

The Annual Bluegrass Weevil

A little weevil causing big problems in the Northeast.

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L*istronotus maculicollis* (Dietz), annual bluegrass weevil (ABW), is a pest of highly maintained turfgrass in the northeastern United States. The earliest report of this insect damaging golf course turf appeared in Connecticut in 1931. The insect then spread to Long Island and Westchester County, N.Y., where it has thrived for the past 70 years. However, recently, damage from this pest has been observed in many other states in the region: Massachusetts, New Hampshire, Maine, Vermont, northern New Jersey, and western and central Pennsylvania. ABW has also been reported in Montreal and areas surrounding Toronto, Canada.

BIOLOGY

Adult ABW are small, compact beetles, approximately 3–4mm long (half the size of Kentucky bluegrass billbug) and with the characteristic weevil snout. Most adults are black, but when adults emerge from the pupal stage, they appear reddish in color and are called callow adults. As their outer shell (exoskeleton) hardens, the weevil takes on a speckled grayish color. This spotted appearance is due to patches of scales on the wing covers (elytra). As the weevil matures, the scales are sloughed away, leaving the adult weevil clothed in its predominate black coloration.

Eggs of the ABW are small (<1mm) and oblong. When eggs are first laid, they are whitish in color, but after a few days the eggs take on a smoky gray appearance. The eggs are

located between the leaf sheaths of the grass plant.

Typical of weevils, larvae of the ABW are legless. They are white, stout larvae with a dark brown



head capsule. Older larvae take on a slightly curved form, but they do not appear as C-shaped as the typical turf-damaging white grub. Pupae resemble adult weevils with the snout, legs, and wings clearly recognizable, but they remain a creamy white color for most of the stage. As the pupae approach emergence, many body parts darken until they surface as callow adults.

SEASONAL PATTERNS

Adult weevils over-winter in areas adjacent to golf course turf. In the early spring, weevils emerge from over-wintering habitats and move onto the turf to feed. Adults begin migrating during *Forsythia* full bloom, and most weevils are on the golf course by the time flowering dogwood is in full bloom. Once on golf course turf, female weevils begin to lay eggs in the short mowed regions (tees, greens, and fairways). The eggs hatch within a week, and the larvae feed on the grass for two months before they enter the pupal stage in mid- to late June. Adults emerge in late June to early July to repeat the life cycle. The second generation larvae ABW complete their cycles at increased speed, and callow adults will be present on the golf course during mid-August. There has also been evidence of a third generation occurring in the southernmost areas of New York in recent summers. However, development of individuals is not closely synchronized, so a turf manager can find all stages of ABW on the golf



course on any given date from late June through early September.

FEEDING INJURY

Most damage is caused by the larval stage of the ABW. Adult females emerge from over-wintering sites and move onto golf course turf, where they lay eggs in short mowed (0.6–2.0cm) grass. Females chew holes in the outer sheaths of the grass blade and insert the eggs between sheaths of the plants of fairways, greens, tees, and collars. Eggs hatch, and first instar larvae feed within the grass stem, but eventually older instars move from within the plant and progress down to the crown of the plant, where they cause the most severe damage. Fifth-instar larvae (the largest stage) cause significant damage that appears as large dead areas of turf on the golf course. Often the damage first appears in collars or the perimeter of greens, tees, and fairways. Cameron (1970) estimated that one larva could kill approximately 20 stems of grass during its development. Adults are known to feed on the grass blades and weaken the grass, but adult feeding causes no severe damage.

The fifth instar larvae are the biggest threat to golf course turf, but smaller instars often go unnoticed in the late spring. Damaged areas first appear as small yellow to brown marks on manicured turfgrass. The chlorotic plants are easily dislodged from the soil. Ultimately, these small areas coalesce to form large regions of dying grass. Eventually, high populations result in substantial areas of dead turf. Since ABW damage overlaps



with anthracnose infection periods and symptoms closely resemble those of anthracnose, weevil damage can easily be misdiagnosed as disease. Although many golf course superintendents have observed ABW larvae to feed primarily on *Poa annua*, annual bluegrass, we have detected considerable larval damage on many varieties of creeping bentgrass. Field experiments also have demonstrated ABW larvae to be present in equal numbers in annual bluegrass and bentgrass plots.

MANAGEMENT

Annual bluegrass weevil larvae can be detected easily by cutting a wedge of turf with a knife and searching the turf/thatch interface for the creamy colored larvae. Cup-cutter plugs also can be removed from potentially infested areas; by gently pulling the plug apart, larvae can be distinguished against the dark colored soil. For first generation larvae, the threshold for damage is between 30 and 80 weevils per square foot, while summer thresholds are generally lower. Heat- and drought-stressed turf in July and August can only tolerate 20-40 weevils per square foot.

Adult monitoring can be performed with a soapy flush. Combine 1 to 2 tablespoons of a lemon-scented dish detergent with 2 gallons of water and pour over a 2- to 4-foot area. The soap irritates adult weevils lying deep in the turf layer, and they rise to the surface within five minutes. Adult weevils can be counted as they ascend. However, adult numbers are not directly correlated with resultant larval populations; the adult monitoring technique is designed to alert the superintendent if weevils are indeed present on the golf course.

Control of ABW populations most often has involved traditional insecticide applications. Applications targeted at emerging adult populations have yielded the most consistent control for golf course superintendents. The chemical treatment should target adults after they emerge from over-wintering, but before the females lay their eggs. Phenological

indicators provide a reliable target date for spring application; sprays applied between *Forsythia* full bloom and dogwood (*Cornus florida*) full bloom, around the middle of April through early May, have provided significant control of ABW populations consistently.



Annual bluegrass weevil larva damage on annual bluegrass is often first noticed around the collar and perimeter of the greens. Damage is usually most severe in these areas.

When pursuing adult weevils, chemical treatments should be watered in lightly. Since larval populations were once thought to be concentrated on edges of fairways and greens, perimeter sprays were believed to provide adequate control. However, recent data from our laboratory have shown ABW larvae to be equally present across the entire width of the fairway, so perimeter applications may not ensure a larvae-free fairway. Because ABW development exhibits extreme overlaps in weevil life stage in July and August, we have a more difficult time predicting timing for control of second generation adult emergence. However, the general rule of thumb for treatment for second generation adult weevils in the metropolitan New York area is July 4th. We are working on a degree-day model that should help refine this date.

The most effective and economical method of control for ABW is to scout

for adult weevils early in the season (April to early May) to verify their presence. Knowledge of the history of ABW infestations on the golf course also is valuable information; if adults indeed are present, a chemical application can be made to infested areas. Spot treating is also successful in controlling damaging ABW populations. Most often, ABW damage is correlated with other turf stresses such as water, fertility, and mowing. Healthy turf can be the best defense against ABW damage.

THE FUTURE OF ABW

The potential for ABW to spread to the midwestern regions of the U.S. is likely, but infestations are not expected in the near future. ABW have remained in the northeastern states for more than 75 years with little spread even from the Westchester County and southern Connecticut epicenters. However, because climate and varieties of grass are similar between midwestern and northeastern golf courses, there is potential for ABW migration west.

Currently, we are investigating potential stress factors that may affect ABW larvae and their damage. We are exploring the possible effects of mowing height and fertilization on the location of ABW larvae, and we are examining the numbers of larvae found in five commonly planted golf course grasses. In addition, we have measured turf quality for the different grass types as well as the turf response to mowing height and fertilization and their relationships with ABW infestation. Results from our field data will be available in the next year.

REFERENCES

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