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A MODIFIED POOL DESIGN FOR COLLECTING ADULT MOLE CRICKETS (ORTHOPTERA: GRYLLOTALPIDAE)

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Mole crickets are one of the most damaging groups of turf and pasture grass pests found in the southeastern U.S. The need to collect mole crickets for use in laboratory studies and the advantages of monitoring adult flight for the timing of insecticide applications initiated the search for effective methods for monitoring flight activity. Ulagaraj and Walker (1973) determined that mole crickets would recognize and fly to stations that utilized electronic reproductions of the male calling song. Basic requirements for developing mole cricket calling traps were outlined by Ulagaraj (1975) and Ulagaraj and Walker (1973, 1975). The three main components of these early traps included a sound source, catching device, and power controller (Walker 1982).

The sound sources, which were once tape-recorded songs of the crickets, now consist of an electronic caller that synthesizes the mole cricket song, similar to that developed by Walker (1982). Over time, the electronic callers have improved so that an external controller is no longer necessary to establish the on/off periods. Since the late 1980s, photocells that detect darkness and automatically turn on the callers at sundown have been in use rather than manual controllers (Walker 1996). In this design, originally developed by Bernie Mans for the University of Florida, the callers are also outfitted with a timer that resets the photocell after a specified time (Walker 1996), in our case two h. This allows for the production of sound during the first couple of h after sunset, a time period when most female mole crickets fly (Ulagaraj 1976). We, too, use the Mans design, and emitters were built for us by Precision Technologies Co. (Raleigh, NC).

Various designs for the catching devices have been utilized including funnels or pans constructed from galvanized sheet metal that direct captured mole crickets into buckets of moist sand, and also into water-filled wading pools covered with coarse netting to prevent predation (Walker 1982). Although some of these earlier sheet metal traps have now been in use at some Florida locations for over 20 years (Frank 2001), they are expensive and not easily transported. A similar funnel design that uses lightweight fiberglass instead of sheet metal was first constructed in 1989 by Parkman and Frank (1993) to inoculate adult mole crickets with *Steinernema scapterisci* Nguyen Smart. This modification is less expensive to construct than the sheet metal design, but still has some disadvantages.

For our laboratory and greenhouse studies at North Carolina State University, it has been necessary to collect large numbers of adult mole crickets. Unfortunately, frequent collection of crickets from calling traps is problematic, if not impossible, due to the long distances between sites. Funnel traps have been used successfully in the past, but require semi-permanent establishment at a site, something that is often difficult to accomplish on golf courses (which constitute the majority of our research sites). The funnels are also difficult to handle and transport, subject to damage during coastal storms, time-consuming to assemble, and expose the crickets to overcrowded conditions in the collection buckets. Wading pools filled with water were tested in the spring of 2002 and found to be ineffective because the crickets are only able to float for 12-24 h (Walker 1982), and frequent checking of the traps was not possible. For our research purposes, we needed a design that was inexpensive, quick and easy to assemble, temporary at each site, and able to maintain the live crickets for up to a week between visits.

A modified design of the wading pools that met all of our requirements was developed in 2003. Instead of one wading pool (General Foam Plastics Corp., Norfolk, VA), two are used, one suspended above the other by four wooden, evenly distributed spacers that prevent excessive sagging of the top pool. The two pools are secured to one another by inserting a bolt (with washer) through the top pool, wooden spacer, bottom pool and then fastening all components with a nut (Fig. 1A). All metal pieces were sprayed with WD-40® spray (San Diego, CA) to prevent rusting and allow for easy disassembly. The top wading pool has ten to twelve holes that are 135 mm in diameter cut into it, which allows the crickets to fall through into the bottom pool as they land and walk in the pool (Fig. 1B). Instead of filling the bottom pool with water, it is filled with moist sand (Fig. 1C). Because sand is used, the mole crickets are in their natural habitat when they fall through the hole in the top pool and stay healthy until retrieved. The bottom of the top pool does not touch the sand layer so it is not possible for many crickets to fly back out through the holes. The cut out holes allow for rain to moisten the sand layer, and drainage holes drilled in the bottom pool prevent flooding. The electronic caller speakers are placed on wooden boards that are centered over the top pool (Fig. 1D).

Fig. 1A

Fig. 1B

Fig. 1C

Fig. 1D

Fig. 1. (A), Bolts fasten two wading pools and wooden spacers; (B), holes cut into top pool for mole cricket entrance into trap; (C), bottom pool filled with moist sand from collection site; (D), speakers for electronic caller are centered above top pool on wooden board.

To retrieve the live mole crickets, it is necessary to unbolt the two pools from one another and remove the top pool. Because the sand is typically less than 5 cm deep, the tunnels can easily be observed and the crickets found quickly. Reassembly of the pools takes approximately five minutes. The time to break down and reassemble the pools is the only disadvantage we have noted compared to the fiberglass funnels which only require a quick emptying of the bucket, but the time to check the traps is still rather minimal and acceptable to us. The soil layer in the bottom pool provides enough surface area for the crickets to move around freely and avoid overcrowding, which is one problem associated with the smaller collection containers (i.e., buckets) used with the funnel traps. Overcrowding is especially important for the southern mole crickets, since they are cannibalistic. Water is added to the sand when the traps are serviced to keep the soil at optimal moisture levels. If a particular collection site is found to be unproductive in terms of number of collected crickets, the pools can be transported easily to a new location. Also, at the end of the flight season, the pools can be removed from the site, an important consideration for many golf course superintendents.

Summary

A modification of the wading pool mole cricket catching devices was designed to allow for the collection of live adult mole crickets. This new design takes less construction than the funnels built by Parkman and Frank (1993), and is inexpensive, minimizes overcrowding (and subsequent canni-

balism), and only requires temporary establishment at collection sites. The use of moist sand instead of water keeps the mole crickets healthy if daily collections cannot be made and the two-pool design prevents flight escape.

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