Alternative Control Tactics for Black Cutworms in Turf

Program Spotlight

The impending review of organophosphates and carbamate insecticides under the Food Quality Protection Act has put the use of these compounds in doubt for cutworm control. Additionally, the use of newer chemistry insecticides such as Imidacloprid for scarab grub control, which appears to have less impact on black cutworm populations than traditional insecticides, suggests that black cutworms may be an increasingly important turf pest in the future.

Black cutworms, *Agrotis ipsilon* (Hufnagel), are economically important pests of highly maintained turfgrass—both sod production and landscape turf—throughout the United States. Cutworms feed on grasses as one of their primary host plants, but most species are also serious pests of other agricultural crops, feeding principally on foliage at the soil surface or on any portion above ground. In some species larvae become subterranean, feeding in the crown and underground fleshy structures.

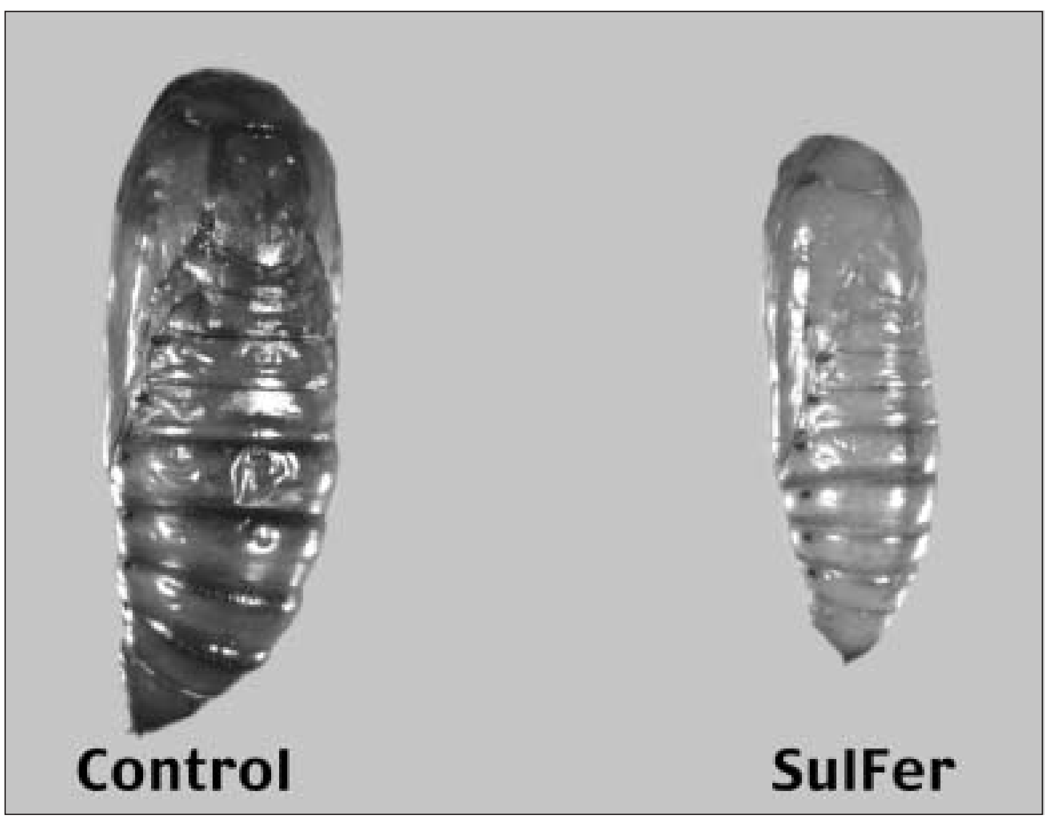
Small larvae feed primarily on the turf surface, crawling over the grass blades, and remain exposed while feeding. Larger larvae feed on grass blades that they first cut at the crown and then drag into silken burrows constructed below the soil. This leads to the characteristic pockmark-like feeding damage observed on greens, tees and fairways. The popular name "cutworm" describes this larval habit.

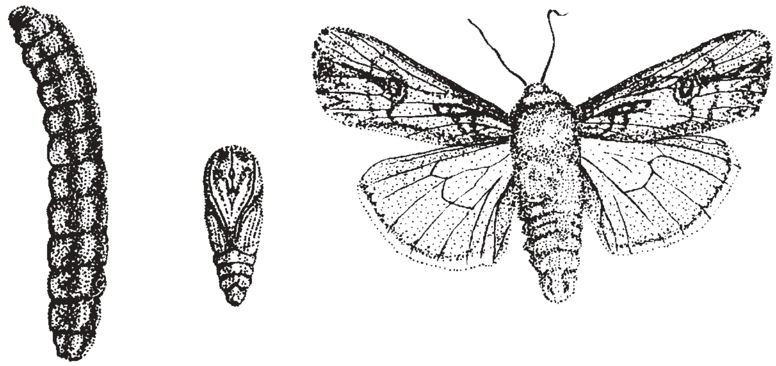
Historically, cutworms were managed with a number of short-to-medium residual organophosphate and carbamate insecticides including isofenphos (Oftanol) and chlorpyrifos (Dursban). The impending review of organophosphates and carbamate insecticides under the Food Quality Protection Act (FQPA) has put the use of these compounds in doubt for cutworm control. Additionally, the use of newer chemistry insecticides such as Imidacloprid for scarab grub control, which appears to have less impact on black cutworm (BCW) populations than traditional insecticides, suggests that BCW may be an increasingly important turf pest in the future.

Materials and Methods

In 2000, three classes of control agents (entomopathogenic nematodes, fungal pathogens and SulFer95) were evaluated against BCW under laboratory and simulated field conditions. Entomopathogenic nematodes used were laboratory reared *Heterorhabditis bacteriophora* (Oswego). BotaniGard, a commercially available mycoinsecticide using *Beauveria bassiana* spores was chosen as the fungal pathogen. SulFer95 is a granular water dispersible fertilizer composed of micronized elemental sulfur particles.

Figure 1





Stages of development of the black cutworm: final larval instar, pupa and adult. From Turfgrass Insects of the United States and Canada, Second Edition *(courtesy of R. Jarecke, NYSAES.)*

Laboratory bioassays investigated one day old BCW neonate exposure to compounds incorporated into a standard wheat germ based diet. Weight, life stage and survival data were noted after a seven-day (SulFer95 only) and a twenty-eight day exposure interval.

Simulated field conditions were achieved by exposing BCW larvae to grass clippings sprayed with the control agents. Five day old BCW larvae were transferred from standard diet and reared on the treated grass clippings for 65 hours and then returned to their standard (untreated) diet. Larval weight and survival data were collected at 24, 48 and 72 hours post exposure.

Pathogens used in laboratory experiments were assayed at three (high, medium and low) rates: H.b. (Oswego) at 1 billion per acre, 100 million per acre and 10 million per acre. BotaniGard at 1 million spores, 1000 spores and 100 spores and SulFer95 at .5 lbs/1000ft^2, 1.0 lbs/1000ft^2 and 50 lbs/1000ft^2.

Results

Laboratory experiments demonstrated that control BCW larvae at 7 days had a survival rate of 98.3% and an average weight of .1191g. BCW exposed to the high rate of SulFer95 had a survival rate of 76.7% with an average weight of .0566g, a 52.4% weight reduction when compared to that of the controls. No significant survival or weight change was noted at the low and medium rates. At 28 days, pupal weights and survival were noted with the following results: controls had a survival rate of 63.3% and an average weight of .5147g. SulFer95 at the high rate had a survival rate of 66.7% with an average weight of .2788g, a 45.8% weight reduction when compared to the controls (see Figure 1). H.b. (Oswego) showed no significant weight change but did have almost 100% mortality in all treatments. BotaniGard showed no significant difference from the control group in either weight or survival.

Simulated field experiments using grass clippings were tested at two rates, low and medium for Sulfer95, medium for H.b. (Oswego) and high for BotaniGard. SulFer95 showed no significant mortality at 24, 48 or 72 hours, however, weight reduction did occur at all three intervals with a direct correlation to rates and time (24-hour low had a 35.6% reduction, medium a 41.3% reduction. 48-hour a 29.7% and a 37.7% reduction. 72-hour a 12.5% and a 21.3% reduction respectively). H.b. (Oswego) yielded 100% mortality at 24 hours. BotaniGard had no effect on mortality or weight.

Conclusions

The results obtained from challenging the BCW larvae with elemental SulFer95 are intriguing. Although no differences in larval survival were noted between SulFer95 and the control, the significant reduction in pupal weight in the SulFer95 treatment could influence the rate of successful adult moth eclosion, mating success, female fecundity, and larval survival in the next generation when compared to the control group. It is not known whether lower pupal weight in the SulFer95 treatment is due to poor assimilation of food eaten or whether the difference is due to less food eaten overall. Feeding studies using SulFer95 that span several successive generations of BCW may be required to demonstrate the long term effects of SulFer95 on BCW biology.

The results obtained from the application of H.b. (Oswego) nematodes are typical for the highly controlled laboratory conditions found here. Testing for efficacy in real-life situations with naturally occurring BCW populations will provide the yardstick needed to measure this treatment in an applied situation.

Nancy H. Consolie and Paul S. Robbins
Michael G. Villani Soil Insect Lab,
NYS Ag Experiment Station, Geneva, NY

The results obtained from challenging the black cutworm larvae with elemental SulFer95 are intriguing.

It is not known whether lower pupal weight in the SulFer95 treatment is due to poor assimilation of food eaten or whether the difference is due to less food eaten overall.

SulFer95 at the high rate had a survival rate of 66.7% with an average weight of .2788g, a 45.8% weight reduction when compared to the controls.