Improved Mole Cricket Management Through the Application of an Enhanced Ecological and Behavioral Database

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Objectives:

1. Develop an effective integrated pest management program for mole crickets that ultimately reduces total pesti cide use through improved implementation of chemical strategies and effective integration of biological and cul tural options.
2. Apply the extensive research findings and validation of biological control strategies based upon our new knowl edge of mole cricket ecology and behavior.

Start Date: 1998
Project Duration: 3 years
Total Funding: $75,069

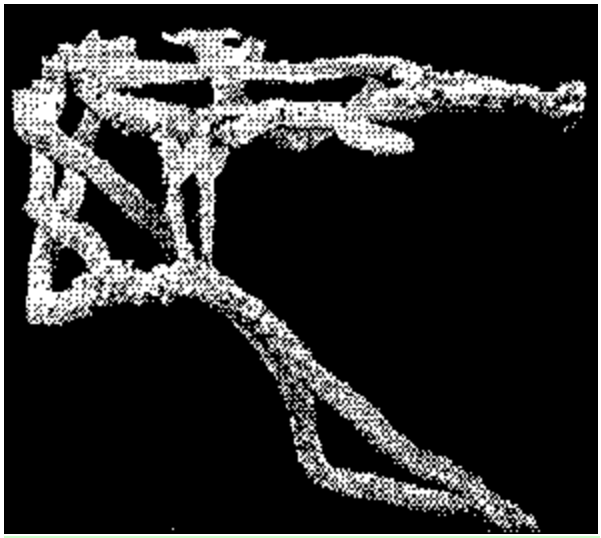
The tawny (*Scapteriscus vicinus*) and southern (*S. borellii*) mole crickets have been the most destructive insect pests of turfgrass on golf courses in the southeastern United States during the past 20 years. There is a need to develop more effective strategies to use current control methods more efficiently and enhance our ability to use biological control agents for the golf industry in the Southeast.

Laboratory and field studies were initiated to evaluate mole cricket behavior toward entomopathogenic soil fungi and to evaluate the efficacy of subsurface and surface fungal applications. The effect of the entomopathogenic fungi, *Beauveria bassiana* and *Metarhizium anisopliae*, on the behavior of tawny mole crickets (TMC) was tested using two experimental methods.

In the first set of experiments, TMC had no choice but to tunnel through a layer of fungal treated sand in order to reach a sod food source. TMC in untreated boxes tended to tunnel to the surface more quickly and in greater numbers than TMC in boxes treated with fungal pathogens. Some TMC started to tunnel into fungal treated sand and then changed direction and tunneled below or away from the treated layer.

Two species of mole crickets are a major problem in the Southern United States. From left to right: adult male tawny, adult female tawny, adult male southern, adult female southern.

In the second set of experiments, TMC were given a choice to establish tunnels in clean or *B. bassiana*-treated sand. TMCs in buckets of sand half treated with *B. bassiana* and half untreated tunneled exclusively in the untreated sand. In buckets of untreated sand, TMC tunneled regardless of side, and tunnels were somewhat larger than those in the choice treatment. In buckets of *B. bassiana*-treated sand, tunnels were extremely small or nonexistent. In two of the four buckets of treated sand, the TMC were at the interface between the sand and sod.



Mole crickets burrow complex Y-shape tunnels in sandy soils along the surface and deep into the profile.

The use of a fiberglass resin material to make castings of mole cricket tunnels has helped differentiate between the behavior of the two species, the tawny mole cricket, *Scapteriscus vicinus*, and the southern mole cricket *S. borellii*.

The behavioral differences provide insight into the differences observed in damage and the success of specific management approaches. The placement of fungal pathogens in the soil may influence the effectiveness of the product. The avoidance behavior observed appears to be an evolutionary adaptation to avoid high concentrations of pathogens.

Much of the research activity this year involved analysis of data and manuscript preparation. The current tally of research publications in print or under review associated with this research project includes fifteen refereed publications. Several other trade journal articles also have been developed as a result of the research findings from this project.

Summary Points

- Behavior differences between the tawny mole cricket, *Scapteriscus vicinus*, and the southern mole cricket, *S. borellii* were determined in laboratory and field observations.
- A Y-shaped tunnel was common for root-feeding tawny mole crickets while the southern mole crickets tunneling pattern was more random which is indicative of a predator.
- These behavior differences may explain the observed damage and unsuccessful management practices used to control the insects.
- The placement of fungal pathogens or insecticides will influence the effectiveness of the product due to the avoidance behavior the crickets.