

Biology and Management of the Annual Bluegrass Weevil In Turfgrass (*Listronotus maculicollis*)

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Introduction The current Latin name for the annual bluegrass weevil (ABW) is *Listronotus maculicollis* (Dietz), which formerly was considered a species of *Hyperodes*. It is a beetle in the weevil family and is a pest of highly-maintained, short-cut turfgrasses in the Northeastern and Mid-Atlantic regions. Reports of damage from this insect were reported as early as 1931 in Connecticut. States that have reported damage from the ABW include: New York, Rhode Island, Massachusetts, New Hampshire, Maine, Vermont, New Jersey, Pennsylvania, Maryland, and most recently Ohio and Virginia. The ABW also has damaged turf in Canada. It has been estimated that golf courses in the New England region spend over \$6,000 annually, using five or six insecticide applications per year to manage this pest (7). It was believed for years that the ABW destructive ability was restricted to annual bluegrass (*Poa annua* spp. *annua* L.), including the perennial subspecies *Poa annua* spp. *reptans* Hauskn., and that it was isolated to the northeastern states. Recent research and field observations, however, have proved this theory incorrect because substantial damage has been observed in creeping bentgrass (*Agrostis stolonifera* L.) fairways and putting green collars in the Mid-Atlantic region.

Biology The ABW has a complete life cycle with 1-3 generations per year possible, depending on location. The adults are small, compact and differ in color from black to gray. Adults are about 1/8 inch long with a characteristic weevil snout. Their body is covered with fine hairs and scales, which are easily observed under magnification. It is difficult to distinguish between male and females. When the adult emerges from the pupal stage they appear reddish, however, their outer shell will harden and the hairs and scales wear off and the weevil appears charcoal-gray in color. The eggs of the ABW are small and oblong, and can be found in leaf sheaths of the grass plant. Initially, the eggs are white in color, but they soon turn gray. Once the larvae emerge, they are legless, with a white body and dark brown head. The older larvae appear slightly curved, but not nearly as C-shaped as other white grubs. Pupae look similar to an adult ABW, but are smaller in size and have a reddish-brown color that gradually darkens.

Damage and Symptoms Damage often is first noticed in the perimeter of greens and fairways that support a high population of *Poa annua*. Most of the damage is caused by the larval stage, and can go unnoticed for some time. Damage to plants begins when the adult female chews into the outer sheaths of the grass blade and lays her eggs between sheaths. This process may just weaken the plant and cause yellowing, but rarely will it kill a plant. When the eggs hatch, the larvae feed on the stem and later instars move into the crown tissue. When crown feeding occurs the turf can be easily pulled from the soil. The hollowed grass stem is the key diagnostic feature. As more eggs

hatch, more severe damage can occur and the damage associated with the fifth instar often is the most destructive. At this point, the turf will appear to be under severe drought stress due to damaged stems. Turf will appear purple before it turns brown and dies-out. Significant damage generally becomes obvious in late May or early June, and often is mistaken for other problems.



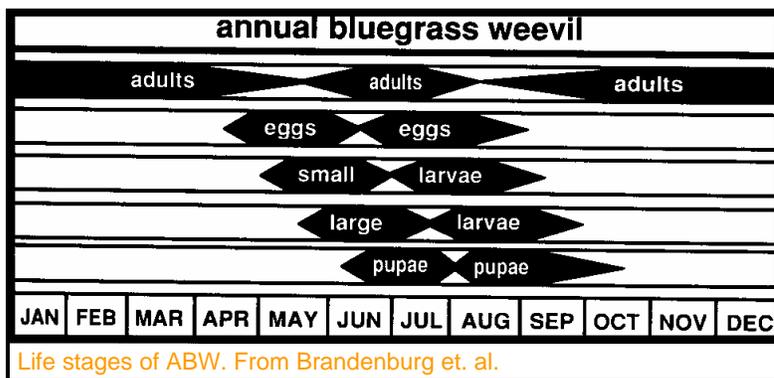
ABW larvae in thatch layer of fairway turf.



Annual bluegrass weevil adult

Seasonal Activity and Geographic Distribution Weevils over-winter mainly as adults in litter under trees and clippings deposited in roughs along the sides of fairways. They begin to migrate from the fine turf areas to these sites in early autumn.

Migration back into fine turf areas typically happens



during early spring (about mid-April in south New York State). Typically, adult feeding, which causes little damage, occurs during the day and the young adults can be seen walking across the turf. Once the adult weevils begin to feed, the oviposition of their eggs in sheaths begins. Eggs are deposited in small groups (2 or 3), and research has shown that each female can have 11 offsprings (1). Larval formation takes about a month for all five instars, and development from egg to adult takes 2 months. The maximum presence of larvae extends from the last week of May until the middle of June, with most damage possible during the summer in Maryland.

Thresholds, Management and Control Options Larvae can be detected by cutting a wedge of turf with a knife or cup cutter and looking in the turf/thatch interface (picture on front). The threshold for damage early in the season is 30 to 80 larvae per square foot. (8) This threshold decreases as turf becomes stressed (3). Monitoring also can be done using flushing techniques (1 oz dishwashing soap/ 2 gal water) to bring the adults to the surface. Black light traps also can be used to attract adults and assess populations (6,8,9).

Cultural control options include proper nutrition and irrigation, which often mask the symptoms. One of the most



Annual bluegrass weevil larvae. From Brandenburg et. al.

effective cultural control methods is to convert from a susceptible turfgrass species to one that is tolerant or resistant (i.e. perennial ryegrass *Lolium perenne* L.) and/or reduce the population of susceptible turfgrass species. The ABW over-winters in adjacent tree litter and leaves and removing this litter may help to reduce populations.

Few natural enemies exist and only have been proven effective in laboratory studies. Biological control has been achieved with late spring applications of a parasitic nematode (*Steinernema carpocapsae*). Successful control has been a challenge due to environmental factors, but fair (70%) control has been achieved (7). Research also has shown that the fungus *Beauveria bassiana* is an unreliable and unpredictable bio-insecticide in field conditions (7). Studies using wasps (*Microctonus*

aethiopoides Loan and *M. hyperodae* Loan) that parasitize the ABW and the Argentine stem weevil (*Listronotus bonariensis* (Kuschel) only have provided 10-20% control of the ABW in lab studies in New Zealand (7).

Chemical control seems to be the most effective way to ensure that the turf stand is not severely damaged by the ABW. Some strategies suggest spot-treating areas that have high populations of adults or past ABW infestations. Chemicals need to be applied before damage is seen and while adults are active in the early spring and before eggs are laid. Typically, chemical applications are made when adult ABW are observed walking across golf course fairways, greens, and roughs, which may be associated with the blooming of dogwood trees (*Cornus florida* L.) A sequential application in July may be needed to control a second generation. Insecticides currently labeled for control of ABW adults include; deltamethrin (Deltagard[®]), bifenthrin (Talstar[®]), cyfluthrin (Tempo[®]), and lambda-cyhalothrin (Battle[®], Scimitar[®]). The aforementioned pyrethroids generally provide high levels of control (> 85% control) (2,4.). For preventative ABW control in chronically infested sites, a long residual insecticide such as imidacloprid (Merit[®]) or halofenozide (MACH2[®]) may be recommended and should be applied before egg hatch. The aforementioned chemicals, however, may only provide fair control (40 to 60% reduction) (4.). Generally, the long residual, preventatively applied insecticides for grubs give less control than the curatively applied pyrethroids that target the adult ABW (between 40 to 50% versus 85-98 %) (4,5). Chemicals should be applied in the proper amount of water (typically > 1.5 gallon/1000 ft²). It is important that all of these insecticides are allowed to dry in the thatch and upper plant parts. If targeting larvae that are feeding in thach, Dylox[®] (Trichlorfon) appears to provide the quickest curative control. Follow label instructions for post application irrigation and rainfall requirements and do not mow for 1 to 2 days after application.

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