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

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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.*

Cooperators:

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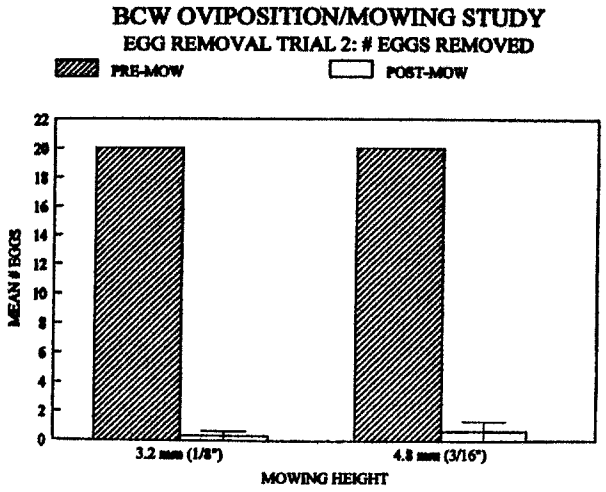
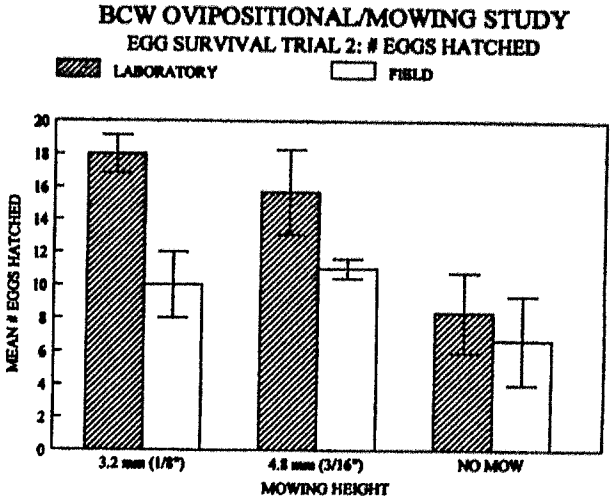
Cultural practices were manipulated to determine effects on densities of Japanese beetle and masked chafer grubs. High mowing throughout the summer, or application of aluminum sulfate just before beetle flights reduced subsequent densities of grubs by as much as 48 and 77%, respectively. Beetles were attracted to irrigated turf for egg-laying, resulting in 2- to 4-fold increases in grub densities in irrigated plots. Liming, fertilization with urea, heavy rolling, and aerification had no effect on white grubs during this 4-year study.

Fertilization with composted cow manure or activated sewage sludge [Milorganite] may result in higher populations of green June beetle grubs.

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 nearly all of the eggs laid on bentgrass greens. The mower roller itself did not dislodge eggs from grass blades. This suggests that cutworm infestations may originate from larger larvae that migrate onto greens from aprons or roughs. Cutworm larvae were observed to crawl as far as 75 feet in one night. More than half of the eggs on clippings collected from mower baskets hatched into healthy larvae. These tests suggest that disposal of clippings away from greens or tees may eliminate one source of infestation. Most cutworm activity on golf greens occurred from midnight until just before dawn, suggesting that control measures would be most effective if applied in the early evening or at night. Young larvae tended to feed on the turf surface,



Removal of marked eggs of black cutworm (BCW) on a bentgrass putting green by mowing.

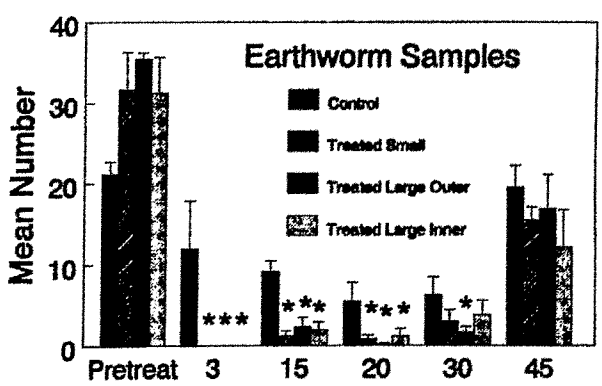


Number of eggs hatched (out of groups of 20) on clippings collected from the mowing basket and held in the laboratory or field.

while older larvae fed mostly from burrows. About 13% of the cutworms collected in late July were fatally infected with parasitic flies or wasps. This is the first documentation of parasitism of cutworms on golf courses. Cutworms showed no preference between aerified and nonaerified areas, but our results suggest that they may be repelled by sand topdressing. Female black cutworm moths preferred creeping bentgrass over other grasses for egg laying.

Research continued on how long it takes for populations of predators, earthworms, and other beneficial species to return to normal levels following an insecticide treatment. Ethoprop (Mocap) applied in April resulted in 100% kill of earthworms. Populations had still not fully recovered after 30 weeks. Several important groups of predators were unaffected, while others were more sensitive to the insecticide. Comparative work on effects of two important new insecticides (imidacloprid [Merit], and RH-0345 [an insect growth regulator]) on the turfgrass ecosystem was begun in 1995.

The fraction containing the chemical sex pheromone of masked chafers was pinpointed by gas chromatography and electroantennogram/behavioral analysis. The active compound was characterized by infrared and mass spectroscopy. Identification of the pheromone is expected soon. Synthesis of this attractant will provide means for monitoring these pests on golf courses and home lawns.



Pattern of recovery of earthworm abundance following treatment of small or large turf areas with ethoprop (Mocap).