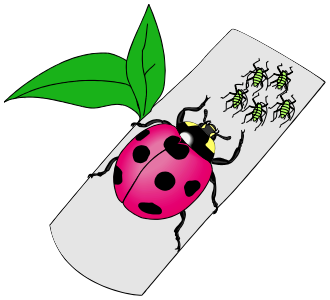
What's New in Research on Black Cutworms?

by Wendy Gelernter, Ph.D

A fairly significant peak of black cutworm adults, noted in our black light trap counts for the first week of June, has resulted in high levels of larval activity in the past two weeks. Reports of direct feeding damage from black cutworm larvae, as well as bird damage, have been reported from several golf courses. For this reason, this issue of Insights will provide a summary of recently published research on control measures for black cutworms. A summary of black turfgrass ataenius research will appear in a future issue.

Biological Control

Effect of Insecticides on Beneficial Insects: In an article by Terry et. al. (1993), some of the pitfalls of the use of broad spectrum insecticides are clearly illustrated. In this study, the University of Kentucky researchers looked at the effect of the insecticides Triumph (isazophos), Sevin (carbaryl) and Tempo (cyfluthrin) on beneficial insects that normally feed on worm and grub pests. They found that Triumph was the harshest on beneficial insects such as spiders, ground beetles, ants, rove beetles and hister beetles (Sevin and Tempo also affected some groups of beneficials, but their impact was generally less severe than for Triumph). Reduction in the number of beneficials led to higher numbers of grubs and armyworms in the insecticide treated plots vs. the non-treated plots. This phenomenon, where insecticide applications result in more, rather than fewer insect pests, is known as **resurgence,** and is one of the main arguments made for reducing the number of broad spectrum insecticide applications. In this no-win situation, the authors recommend that if broad spectrum insecticide applications are absolutely necessary, that they be made AFTER grubs and worms have passed the early larval stages. This is because beneficial insects most commonly feed on eggs and newly hatched grubs and worms. A second option for avoiding resurgence is to use selective insecticides that kill pest insects, but have little impact on beneficials. Recent research on a few of these selective materials is presented below.



The ladybird beetle, a beneficial insect, feeding on aphids.

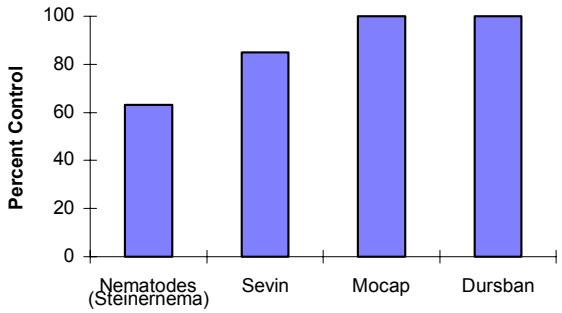
Efficacy of Biological Control Products for Black Cutworm

Entomopathogenic nematodes (beneficial nematodes that attack insects but have no negative effects on plant growth) are currently marketed for control of worm and grub larvae, with widely varying levels of efficacy due to the nematodes susceptibility to lack of moisture, ultraviolet light and high temperatures. Kaya and colleagues from the University of California, Davis (1993) report that some of the variability in results is due to very different behaviors that different species of nematodes have. For example, the nematode *Steinernema carpocapsae* tends to sit and wait at the soil surface for attractive insect hosts to walk by. This ambusher strategy makes this strain more effective for insects such as black cutworm which also feed near the

soil surface. In contrast, the nematode *Heterorhabditis bacteriophora*, which occurs deeper in the soil and actively forages for insect hosts (the cruiser strategy) was less effective on black cutworms, but was more effective at controlling beetle grub pests, which also feed deeper in the soil. Most nematode products currently marketed are based on *Steinernema carpocapsae*, which should increase the chance of success on black cutworms.

Brandenburg et. al. (North Carolina State University, 1993) tested *Steinernema carpocasae* in the field for black cutworm control, and compared the results to those obtained when broad spectrum insecticides such as Sevin, Mocap and Dursban were applied. The authors found that the conventional chemicals won the day, with control levels of 85 - 100%. Control with the nematodes was 63% (see below).

Control of Black Cutworm Larvae on Turf
Brandenburg et. al., 1993



Is 63% control of nematodes acceptable? Do the “soft” benefits of nematodes make up for the decrease in efficacy? We are interested in your thoughts on the matter.

Bacillus thuringiensis (Bt) is a small bacterium that, when eaten by susceptible insects, causes them to stop feeding immediately, and to die several days later. There are hundreds of strains of Bt that have been identified, and each has a very specific host range -- some kill mosquitoes and black flies only, while others are highly active on cotton pests such as the cotton bollworm. There are currently over 20 products on the market based on different strains of Bt, although none of these products has been widely adopted among turf managers. Based on the work of several researchers, it may be clear why Bt has enjoyed so little success in turf so far. Authors Buhler et. al. (Purdue University, 1993) and Weaver (West Virginia University, 1993) both show that treatments with the product Dipel (based on Bt strain *kurstaki*) were not effective at controlling black cutworm. All is not lost, since many companies are actively developing new strains of Bt with different host ranges. We will be testing some of these new products this summer, and will keep you posted on results.

Cultural Control of Black Cutworm

Cultural practices identified by Williamson and Shetlar (1994) in a recent report may also help manage worm populations. These researchers noted that black cutworm adult females laid most of their eggs on the terminal 25% of the grass blade. For this reason, most eggs are removed by daily mowing of greens and frequent mowing of tees. If this holds true for Southern California populations of black cutworms, this means that most larvae are coming from clippings near tees and greens. Clipping removal throughout the course might reduce larval populations but this technique may be too costly.

Efficacy of Conventional Control Measures for Black Cutworm

Insecticidal Soaps: While insecticidal soaps are technically regarded as conventional insecticides, their lower levels of toxicity to beneficial insects such as ground beetles, makes them an interesting alternative. These products work on contact, breaking down the insect's waxy cuticle and causing it to desiccate and die, usually within a few hours. Heller and Walker at Pennsylvania State (1993 and 1994) investigated the efficacy of the insecticidal soap product M-Pede, when used alone or in combination with Chlorpyrifos for control of black cutworm larvae. They found that even when applied by itself, M-Pede had fairly good activity on cutworm larvae. When used in combination with chlorpyrifos, M-Pede appeared to improve upon the activity of chlorpyrifos.

Chlorpyrifos (Dursban or Pageant): Several researchers Brandenburg et. al., 1993, Heller and Walker, 1993 and 1994) report that various formulations of chlorpyrifos provided good to excellent control of black cutworm larvae. Despite the fact that chlorpyrifos has the drawback associated with broad spectrum insecticides, it is a reliable and effective tool for cutworm control.

Integrated Pest Management

By combining all of the above techniques into a pest management program, we can effectively put this

hungry guy on a strict diet!

References

1. Brandenburg, R.L., Hertl, P.T. 1993. Black cutworm control on bentgrass golf greens. Insecticide and Acaricide Tests. 18:306.
2. Buhler, W.G., Gibb, T.J. 1993. Efficacy of insecticides on black cutworm in bentgrass. Insecticide and Acaracide Tests. 18:305-306
3. Heller, P.R., Walter, R. 1993 Evaluation of insecticidal soap, conventional and experimental formulations to control black cutworm on creeping bentgrass at the Valentine Turfgrass Research Center. Insecticide and Acaricide Tests. 18:306-307.
4. Heller, P.R., Walker, R. 1994. Control of black cutworm on creeping bentgrass at the Valentine Turfgrass Research Center. Arthropod Management Tests. 19:300-301.
5. Kaya, H.K., Burlando, T.M., Thurston, G.S. 1993. Two entomopathogenic nematode species with different search strategies for insect suppression. Environmental Entomology 22(4):859-864.
6. Terry, L.A., Potter, D.A., Spicer, P.G. 1993. Insecticides affect predatory arthorpods and predation on Japanese beetle eggs and fall armyworm pupae in turfgrass. J. Economic Entomology 86(3):871-878
7. Weaver, J.E. 1993. Black cutworm control on golf course greens with Bacillus thuringiensis. Insecticide and Acaricide Tests. 189:307-308.
8. Weaver, J.E. 1994. Black cutworm control on golf course greens with Bacillus thuringiensis and fenoxycarb. Arthropod Management Ttests. 19:341-342.
9. Williamson, R.C., Shetlar, D.J. 1994. Black cutworms: where are they coming from? USGA Green Section Record 32(5):5-7