Cultural Control, Risk Assessment, and Environmentally Responsible Management of White Grubs and Cutworms in Turfgrass

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Goals:

- Determine factors that affect the distribution and abundance of white grubs and cutworms on golf courses.
- Reduce the use of insecticides by identifying methods to reduce white grub and cutworm insects through modified cultural practices.
- Provide better information on the effects of pesticides on natural enemies of turfgrass pests and other beneficial species that live in golf course turf.

Fertilization, watering, mowing height, soil compaction, soil pH, and aerification were manipulated in large field plots to determine how these factors affect choice of egg-laying sites, and subsequent population of Japanese beetle, masked chafer, and green June beetle grubs. Soil moisture was the most important factor determining abundance of white grubs; infestation levels were 2- to 4-fold higher in irrigated plots. In contrast, grubs were less abundant in high-mown turf, and in plots treated with sulfur to lower soil pH. In 1994, for example, total biomass of grubs was reduced by 55 percent and 77 percent, respectively, in high-mown and sulfur-treated turf. Liming, fertilization with urea, heavy rolling, and aerification had no effect on white grub population during this four-year study.

The number of grubs required to cause noticeable injury was found to be much higher in all common turfgrasses than suggested by prevailing rule-of-thumb estimates used by the industry. Irrigation and fertilization encouraged regrowth of foliage and enhanced appearance and rooting strength of grub-damaged turfgrasses.

Most eggs of black cutworms were laid singly on the tips of bentgrass leaf blades. Mowing at 1/8" or 3/16" was shown to remove 80-91 percent of black cutworm eggs laid on bentgrass greens. This suggests that cutworm infestations may originate from larger larvae that migrate onto greens from aprons or roughs. Cutworms showed no preference between aerified and non-aerified areas, but our results suggest that they may be repelled by sand topdressing. When aerification holes were available, about 60 percent of cutworms used them

as a refuge. Cutworm larvae were most active on greens from midnight until just before dawn. Most larvae were observed grazing, i.e., feeding on the turf surface, suggesting that control measures would be most effective if applied in the early evening or at night.

A study was conducted in 1994 to clarify how long it takes for the population of predators, earthworms, and other beneficial species to return to normal level following use of broad-spectrum insecticides. Ethoprop (Mocap) applied in April resulted in 100 percent kill of earthworms. Populations were still reduced by 70 to > 90 percent in both small and large plots at the end of the growing season. Samples containing predators and other beneficials are presently being sorted and analyzed.

Analysis of female extracts by electrophysiology and gas chromatography pinpointed the fraction containing the sex pheromone of masked chafer beetles. Identification of the pheromone is expected soon. Synthesis of this attractant will provide means for monitoring these pests on golf courses and home lawns.