up to 20 min). The insect will be more visible in shorter mown turf, but the caterpillars will tend to climb up the grass leaves. The method works better in moist soil and in the morning when the larvae are close to the surface. Irrigate the sampled area afterward to reduce any chances of sun scalding.

Damage thresholds vary considerably for different situations. On short-cut bentgrass on golf courses, fewer than 10 larvae per 1 square yard may warrant control; on medium to low maintenance lawns with sufficient irrigation or rainfall, as many 200 larvae per 1 square yard may not cause damage.

The best time to check for larval populations can be determined by monitoring the adult populations. For some species, commercial sex attractant lures are available (e.g., bluegrass webworm). The simplest monitoring method is to regularly walk the turf at sunset after daytime temperatures warm to 80°F (26°C) and night temperatures are above 55°F (13°C). Adult moths will skitter in low zig-zagging flight over the grass. Note the peak adult flight activity; 10 to 14 days later most of the larvae will have hatched.

Management: A healthy, vigorous turf and balanced fertility and irrigation during dry periods will enhance the turf's tolerance to SWW feeding. Endophyte-enhanced (infected with *Neotyphodium* endophytes) perennial ryegrasses and fescues are relatively resistant to SWW.

Natural enemies: Various species of parasitic wasps and flies and predatory insects such as

ground beetles, rove beetles, ants, and many bird species prey on SWW eggs, larvae, pupae, and adults. Predators and parasites often keep SWW populations at tolerable levels. Treating lawns preventively will 'control' the parasitic and predatory insects and may encourage SWW outbreaks later in the year.

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

To aid in locating control products, active ingredients listed below are followed by trade names in parentheses. Be aware that the active ingredients in these products may change. When purchasing control products, always check the label for the active ingredient. Always read instructions on insecticide labels very carefully.

Effective insecticides for SWW control include the organophosphates acephate (Orthene®, Address®), diazinon (Diazinon®; not for golf courses, sod farms, turf areas > 1 A), chlorpyrifos (Dursban®; not for residential turf or where children may be exposed), the carbamate carbaryl (Sevin®), the pyrethroids bifenthrin (Talstar®, Ortho® Lawn Insect Killer Granules), cyfluthrin (Tempo®), deltamethrin (Deltagard®), lambda-cyhalothrin (Battle®, Scimitar®), and permethrin (Astro®), and the naturalyte spinosad (Conserve®, Bull's Eye™). Chlorpyrifos, deltamethrin, and lambda-cyhalothrin are presently only available for commercial use.

The biorational control halofenozide (MACH 2®) is a molt accelerating compound and is just as effective, but has minimal effects on beneficial insects.

Try to apply late in the afternoon or evening because the larvae feed at night. Liquid sprays often work better than granules for SWW control. Apply in about 2 gal/1,000 ft² (8 L/100 m²). Don't water treatments in, and withhold deep irrigation and mowing for 1 to 2 days to leave the residues on the grass. Granular formulations must be activated with a light post-treatment irrigation (1/8" = 3 mm). Rotate materials of different chemical classes to reduce the chance for resistance problems or enhanced microbial degradation.

Biological/Biorational control: Products that contain the insect-parasitic nematode *Steinernema carpocapsae* (e.g. Ecomask™, Millenium®) give good control of SWW. 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. Nematode products must be handled and stored with more care than chemical insecticides (living organisms!), but have the advantage of no reentry interval due to their non-toxicity to humans.

Products containing *Bacillus thuringiensis* or azadirachtin (neem) are effective only if applied against young larvae. Application when SWW damage shows up is often too late.

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Desktop publishing by Rutgers-Cook College Resource Center

Published: June 2002

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N.J. AGRICULTURAL EXPERIMENT STATION
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