FEATURE ARTICLE

Invasive Grub Species Still on the Move!

Daniel A. Potter

Early June to mid-July is the optimal period for preventive control of most species of white grubs in the cool-season and transition turfgrass zones. As we prepare for the annual grub onslaught, it's worth noting that several important species are expanding their ranges and causing problems in areas where they may not have been problematic in the past.

Lately I'm getting lots of calls from turf managers in Indiana, Illinois, Michigan, Wisconsin, Iowa, Missouri, and Arkansas about plague-like infestations of Japanese beetles (*Popillia japonica*) they've experienced in the past two years. Japanese beetle (JB), an exotic species that first was discovered near Riverton, New Jersey in 1916, has steadily spread so that it now is established in all states east of the Mississippi River except for Florida. As this pest moves into new counties and states, the pattern has been for it to reach outbreak densities for the first 10 to 15 years or so after establishment, after which population levels slowly decline and equilibrate at levels that are troublesome, but somewhat less overwhelming. Entomologists don't fully understand why this occurs, but likely it has to do with a whole suite of natural enemies, including pathogenic microorganisms (milky disease bacteria, nematodes, and others), parasitic insects, and predators, that lag behind the JB population but eventually "kick in" to suppress the grub stage. That's the pattern we've experienced in Kentucky since the early 1980s.

In the meantime, turf managers dealing with JB may benefit from lessons that we've learned from field research. First, **traps probably won't solve your JB problems; more likely, they'll aggravate them by attracting far more egg-laying and leaf-chomping beetles than actually are caught.** I'm unaware of any evidence that you can "trap out" an infestation once the pest is established. **Milky disease spore powder has performed poorly in field trials,** including multi-year trials on golf courses. Certain trees and shrubs, among them lindens, sassafras, purple-leaf plums, Norway maples, wild and cultivated grapes, and many crabapple varieties, are JB magnets, attracting hordes of hungry adults, which lay eggs in nearby moist turf. **Where practical, substitute resistant plants** (e.g., red maple, ornamental pears, tuliptree, ash, dogwood, etc.). **Carbaryl (Sevin®) has been the industry standard for controlling the adults.** Professionals also can use pyrethroids [e.g., binfentrin (Talstar®), lambda-cyhalothrin (Scimitar®), cyfluthrin (Tempo®)], or other products. Repeat (weekly) applications usually are needed to protect highly favored host plants. **Imidacloprid (Merit®) or halofenozide (Mach 2®) generally provide excellent preventive control of the grubs if applied any time from early June to mid-July.** Thiamethoxam (Meridian®), the new insecticide from Novartis whose registration is expected later this summer, also gives excellent preventive control of JB grubs. **Trichlorfon (Dylox®) is your best bet for "rescue" treatments after the grub damage appears.**

European chafer (EC), *Rhizotrogus majalis,* another highly destructive grub species, also seems to be on the move. The EC is endemic to western and central Europe and was first discovered in the United States near Rochester, New York in 1940. Since then it has spread and become established in New York, Connecticut, Massachusetts, Rhode Island, northern and central Pennsylvania, across northern Ohio into eastern Michigan, and into Ontario, Canada along the Niagara frontier.

Like other annual grub species (e.g., masked chafers and JB), the EC has a one-year life. The night-flying adults are light reddish-brown beetles, resembling May beetles or so-called "Junebugs," about 9/16 in. (13–15 mm) long, with distinct longitudinal grooves on the wing covers. Adults, which are active in June and July, emerge from the turf at dusk on warm, clear nights and fly to trees, where dense mating aggregations occur. The adults nibble the margins of tree leaves but cause little real damage. Eggs are laid in moist turf and generally hatch into grubs by late July or early August. EC grubs resemble other grub species, but can be distinguished by examining the pattern of spines on the raster (an area of spines and hairs on the underside of the tail end). **The EC raster has two distinct, nearly parallel rows of small spines that diverge outward at the tip of the abdomen, like a partly open zipper.** (See *Destructive Turfgrass Insects,* Ann Arbor Press, or check the website

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http://www.ohioline.ag.ohio-state.edu/hyg-fact/2000/2510.html [Factsheet HYG-2510] for an illustration.)

EC grubs grow rapidly, so that severe damage to turf begins to appear by late summer and continues through the autumn. The large, third-instar grubs continue to feed into November, a full month later than JB grubs, before going deeper in the soil for overwintering. They return to the root zone in March as the ground thaws, sometimes also causing severe damage in spring. Where there is thick sod or heavy snow cover, the grubs may remain in the root zone, feeding even in the winter.

EC tends to be our toughest grub species to control. **Imidacloprid (Merit®) at the high labeled rate (0.4 lb of active ingredient per acre) generally works well if applied preventively during the window of early June to mid-July. Thiamethoxam (Meridian®) reportedly provides good preventive control, comparable to imidacloprid.** Halofenozide (Mach 2®) has not performed as well against the EC as against other grub species. Indeed, there is growing research evidence that EC is relatively insensitive to halofenozide's molt-inducing effects. **Trichlorfon can be used for early preventive control after egg hatch,** but large EC grubs are especially hard to control with insecticides once the damage appears.

ASK DR. BEARD

Q *I have been told that the main time to apply potassium fertilizers is in the autumn. Is this correct?*

A The original research demonstrating the beneficial effects of using high potassium levels was conducted by this author in relation to the enhancement of autumn hardiness to low-temperature kill of cool-season turfgrasses. Subsequent research has demonstrated beneficial aspects of higher potassium levels in enhancing tolerance to a broad range of stresses, such as heat, drought, wear, and cold. Higher potassium levels also have a year-round effect in terms of improved rooting and reduced proneness to a broad range of diseases. **Thus, the strategy of higher potassium levels may apply year-round, especially whenever any of the various environmental stresses occurs in a given climatic region.** Specifically, the strategy is as follows: **Once the soil potassium level is demonstrated to be in the high range based on a chemical soil test, then apply potassium at 75 to 100% of the nitrogen rate being applied.** It should also be noted that excessively high potassium applications can result in a competitive inhibition of nutrient uptake that adversely affects certain plant levels, especially magnesium.

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