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FORAGING SITES OF THE SOUTHERN MOLE CRICKET, SCAPTERISCUS ACLETUS (ORTHOPTERA: GRYLLOTALPIDAE)[1]

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Abstract. **Populations of the southern mole cricket,** Scapteriscus acletus **Rehn and Hebard (4-dot form), were established in 3.1 m diameter (7.6 m²) tanks. Each tank was divided into pie-shaped quadrants, with surface coverings of fine sand, shredded cypress bark, 'Tifway' bermudagrass** (Cynodon x magenissii **(Hurcombe) and 'Floratam' St. Augustinegrass** (Stenotaphrum secundatum **(Walt.) Kuntze). Pitfall sampling showed the surface movement pattern of the southern mole cricket was significantly greater (5% level) in bare sand than in areas with turfgrass. The order of site preference (% of catch) was sand (40.0%) > bark (28.8%) > bermudagrass (20.0%) > St. Augustinegrass (11.3%). More than 5% of available mole crickets were trapped each day for the first 7 days and the mean daily catch for 14 days was 5.7% of the available crickets.**

Mole crickets (Orthoptera: Gryllotalpidae) are pests of turfgrasses, pastures, vegetables, and several field crops in the southeastern United States and many islands of the Caribbean Archipelago (1, 2, 3, 8, 12, 13, 14, 16, 17). Damage is caused primarily by three species of *Scapteriscus*: southern mole cricket, *S. acletus* Rehn and Hebard; tawny mole cricket, *S. vicinus* Scudder (previously referred to as the Changa or Puerto Rican mole cricket); and short-winged mole cricket, *S. abbreviatus* Scudder. Recently, Walker (13) wrote "the annual dollar cost of mole crickets in the Southeast is surely in the tens of millions—as suggested by the ca. 146 tons of active ingredient (costing ca. $11.7 million) applied for insecticidal control of mole crickets in Florida in 1980." Southern (9) estimated total losses and cost of control for 1980, due to mole crickets in Florida were $35.0 million.

Scapteriscus spp. damage turfgrass and vegetable and flower gardens in the urban landscape. As they tunnel through the soil, they leave mounds of soil on the surface. They also feed directly on the root system which can seriously weaken turfgrass and other plants. Plants are often uprooted and die due to desiccation. The tawny and short-winged mole crickets do more extensive root and shoot feeding and appear to be more damaging species in that respect (5, 10, 11, Matheny and Reinert, unpublished data), however, the southern mole cricket causes considerable damage by its tunneling alone.

The purpose of this study was to determine the feeding and tunneling site preference for the southern mole cricket.

Materials and Methods

Ten steel walled wading pools [ca. 3.1 m diameter and 60 cm high], fitted with plastic screened bottoms, were constructed on an asphalt pad. Pools were partially filled with 35-40 cm of fine sand dug from a Pompano Fine Sand site at the Ft. Lauderdale Research and Education Center. Each pool was divided into pie-shaped quadrants (1.9 m²) with the dividing lines established according to compass directions. Quadrants were randomly assigned and established with either bare fine sand, shredded cypress bark, 'Tifway' bermudagrass sod, or 'Floratam' St. Augustinegrass sod (Fig. 1).

Three pitfall traps [combined modifications of Majer (4) and Morrill (6)] were placed along the center line of each pie shaped quadrant with spacings of 7 cm from the tank wall and 15 cm between traps. For each trap location, an 18 cm long section of 7.6 cm inside diameter schedule 40 PVC pipe was first inserted into the sand level with the soil line. These pipes were fitted with 9 oz. capacity plastic Paper Maid®[2] cups (James River Corporation Parchment, MI 49004) which had a top diameter of 7.8 cm and a depth of 9 cm. Each cup was cut so it would slide within the tube and provided with 5 small drain holes in the bottom. Cups were half filled with moist sand to provide a median for captured mole crickets, and suspended ca. 5 cm below the soil line by partially filling each tube with sand for support. Tanks were watered heavily to settle the sand and the turfgrasses were allowed 5 days to establish before mole crickets were introduced.

Mole cricket populations were established by introducing 20 female southern mole crickets (4-dot form) near the center of each tank and allowing them to burrow into the soil (any that were initially trapped were placed back in the center). All 10 tanks were established during May 1979, using southern mole crickets collected at the Research Center.

Overhead irrigation was provided as needed and each tank was covered with a coarse screen top to prevent immigration and emigration of the mole crickets as well as to prevent outside predation on the confined populations.

Trap catches were examined daily at ca. 8:00 AM for 14 days following introduction. Captured mole crickets were released near the center of the tank and any specimens that died either in the traps or on the soil surface were replaced. Trap catches for quadrants were analyzed by analysis of varience and daily captures were subjected to regression analysis.

Results and Discussion

Southern mole crickets (4-dot form) exhibited a significant preference (5% level) for surface movement on bare sand vs. turf of bermudagrass or St. Augustinegrass (Table 1). Based upon pitfall catches, the order of preference was sand > shredded cypress bark > bermudagrass > St. Augustinegrass. Nearly 40% of the captured mole crickets were trapped within the bare sand quadrants. This is in strong contrast to only 20% and 11% trapped within the bermudagrass and St. Augustinegrass, respectively. If we assume these numbers are representative of the total mole crickets frequenting the respective quadrant, then this experiment adds additional support to the general hypothesis that the southern mole cricket (4-dot form) is not a major turfgrass pest, and does not cause excessive feeding damage in turf. Several authors (5, 10, 11, Matheny and Reinert, unpublished data) have dissected the crop contents of mole crickets and found mostly animal remains in southern mole crickets and only small amounts of animal remains in tawny and short-winged mole crickets. Numerous samples taken across Florida by 5 different sampling systems from bermudagrass, St. Augustinegrass, bahiagrass (*Paspalum notatum* Flugge), and centipedegrass (*Eremochloa ophiuroides*

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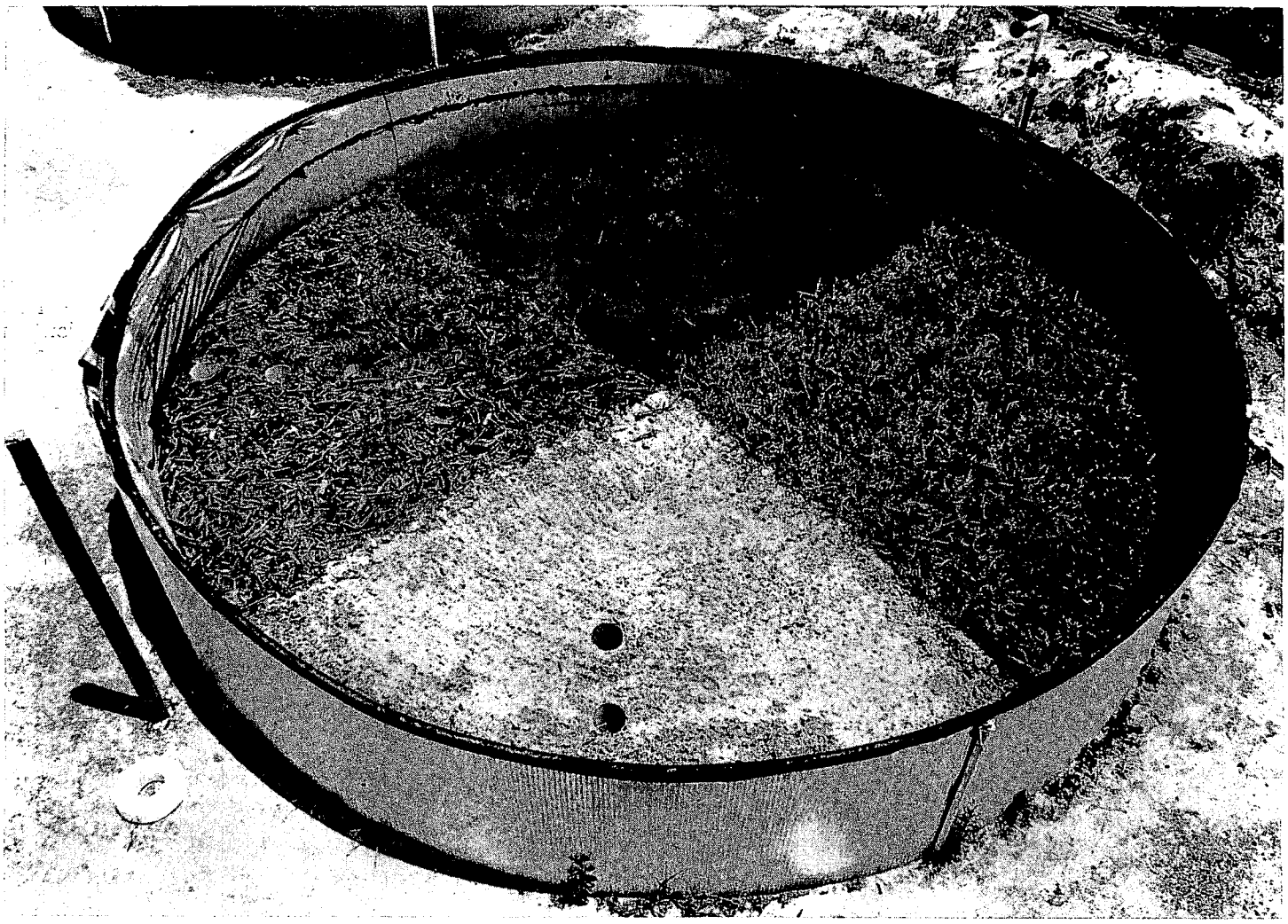

Fig. 1. Tank arena used to determine southern mole cricket foraging site preference. Quadrants from top clockwise are 'Tifway' bermudagrass, 'Floratam' St. Augustine grass, bare fine sand, and shredded cypress bark.

(Munro) Hack. have yielded large populations of tawny and short-winged mole crickets. Southern mole crickets were only found in areas of bare soil or in thin grass usually adjacent to bare soil areas (7, unpublished data). Walker and Ngo Dong (15) also concluded that the southern mole cricket had little if any effect on either 'Pensacola' bahiagrass or 'Coastal' bermudagrass.

The location of the pitfall trap within a quadrant influenced the number of crickets trapped during the experiment. Traps located closest to the center of the tanks (but still 2.5 m) captured 44.4% of the total catch, possibly because they were within the most direct line of travel from the majority of the surface area within each quadrant. Those located closest to the tank edge trapped 32.5% and were probably influenced to some extent by the edge effect of the tank.

Mean daily catches for the 14-day sampling period are shown in Fig. 2. Captures decreased significantly ($r^2 = 0.73$) with increased time. Highest catches were taken on days 1 and 2 following the release and an average of 1.8 crickets

Table 1. Number of southern mole crickets in different capture sites in tank cages with pie-shaped quadrants of choice (10 replicates).

Site	Avg. no. trapped/ cage/site/ 14 days	Trapped/site	
		% of total	% of captures
Sand	6.4 a[z]	2.3 a	40.0 a
Shredded cypress bark	4.6 ab	1.6 ab	28.8 ab
'Tifway' bermudagrass	3.2 b	1.1 b	20.0 b
'Floratam' St. Augustinegrass	1.8 b	0.6 b	11.3 b

[z]Mean separation in columns by Waller-Duncan K Ratio t Test. (K = 100), 5% level.

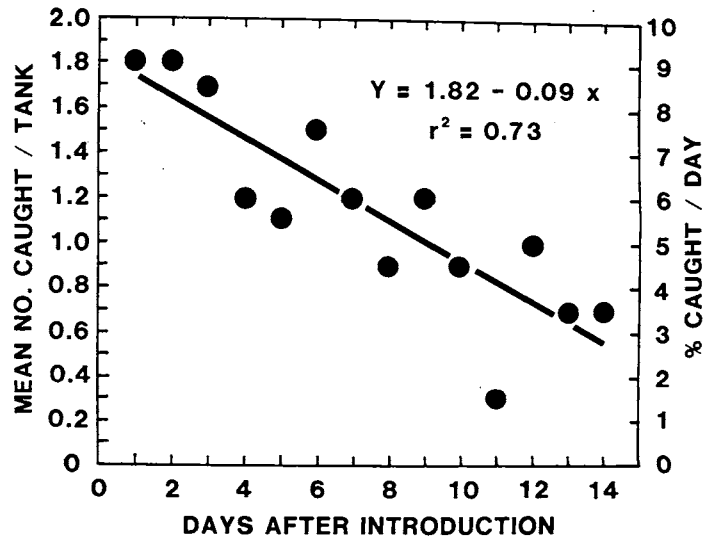

Fig. 2. Mean daily catches of southern mole crickets trapped during a 14-day sample period following introduction.

were captured per tank each day. Greater than 5% of the total crickets available in the test were captured each day for the first 7 days. During the 14-day sampling period, an average of 1.14 crickets per tank were captured daily or 5.7% of the total crickets available.

If a similar experiment was conducted with tawny or short-winged mole crickets, probably most of the mole crickets would be captured in one of the turfgrass quadrants.

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SPATIAL DISTRIBUTION OF SOUTHERN RED MITE ON FIELD GROWN ILEX CRENATA[1]

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Abstract. **Southern red mites** [Oligonychus ilicis **(McGregor)] and eggs were collected from commercially grown holly,** Ilex crenata **Thunb. 'Hetzii' at a nursery near Macclenny, Florida to determine distribution on the host. Plants were spatially divided into 1) lower, middle, and upper heights, 2) inner and outer zones, and 3) north, south, east, and west quadrants. Egg and mite densities were highest on leaf undersurfaces. Eggs were uniformly distributed with respect to plant height. However, 44% of the mites were collected from leaves in the upper plant height. The inner zone of the plant contained 61 and 58% of the eggs and mites, respectively. Eggs and mites were most abundant in the north-south plant quadrants. The highest egg density was recorded from the inner-middle-south site and mites were most prevalent in the inner-upper-north plant region. Based upon density, the optimum sampling location appears to be in the inner zone at either the upper or middle heights in the north or south quadrants.**

Information concerning the spatial distribution of an insect or mite on its host plant is essential to estimate population densities accurately. Many pests exhibit a preference for a particular location on a host plant (2, 5, 7, 8). A knowledge of a pest's distribution can increase efficiency of a pest management program by reducing sample variability and size (10).

The spatial distribution of *Oligonychus ilicis* (McGregor), the southern red mite, on field grown holly, *Ilex crenata* 'Hetzii' was studied to determine the optimum sampling location.

Materials and Methods

The spatial distribution of *O. illicis* on *I. crenata*, a commercially grown holly, was studied in March 1977 at Blair Nursery near Macclenny, Florida. The experimental plot (ca. 0.1 ha) contained 20 north-south rows of untreated, 1 m high plants. To the east, adjacent to the experimental plot, were 1.5 ha of holly plants which were treated periodically with ground applications of a dicofol-parathion mixture. Samples were taken from the center of the experimental plot to avoid effects of pesticide drift. Five contiguous plants were sampled in each of 2 rows, and 24 samples were collected from each plant. Each sample consisted of 10 leaves, and sampling sites were selected from lower, middle, and upper heights (20, 50, and 80 cm, respectively) and from outer and inner zones (delineated by ½ the radius) of the plant. Samples from these 3 heights and 2 zones were further subdivided so as to represent the north, south, east, and west quadrants of the holly plants. All plant material was refrigerated until examined to prevent mite movement. Since leaves of *I. crenata* were somewhat cupshaped and ranged in size from 2.5-3.5 cm², examination of plant material under a dissecting microscope was chosen as the most desirable method for obtaining accurate counts of eggs and mites (6). Analysis of variance and Duncan's multiple range test were used to determine significant differences in the distribution patterns.

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