



## Pest Mole Cricket Management <sup>1</sup>

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Three species of mole crickets were first detected in the southeastern U.S. about 1900, and are now serious plant pests. Those species are the tawny mole cricket, *Scapteriscus vicinus* (Figure 1), southern mole cricket, *Scapteriscus borellii* (Figure 2), and shortwinged mole cricket, *Scapteriscus abbreviatus* (Figure 3). Other, non-damaging mole crickets occur in North America (e.g., *Neocurtilla hexadactyla*), but these three are the most damaging.



**Figure 1.** Tawny mole cricket adult. Credits: L. Buss, University of Florida



**Figure 2.** Southern mole cricket adult. Credits: L. Buss, University of Florida



**Figure 3.** Shortwinged mole cricket adult. Credits: L. Buss, University of Florida

### Host Range

Though usually considered pests of grass on lawns, golf courses, and pastures, *Scapteriscus* spp. mole crickets have a broad diet. The southern mole

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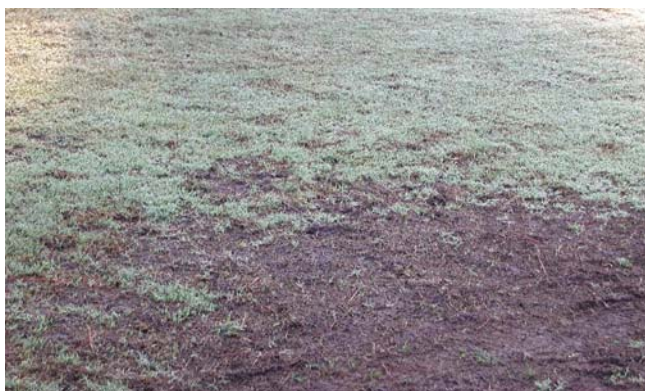
cricket feeds mainly on other insects, and the tawny mole cricket feeds on plants. The shortwinged mole cricket feeds on grasses, but it generally hasn't caused much damage in the state. Plants injured by both tawny and southern mole crickets include tomato, strawberry, beet, cabbage, cantaloupe, carrot, cauliflower, collard, eggplant, kale, lettuce, onion, pepper, potato, spinach, sweet potato, turnip, chufa, peanut, sugar cane, tobacco, such flowers as coleus, chrysanthemum, and gypsophila, as well as weeds such as pigweed. The tawny mole cricket often injures bahiagrass and bermudagrass, and the shortwinged mole cricket often attacks St. Augustinegrass and bermudagrass.

### Damage

Mole crickets can damage plants by feeding at night on aboveground foliage or stem tissue and belowground on roots and tubers. Seedlings may be girdled at the stems near the soil surface, though some plants may be completely severed and pulled into a tunnel to be eaten. Mole cricket tunneling in the upper 25 cm of the soil (Figures 4, 5) dislodges plants or causes them to dry out. Small mounds of soil are also pushed up. They tunnel closer to the surface when the soil is moist and warm, but go deeper if the weather cools or the soil dries. Tunneling reduces the aesthetic quality of turfgrass, interferes with the roll of the ball on golf courses, and results in reduced livestock grazing on severely infested pastures.



**Figure 4.** Mole cricket tunneling in dirt. Credits: E. A. Buss, University of Florida



**Figure 5.** Large area of mole cricket tunneling. Credits: E. A. Buss, University of Florida

### Life Cycle

The southern and tawny mole crickets are similar in appearance and biology. The shortwinged mole cricket is different because its short wings prevent flight, and males have no calling song. Typically, the eggs of these three species are laid in April-May, and nymphs occur through August. In southern Florida, however, the shortwinged mole cricket can produce eggs throughout the year. Some adults occur in August or September, but both nymphs and adults overwinter. Overwintering nymphs become adults by April, and adults fly and mate. One generation per year is normal, though in southern Florida southern mole crickets have two generations and fly three times (spring, summer, and autumn). Due to temperature differences, adult southern and tawny mole crickets emerge earlier in the year in southern Florida than in northern Florida.

### Description

**Eggs:** About 25-60 eggs per clutch are laid in a chamber in the soil. The chamber can be 5-30 cm below the soil surface, and measures 3-4 cm in length, width, and height. Egg development lasts about 3 weeks, depending on soil temperature. Females may lay up to 5 clutches of eggs before dying.

**Nymphs:** Nymphs hatch from eggs from April through June. They may eat the egg shell or cannibalize siblings, but soon dig to the soil surface. Nymphs resemble the adults, but their wings (wing pads) are not completely developed. The number of instars is variable, probably 8-10.

**Adults:** Mole crickets have enlarged forelegs that they use to dig in soil (Figure 6). The forelegs have large blade-like projections, called dactyls, and the number and arrangement of dactyls, and the pronotum pattern are used to identify different species (Figure 7).

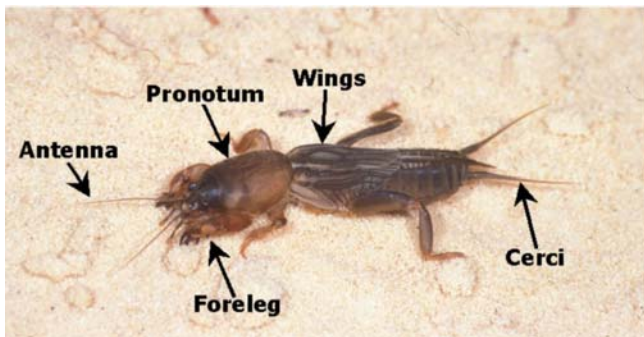


Figure 6. Mole cricket anatomy.

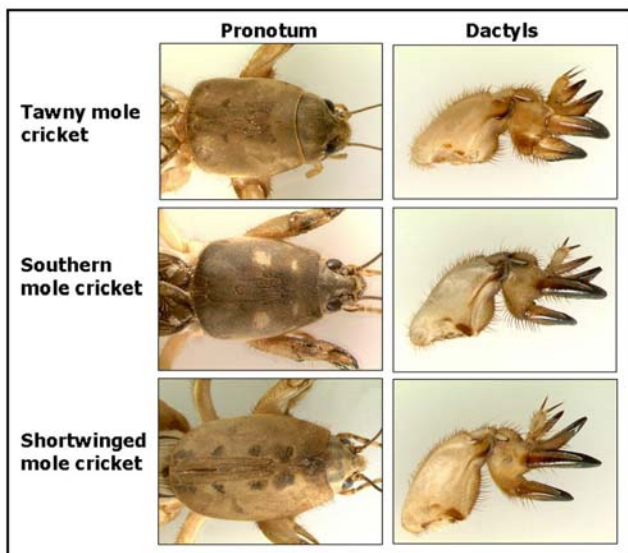


Figure 7. Key traits used to identify *Scapteriscus* spp. mole crickets.

Tawny and southern mole cricket males attract females by producing a courtship song from their burrows early in the night. Mating occurs within the male's burrow, after which the burrow may be usurped by the female. Mating and dispersal flights occur in spring, mostly in April and May.

Tawny mole crickets look similar to southern mole crickets, with moderately long forewings and long hind wings, a yellowish brown body, and a dark pronotum with a central band. Dactyl spacing distinguishes between the two species. The dactyls nearly touch at the base, like the shape of a "V". The

tawny mole cricket's calling song is a loud, nasal trill sung during the first 90 minutes after sunset.

Southern mole crickets have long hind wings that extend past the abdomen and are rounded at the tips. Adults are brown with a dark pronotum. The dactyl spacing is similar for shortwinged mole crickets (looks like a "U"), so these two species can best be distinguished by wing length. The southern mole cricket's calling song is a low-pitched ringing trill that is emitted during the first two hours after sunset. As a predator, the southern mole cricket is more active and tunnels more than the tawny mole cricket.

Shortwinged mole cricket adults are 22 to 29 mm long, with wings shorter than the pronotum (area behind the head). The body is mostly whitish or tan in color, but the pronotum is brown mottled with darker spots. The top of the abdomen has a central row of large spots, and smaller spots to either side. Dactyl spacing looks like a "U". Shortwinged mole cricket males have no calling song, but do make chirping sounds during courtship.

## Management

### Sampling

Several methods are used to estimate mole cricket populations and assist in timing pesticide applications. One way is to rate the amount of tunneling damage that is visible. Tunneling is most obvious in low-cut grass or areas with minimal vegetation, and thus can be detected easily in crops, bahiagrass lawns and pastures, or bermudagrass fairways. Tunneling is hard to see in St. Augustinegrass. The tunnels are most visible in early morning, when the dew is on the grass and the soil may be moist.

A more consistent but labor intensive method of sampling is a "soap flush." Flushing is more effective in very moist soil. Mix 1.5 oz (2 TBSP) of lemon liquid dishwashing soap in 2 gal of water in a sprinkling can, and pour the solution onto 3-4 sq. ft. of turf. If two to four mole crickets emerge within 3 minutes after applying the soap solution, insecticide use may be justified. Flushing with a synergized pyrethrin insecticide solution is equally effective.

Adult females can also be captured at night with commercially available electronic sound traps that mimic male mating songs. In addition, adult mole crickets are strongly attracted to lights during their spring dispersal flights.

### Biological Control

Natural enemies of *Scapteriscus* spp. mole crickets exist naturally in North America. Among the natural enemies are amphibians (e.g., toads, *Bufo* spp.), birds (e.g., sandhill cranes, *Grus canadensis*), and mammals (e.g., armadillos, *Dasypus novemcinctus*). They, and the few predatory insects that attack crickets such as tiger beetles, are not effective. Thus, several natural enemies have been introduced from South America. A parasitic wasp, *Larra bicolor* (Figure 8), was imported from South America in the 1980s and released, and has since spread in Florida. Another parasitoid, the red-eyed brazilian fly, *Ormia depleta* (Figure 9), was released in 1988. It is attracted to the mating calls of male mole crickets. See the Featured Creature articles for more information.



**Figure 8.** Mole cricket adult parasitized by *Larra bicolor*. Credits: L. Buss



**Figure 9.** *Ormia depleta* adult. Credits: L. Buss, University of Florida

Biological control of mole crickets can be enhanced by applying the entomopathogenic nematode, *Steinernema scapterisci* (Figure 10), and possibly to a lesser degree by other entomopathogenic nematodes. It was introduced from Uruguay in 1985. *Steinernema scapterisci* infects only *Scapteriscus* spp., persists readily in Florida's climate, and is dispersed by mole crickets. Infected mole crickets die within 12 days. This nematode (Nematac S®) can be purchased from commercial suppliers (Lesco, Prosource One, UHS, Gardens Alive, and others), sprayed as a suspension in water to soil, and is fairly persistent in the soil. It is more effective when applied to adults and large nymphs.



**Figure 10.** Mole cricket infected with the nematode, *Steinernema scapterisci*. Credits: L. Buss, University of Florida

### Insecticides

Liquid and granular formulations of insecticides are commonly applied to the soil to suppress young mole cricket nymphs. Smaller nymphs are easier to control early in the summer. Pre-irrigation may be necessary so the soil is moist during the application. Homeowners should run sprinklers for about an hour. This helps the pesticide to penetrate into the soil, or in the case of baits, encourages the mole crickets to come to the surface to feed on the bait. Some insecticides should be watered in after application to move them into the root zone of the plants where the mole crickets are feeding. However, it is essential to read and understand the insecticide label carefully for application directions.

Bait formulations are useful against larger nymphs in late summer. Mole crickets feed at night, so baits should be applied in the early evening. Baits are incompatible with irrigation and rainfall.

For specific insecticide recommendations, see Table 1. Additional information is available on the Mole Crickets web site

(<http://molecrickets.ifas.ufl.edu/mcri0001.htm>)

(<http://molecrickets.ifas.ufl.edu/>) and the

IPM/Biological Control web site

(<http://biocontrol.ifas.ufl.edu>).

**Table 1.** Insecticides labeled for professional use against mole crickets in Florida.

Active Ingredient	Florida Registered Products	Chemical Class	Signal Word
Acephate	Acephate Pro 75 Address T/O Orthene Turf, Tree & Ornamental Spray	Organophosphate	Caution Caution Caution
Bifenthrin	Talstar GC Flowable*, Granular* Talstar Insecticide Mole Cricket Bait Talstar Lawn & Tree Flowable, PL Granular	Pyrethroid	Caution Caution Caution
Carbaryl	Parkway's Mole Cricket Bait	Carbamate	Caution
Chlorpyrifos	Dursban 2 Coated Granules Dursban Pro	Organophosphate	Warning Caution
Cyfluthrin	Tempo 2 EC Tempo 20 WP, SC Ultra	Pyrethroid	Warning Caution
Deltamethrin	DeltaGard GC*, T&O	Pyrethroid	Caution
Fipronil	Chipco Choice Top Choice	Phenyl pyrazole	Caution Caution
Imidacloprid	Merit 75 WP, 0.5 G	Chloronicotinyl	Caution
Lambda-cyhalothrin	Battle GC T&O* Scimitar CS, GC*	Pyrethroid	Caution Caution
<i>Steinernema scapterisci</i>	Nematac S	Biopesticide	Caution
<b>* = Restricted Use Pesticide</b>			

**Table 2.** Insecticides labeled for homeowner use against mole crickets in Florida.

Active Ingredient	Florida Registered Products	Chemical Class	Signal Word
Bifenthrin	Scotts MaxGuard Scotts Turf Builder with SummerGuard	Pyrethroid	Caution Caution
Cyfluthrin	Bayer Advanced Lawn & Garden, Multi-Insect Killer	Pyrethroid	Caution
Fipronil	Over-N-Out	Phenyl pyrazole	Caution
Imidacloprid	Bayer Advanced Lawn & Garden, Season-Long Grub Control	Chloronicotinyl	Caution
Lambda-cyhalothrin	Triazicide	Pyrethroid	Caution
Permethrin	Spectracide Bug Stop Multi-Purpose Insect Control Concentrate	Pyrethroid	Caution
<i>Steinernema scapterisci</i>	Mole Cricket Nematodes (Gardens Alive)	Biopesticide	Caution