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TURFGRASS TRENDS

BLUEGRASS WEEVIL CONTROL

# Curative Programs for Bluegrass Weevil Larvae Require Patience

By Steven McDonald and Daniel Biehl

The Annual Bluegrass Weevil (ABW) is a pest of highly maintained, short-cut turfgrasses. Historically, this beetle in the weevil family has been a problem in the northeastern United States. However, during the past few years, the ABW has become a serious pest throughout the entire Mid-Atlantic region.

It was believed for years that the destructive ability of ABW [previously known as the *Hyperodes* weevil; *Listronotus maculicolis* (Dietz)] was restricted to annual bluegrass (*Poa annua spp. annua* L.), including the perennial subspecies *Poa annua spp. reptans* Hauskn., and that damage from the ABW was isolated to the Northeast. Recent research and field observations, however, have proved this theory incorrect and substantial damage has been observed in creeping bentgrass (*Agrostis stolonifera* L.) fairways and putting green collars in the Mid-Atlantic region. Most recently, ABW has been reported damaging annual bluegrass in Ohio.

The damage from ABW during the 2007 season has been widespread throughout the Northeastern and Mid-Atlantic regions. Personal observation and field reports of pyrethroid applications not providing acceptable levels of control are occurring and could be related to inconsistent spring weather and also higher than normal ABW populations. Many research efforts have focused on the control of ABW adults using pyrethroid chemistry in the early spring, timed with the bloom of the forsythia and dogwood trees. There might be instances where this application was not timed correctly or the application failed to control the adults migrating from over wintering sites.

It is also possible that pyrethroid-resistant populations of

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PHOTO 1

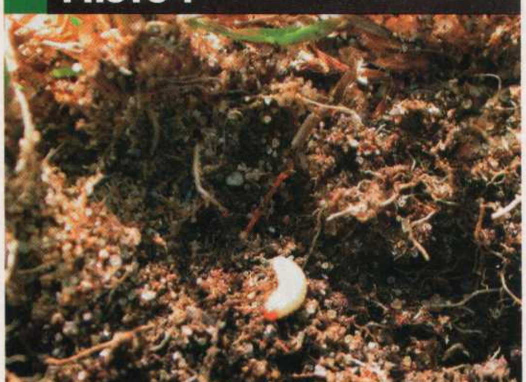

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**TABLE 1**

**Activity of annual bluegrass weevil larvae and pupae as influenced by various insecticide applications.**

| Treatment | Rate | 2 DAT | | 4 DAT | | 7 DAT | | 12 DAT | |
|---|---|---|---|---|---|---|---|---|---|
| | | Activity Rating (0-5)* | | | | | | | |
| Dylox 6.2G | 131 lbs/A | 1.3** | c | 2.0 | a | 0.3 | c | 0.3 | b |
| CrossCheckGC | 43.56 fl oz/A | 2.0 | bc | 2.5 | a | 1.6 | ab | 0.3 | b |
| Dursban Pro | 65.34 fl oz/A | 3.5 | a | 2.3 | a | 1.3 | abc | 0.2 | b |
| Provaunt 30WDG | 12 oz/A | 3.5 | a | 2.2 | a | 0.8 | abc | 0.0 | b |
| Meridian 25WG | 17 oz/A | 2.8 | ab | 2.3 | a | 0.7 | bc | 0.2 | b |
| Untreated | - | 2.8 | ab | 2.3 | a | 2.0 | a | 1.3 | a |
| P>F | | 0.04 | | 0.97 | | 0.03 | | 0.04 | |

** All of the life stages were rated on a 0 to 5 movement scale, where 0.0 = no movement after 10 seconds, 2.5 = insect moving slowly, deeper in profile and 5.0 = when the insect moved as soon as exposed.*
*** Means in each column followed by different letters are significantly different ($P \leq 0.05$) according to the Fischer's Protected least significant difference test.*

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ABW have developed, which might complicate the springtime application even further. This spring application theoretically provides control of adults before they have a chance to lay eggs and prior to the egg hatch. This is important since ABW larvae (following the egg laying period) are the life stage that damages turf. From personal experience and field observations, larvae can be extremely difficult to control. This may be because they are below the thatch. Applications targeting ABW larvae may take several days to affect the insect and cause a stop in their feeding.

To date, no research has been reported that examined the duration of ABW activity following an insecticide application in the Mid-Atlantic region. A superintendent routinely scouts before and after the application of plant protection materials and will assess the level of control in the days following.

An important purpose of this study was to investigate the quickest and most effective insecticide as well as gain information regarding control of ABW in the larvae stage following the signs of visible damage to a fairway. This information would be extremely valuable to superintendents who have observed ABW damage and also observe that the larvae are still active following an application targeting them.

## Material and methods

This trial was conducted in the approach of the fourth hole of the Centennial Course at Philadelphia Country Club in Gladwyne, Pa. The study area was maintained as a typical fairway (mowed at one-half inch, irrigated and chemically treated as needed). This portion of the fairway consisted of 70 percent annual bluegrass, 20 percent creeping bentgrass and 10 percent perennial ryegrass (*Lolium perenne L*). The soil was a native clay-loam soil with a pH of 6.4. Thatch was measured as less than one-half inch thick.

All damage at this study site was observed only on the annual bluegrass. Individual plots were 2.5 feet by 5 feet, and treatments all were applied June 7, 2007. All liquid treatments were applied from a TeeJet 8004 flat fan nozzle calibrated to deliver 1 gallon of water per 1,000 square feet.

The granular treatment (Dylox 6.2G) was applied using a shaker bottle. The area was irrigated with 0.2 inches of water supplied from overhead irrigation immediately after application. Treatments were arranged in a randomized complete block with three replications. Insecticide treatments included: Dylox 6.2G (6.2 percent trichlorfon), CrossCheck GC (7.9 percent bifenthrin), Dursban Pro (chlorpyrifos), Provaunt (indoxacarb) and Meridian (thiamethoxam). All product application rates are shown in Table 1. The damage was observed six days before treatments were applied. However, turf damage was significantly worse two days prior to the applications.

All plots were visually rated on 0 to 10 scale for turf quality, with 7.5 being minimal acceptable level for a fairway and 10 being optimal quality, color and density. Due to our interest in the quickest knockdown, we took activity ratings at two (2 DAT), four (4 DAT) seven (7 DAT) and 12 (12 DAT) days after treatment. This was done by removing one 4.25-inch diameter plug from the center of the plots (new plug on each date). The plug was destructively pulled apart to count the number of ABW per plug and also assess live activity and movement of the ABW.

Four of five life stages of this insect were observed in the study and include: third instar larvae (10 percent), fifth instar larvae (60 percent), pupae (30 percent) and callow adult (less than 1 percent). All of the life stages were rated on a 0 to 5 activity scale, where 0.0 = no activity after 10 seconds, 2.5 = insect moving slowly, and found deeper in soil profile, and 5.0 = insect moved as soon as exposed.

## Results

**Activity Rating:** In this trial, the activity rating was our measure of the impact of the treatments on the insect movement and viability (Table 1). At the 2 DAT rating, Dylox had the greatest reduction in ABW larvae activity in the pulled plugs. Although not significantly different from the untreated control plots, all plots treated with Dursban or Provaunt had the highest activity ratings. At 4 DAT, no significant differences were observed among the treated insecticide plots and the untreated plots. By 7 DAT, all insecticide-treated plots showed a reduction in movement of the ABW larvae. The highest reduction in the activity of the ABW was observed in plots treated with Dylox, followed by Provaunt or Meridian. By 12 DAT, all ABW activity in the insecticide treated plots was significantly less (i.e., 0.0-0.3), when compared to the untreated plots (1.3). Complete control (i.e. no visual movement of any ABW) was observed in plots treated with Provaunt.

**Turfgrass Quality:** At 2 DAT, all insecticide-treated plots had a slightly higher turfgrass quality, although not statistically higher than the untreated control. That trend continued on 4 and 7 DAT. No significant differences in turfgrass quality were observed among the insecticide treatments until 12 DAT. It is important to note that the turfgrass quality in the untreated plots was nearly the same at 12 DAT as it was at 2 DAT, and generally all of the treated plots had higher quality.

Data from this study indicate that superintendents making curative (i.e., rescue) treatments targeting the ABW larvae that are actively feeding need to be patient following the application. In this study, we first observed a significant decline in the movement and feeding (as indicated by turfgrass quality and recovery) on 4 to 7 DAT rating dates. The top three performers over the 12 days of evaluation, based on turfgrass quality and activity rating, were Dylox, Meridian and Provaunt. Dylox has previously been reported to provide greater than 80 percent control of ABW larvae.

This study supported many field observations in which ABW larvae, pupae and callow adults continue to move and might or might not stop feeding following an insecticide application. In this trial, we observed some differences among treatments in the quickest knockdown. It is important to note that many other insecticides could have been included [i.e., Conserve (spinosad), Merit (imidacloprid), Arena (clothianidin) and others] in this one-year field study. However, we did not have them available at the initiation of this study.

Conserve has been shown to provide excellent curative control (over 90 percent) of the ABW larvae in many studies throughout the Northeast region. It is also important to note that the level of damage observed in this study should be considered severe. After 12 days of rating, the turfgrass quality in all of the plots (insecticide-treated and untreated) was still unacceptable (below 7.5).

Hence, it is best for superintendents to target this pest on a preventive basis using a combination or rotation of materials for resistance-management programs.

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## REFERENCES

Bervard, D. 2007. They're back. USGA Mid-Atlantic Regional Update: June 15, 2007. Online: http://www.usga.org/turf/regional_updates/regional_reports/midatlantic/06-15-2007.html

Rimelspach, J. 2007. Annual bluegrass weevil found in Ohio. Buckeye Turf Website. June 28, 2007. Online: http://buckeyeturf.osu.edu/index.php?option=com_intsportsnotes&Itemid=85&noteid=1238
Rothwell,N.P. 2002. Annual blugrass weevill: Future pest In Michigan? 72nd Annual Michigan Turfgrass Conference Proceedings.

http://www.turf.msu.edu/docs/72ndMTFConference.pdf

Skorulski, J. 2007. 2007 Northeast News Update. April 27, 2007. http://www.usga.org/turf/regional_updates/regional_reports/northeast/04-27-2007.html

Vittum, P. 2005. Annual bluegrass weevil: A metropolitan pest on the move. Golf Course Management. May 2005. p 105-108.

Vittum, P. 2006. The Annual Bluegrass Weevil Rears its Ugly Head. USGA Green Section Record. January/February. 44(1): p 16-17.

Vittum, P. 2007. Annual Bluegrass (Hyperodes) Weevil. Online: http://umass-turf.org/mangement_updates/2007_archive/19jun07.htm