Tunneling For Answers

Program Update

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Although much of the research we con duct is focused on turfgrass pests that are important in New York or in the Northeast, there are times when our interests stretch beyond the neighborhood to collaborate with other turf entomologists around the country. One such project involves a collaboration with Dr. Rick Brandenburg, the turfgrass entomologist at North Carolina State University and focuses on the behavior of mole crickets in coastal North Carolina. At Cornell we have developed a variety of techniques that allow us to follow the movement of crickets under the soil. One technique involves using X-rays to produce radiographs to follow crickets over time.

Radiographic studies of mole cricket tunneling have documented stereotypic behavior of southern and tawny mole crickets. We have determined that soil physical properties, the presence of other crickets (of the same or different species), the presence of biological or chemical insecticides, and the presence of fluids from other crickets can alter this behavior and may help explain the variability observed when attempting to manage crickets in the field.

The use of radiography chambers that are essentially two dimensional provides valuable insight into the subterranean activity of mole crickets. However, the actual three dimensional components of the mole cricket's behavior are not well documented. The use of larger chambers to hold soil and preparation of a wax-based material to create casts of the tunneling structure has proven quite successful. Ordinary canning wax was heated and poured down cricket tunnels to create permanent wax castings of these tunnels in larger soil arenas. These castings allow us to view and analyze the burrowing behavior of the crickets during their tenure in the soil in response to a variety of control agents under various soil conditions.

These casts document not only the typical "Y" shaped structure of the tunnel, but the development of an extensive network of tunnels useful for feeding and escape. They not only confirm radiograph findings, but allow further exploration of cricket behavior. Additionally these arenas are of a sufficient size to determine surface activity and turfgrass damage that is indicative of field damage.

The use of this technique in the field during the summer and fall of 1997 has further documented the accuracy and validity of the laboratory radiographs. Field validation of tawny mole cricket tunneling behavior was conducted by creating wax castings of mole cricket tunnels on golf course driving ranges which permitted complete excavation of castings. Wax castings in field tunnels and subsequent excavation of these castings have documented the 'Y' shaped tunnels observed in the radiographs. The consistency of these tunnels lends credibility not only to the laboratory studies, but also to the theory that tunnel construction plays a significant role in mole cricket ecology and avoidance of control strategies.

Seeking the answers to these fundamental questions about pest behavior will undoubtedly aid in the development of more effective integrated management programs. Clearly, understanding pest ecology is the foundation of an IPM program.

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