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Evaluation of Turfgrasses for Resistance to Mole Crickets (Orthoptera: Gryllotalpidae)

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Abstract. **Bermudagrass (*Cynodon* sp.) and paspalum (*Paspalum vaginatum)* genotypes were evaluated in laboratory, greenhouse, and field experiments for potential resistance to the common turfgrass pests, tawny mole cricket (*Scapteriscus vicinus* Scudder) and southern mole cricket (*Scapteriscus borellii* Giglio-tos). Potential resistance among 21 seashore paspalums to both insects in an environmental chamber at 27 °C, 85% relative humidity, and 15 hours light/9 hours dark) revealed that Glenn Oaks 'Adalayd' was least tolerant of cricket injury, while 561-79, HI-1, and 'Excalibur' were most tolerant. Nymphal survival was not influenced by turfgrass type. Plant selections that maintained the highest percentage of their normal growth after 4 weeks of feeding by tawny mole crickets over three separate greenhouse trials were 561-79, HI-1, HI-2, PI-509018, 'Excalibur', SIPV-1 paspalums, and 'Tifeagle' and 'Tifsport' bermudagrasses. Although none of the tested genotypes was highly resistant to tawny mole cricket injury, 'TifSport' bermudagrass and 561-79 (Argentine) seashore paspalum were most tolerant.**

The multifaceted and diverse turfgrass industry, encompassing a variety of goods and services, has expanded greatly since the 1950s and now exceeds $20 billion in overall value (Watson et al., 1992). Turfgrass adaptability and aesthetic traits have traditionally been emphasized in turfgrass breeding programs. Recent efforts in plant improvement have incorporated insect and disease resistance (Quisenberry, 1990). Reinert (1982) and Quisenberry (1990) reviewed turfgrass resistance to insects and mites. Little work, however, has focused on subterranean turfgrass pests such as mole crickets and white grubs (Potter and Braman, 1991).

Tawny and southern mole crickets have become serious pests in the southeastern United States since their entry into this country in about 1900, probably in the ballast of ships, (Nickle and Castner, 1984; Walker, 1984; Walker and Nickle, 1981). The tawny mole cricket is the most destructive of the two species, because it consumes more plant material than does the primarily predaceous southern mole cricket.

Previous evaluations have revealed variation in the degree of susceptibility among warm-season turfgrasses to tawny mole cricket damage (Braman et al., 1994; Reinert and Busey, 1984). Reinert and Busey (1984) examined the relative susceptibility of bermudagrass, bahiagrass (*Paspalum notatum* Flugge), St. Augustinegrass [*Stenotaphrum secundatum* (Walt.) Kuntz], centipedegrass [*Eremochloa ophiuroides* (Munro) Hack.], and zoysiagrass (*Zoysia* sp.) to the southern and tawny mole cricket. In field observations, fine selections within a grass species sustained more damage than did coarse selections. Braman et al. (1994) evaluated nine experimental and three commercial cultivars of zoysiagrass in greenhouse trials for potential resistance to tawny mole cricket. After a 4-week period, reduction in growth caused by *S. vicinus* at densities equivalent to 15 adults per 0.9 m² was most severe for DALZ 8516, DALZ 9006, and 'Meyer' zoysia. The cultivars that grew best in this greenhouse evaluation were 'Diamond', 'Palisades', DALZ 8701, and 'Emerald' zoysia. In an effort to anticipate a total management program for new turfgrass cultivars, evaluations for potential resistance of bermudagrass and paspalum to southern and tawny mole crickets were conducted.

Materials and Methods

Insects. Mole crickets for evaluations were collected in Tifton, Ga., by gathering adults attracted to lights at night during the spring mating flights. Collection was assisted at times by using an acoustical device that synthetically produces and amplifies species-specific cricket songs (Walker, 1982). Adult males and females were held for 1 week postcollection to help ensure that they were not infected with parasitic nematodes or injured during the collection process.

Plants. Grasses included primarily experimental selections of hybrid bermudagrass [*Cynodon dactylon* L. x *C. transvalensis* (Burtt-Davy)] and seashore paspalum (*Paspalum vaginatum* Swartz). Seashore paspalum is a warm-season, salt-tolerant turfgrass found in tropical, subtropical, and warm temperate regions of the world (Duncan, 1999). Bermudagrasses in this study were selections from the U.S. Dept. of Agriculture, Agricultural Research Service, Forage and Turf Research Unit, Coastal Plain Experiment Station, Tifton, Ga. (Burton, 1966a, 1966b, 1985; Hanna and Elsner, 1999; Hanna et al., 1997; Hein, 1961).

Mole cricket evaluations. Turfgrasses were examined for potential resistance to tawny and southern mole crickets in greenhouse, laboratory, and field experiments. In all cases, crickets were field-collected, except for a nymphal development study. In that study, field-collected crickets were maintained on bermudagrasses until they oviposited. Recovered eggs were held on moist sand at 27 °C until nymphs emerged.

Laboratory evaluations. Expt. 1. Potential resistance of seashore paspalum to southern and tawny mole cricket was evaluated using potted plants in a controlled environment chamber maintained at 27 °C, 85% relative humidity (RH), and 15 hours light/9 hours dark photoperiod. Grasses planted into fine sand (0.25–0.10 mm) in 7.62-cm² plastic pots (10-cm tall) were watered daily and fertilized weekly with a solution containing 250 mg·L^{-1} of Peters 20N–20P–20K (Scotts-Sierra Horticultural Products Corp., Maryville, Ohio). Turf was cut weekly to a height of 5 cm. In a no-choice test, a split-plot design with four replications was used to examine the effect of tawny mole cricket and southern mole cricket on 21 paspalum selections (Table 1). Pots were infested with either one tawny or one southern mole cricket, and covered with nylon screen to prevent their escape. Four replications of the 21 grasses were also maintained as controls. Crickets were allowed to tunnel and feed for 10 d. At that time, turfgrass quality ratings were made on a 0–9 scale, where 9 was highest quality and 0 was lowest quality (dead plants).

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Table 1. Seashore paspalum response to infestation by southern mole cricket (SMC) or tawny mole cricket (TMC).

	Plant dry wt (mg)			Quality[z]	
Entry	Noninfested	SMC infested	TMC infested	SMC infested	TMC infested
PI 377709	1.93	1.78	0.75	7.75	3.25
'Tropic Shore'	1.92	1.58	0.96	8.00	3.50
PI 299042	1.82	1.53	1.00	6.25	4.00
PI 364985	1.79	1.36	0.71	6.00	2.75
PI 509023	1.64	1.76	2.49	7.50	5.00
310-79	1.36	0.92	0.36	5.75	3.00
561-79	1.35	0.98	1.25	5.50	4.00
PI 509018	1.26	0.83	0.39	7.25	4.00
SIPV-1	1.24	0.65	0.71	5.25	6.25
PI 509022	1.23	1.82	0.37	7.50	3.25
HI-2	1.20	0.88	0.55	7.50	4.50
PI 509020	1.20	0.64	0.90	6.50	3.75
'Excalibur'	1.17	0.92	1.25	6.50	6.25
HI-1	1.14	0.92	0.79	7.75	5.50
Mauna Kea	1.06	1.03	0.33	7.75	3.75
G.O. 'Adalayd'	1.02	0.46	0.10	4.50	1.25
PI 509021	0.94	0.79	0.23	6.25	3.75
Fidalayel	0.89	0.62	0.19	7.25	3.75
Temple-2	0.84	3.33	0.79	7.25	5.25
SIPV-2	0.78	0.84	0.70	6.75	5.50
Temple-1	0.53	0.29	0.44	6.00	5.00
$F_{3,20}$	3.13	1.08	2.58	1.79	1.04
P	0.0003	0.390	0.002	0.043	0.436
$LSD_{0.05}$	0.61	1.82	0.92	2.11	3.66

[z]0 = dead plant, 9 = maximum quality.

Table 2 . Response of *S. vicinus* nymphs to turfgrass selections after feeding for 30 d.

Entry	Mean no. surviving nymphs	Survival %	Avg nymphal wt (mg)
	Bermudagrass		
'Tifdwarf'	1.86	62	204.3
'Tifgreen'	1.71	57	226.8
'TifEagle'	1.14	38	214.8
'Tifway'	1.00	33	184.0
'TifSport'	1.29	43	197.1
94-21	1.43	48	192.0
94-91	1.14	38	221.7
94-191	1.14	38	161.7
	Zoysiagrass		
'Cavalier'	0.86	29	162.0
F value	1.1	1.1	1.0
P value	0.4	0.4	0.4
$LSD_{0.05}$	NS	NS	NS

[NS]Nonsignificant at $P \leq 0.05$.

Expt. 2. A laboratory assessment of suitability of eight bermudagrasses and one zoysiagrass (Table 2) for tawny mole cricket nymphal development was conducted under the same environmental conditions (see Expt. 1). Three newly emerged nymphs (<24-h-old) were introduced into each 15-cm diameter pot of sand (30.5 cm tall) containing a single turf type. Pots were arranged in the growth chamber in a randomized complete-block design with seven replications, and were destructively sampled 30 d after infestation. Number and weight of surviving crickets were recorded.

Greenhouse evaluations. Expt. 3. A greenhouse assessment of seashore paspalum response to tawny mole cricket was conducted according to the methods of Braman et al. (1994). Established plugs of grass of 18 plant taxa (Table 3) were transferred to polyvinyl chloride (PVC) tubes (38-cm tall, 15 cm-diameter) containing fine sand (0.25–0.10 mm). These tubes were covered at the bottom with plastic petri dish lids, placed in wooden box frames, and equipped with drip irrigation. Watering and fertilization regimes were maintained as previously described. Two female and one male cricket were introduced into each tube (designated as infested treatments). A randomized complete-block design with five replications was used. Both infested and noninfested tubes were covered with 32-mesh screen (Chicopee Manufacturing Co., Gainesville, Ga.) to prevent escape of crickets and to ensure equivalent light, temperature, and RH conditions.

Top growth was clipped to a height of 5 cm 2 weeks after infestation. Clippings were placed in paper bags, oven-dried at 43 °C for 5 d, then weighed. Dry weight of top growth was recorded 3 and 4 weeks postinfestation, and microplots were destructively sampled after 4 weeks. Root dry weights were determined as well as number of surviving crickets. Sand was sifted, and the number of eggs was also recorded.

Expts. 4 and 5. Similar methods were used to evaluate potential resistance of bermudagrass selections to tawny mole crickets. Established plugs of 34 bermudagrasses were transferred to PVC tubes. Watering and fertilization regimes were maintained as previously described. Two female and one male cricket were introduced into each of 90 (Expt. 4) or 80 (Expt. 5) tubes designated as infested treatments. Expt. 4 included 18 infested plant taxa and their 18 noninfested counterparts; Expt. 5 included 16 infested plant taxa (Table 4) and their noninfested counterparts. A randomized complete-block design with five replications was used for both trials. Again, all tubes were covered with 32-mesh screen, and both infested and noninfested microplots were covered with screen. Data collected were as described for Expt. 3.

Field evaluations. Expt. 6. Field plots were established in Tifton, Ga., in an area of known mole cricket activity. Thirty-five seashore paspalums and seven bermudagrasses (Table 5) were planted in 2.13-m^2 plots arranged in a randomized complete-block design with seven replications. Data collected included number of tunnels per plot on five dates during establishment (Table 5). Subsequent to complete establishment, mole cricket damage was rated according to methods described in Cobb and Mack (1991). A 1-m^2 grid was used to assign damage on a 0–9 scale according to how many of nine interior divisions of the grid contained mole cricket tunnels (Table 5). Irritant soap flush samples were used to make an assessment of nymphal populations on 23 May 1997.

Data analysis. Percentage data were transformed before analysis using arcsin √%. Data were subjected to the GLM procedure (SAS Inst., 1985) with mean separation by Fisher's protected LSD test. The effect of cricket infestation and feeding in Expts. 3–5 was evaluated by comparing growth of infested plants with that of noninfested counterpart plants for each infested plant replicate. Therefore, effect of cricket feeding is given as mean percentage of noninfested controls (Tables 3–5), and is a relative measure of injury, allowing plant entries of different growth habits to be compared for their response to cricket injury irrespective of differences in growth habit among entries.

Results and Discussion

Laboratory evaluation. Expt. 1. Among the 21 accessions of *P. vaginatum* evaluated, Glenn Oaks 'Adalayd' was least tolerant of infestation by crickets (Table 1). Plants infested with tawny mole crickets had lower quality and dry weight relative to the noninfested controls than did those infested with southern mole crickets. Dry weights averaged among entries were 1.25 g for noninfested plants, 1.02 g for southern mole crickets, and 0.73 g for tawny mole crickets (F = 21.88, $P \leq 0.001$, LSD = 0.16). Average plant quality ratings were 8.0 for noninfested plants, 6.7 for those infested with southern mole crickets, and 4.0 for those infested with tawny mole crickets (F = 71.5, $P \leq 0.001$, LSD = 0.66).

Laboratory evaluation. Expt. 2. Average survival of nymphal tawny mole crickets after 30 d on potted turfgrasses ranged from 29% on 'Cavalier' zoysiagrass to 62% on 'Tifdwarf' bermudagrass (Table 2). Nymphal weight gain ranged from an average of 161.7 mg on 94–191 bermudagrass to 226.8 mg on 'Tifgreen' bermudagrass. Differences among entries were nonsignificant ($P > 0.05$).

Greenhouse evaluation. Expt. 3. Survival of crickets after 4 weeks was not influenced by turfgrass type (Table 3). While southern mole crickets are cannibalistic, tawny mole crickets are not, and this was not considered a significant source of mortality. Similarly, little effect on egg production was observed in this experiment, although a previous study demonstrated an influence of turfgrass type on oviposition (Braman et al., 1994). All turfgrass selections had lower root dry weights than did noninfested controls (Table 3). Although root dry weight as a percentage of noninfested controls ranged

Table 3. Seashore paspalum response to tawny mole cricket injury.

	Mean % of noninfested controls (n = 5)						
	Shoot dry wt (mg)				Root dry	No.	No.
Entry	2 wk	3 wk	4 wk	Total	wt (mg)	crickets	eggs
561-79	204.6	172.4	52.7	154.3	60.8	1.8	3.0
PI-509018	129.4	8.5	27.4	82.0	24.2	1.8	7.0
PI-364985	62.4	206.7	62.8	61.7	43.1	1.6	3.0
PI-509021	92.4	124.8	15.8	61.1	42.7	2.2	4.2
PI-509022	33.9	31.3	10.8	25.2	6.7	1.8	1.6
PI-509023	34.2	5.6	0	24.3	30.4	2.0	6.8
HI-1	158.0	38.3	79.1	113.2	60.6	1.6	7.2
HI-2	104.6	78.4	107.4	91.5	88.8	1.8	1.2
'Mauna Kea'	120.3	21.5	43.0	76.5	65.5	1.6	11.8
'Excalibur'	129.1	27.0	15.6	97.4	44.5	1.8	0
Temple 2	101.1	14.6	23.6	71.5	30.3	2.4	2.8
SIPV-1	122.9	10.0	42.9	82.2	73.6	2.0	0
SIPV-2	84.1	24.9	31.9	64.6	33.2	1.6	5.6
Temple 1	90.3	27.9	27.6	67.6	21.2	1.8	6.0
310-79	83.8	57.9	1.8	71.8	45.5	2.0	6.2
'Fidalayel'	141.2	8.5	5.5	88.2	17.3	1.8	5.6
Glenn Oaks 'Adalayd'	66.3	40.3	0	43.5	44.4	2.0	4.0
Common bermuda	73.0	17.1	4.0	47.0	26.0	1.6	5.4
F value	1.72	1.52	0.83	2.41	1.15	0.51	0.74
P value	0.05	0.11	0.66	0.006	0.330	0.939	0.756
$LSD_{0.05}$	92.8	NS	NS	56.0	NS	NS	NS

[NS]Nonsignificant at $P \leq 0.05$.

Table 4. Bermudagrass response to tawny mole cricket injury.

	Mean % of noninfested control (n = 5)						
	Shoot dry wt (mg)				Root	No.	No.
Entry	2 wk	3 wk	4 wk	Total	dry wt	eggs	crickets
			Expt. 4				
'Tifdwarf'	91.9	169.7	49.6	103.7	43.5	7.8	3.0
'Tifgreen'	90.0	123.0	213.3	142.1	69.7	0	1.8
'TifEagle'	108.7	219.4	90.3	139.5	66.0	4.2	2.0
'Tifway'	78.1	198.1	29.9	102.0	52.1	5.2	2.8
'Tifway 2'	97.5	85.6	46.4	76.5	37.8	5.6	2.6
'TifSport'	124.2	293.7	152.2	190.0	66.9	0	1.8
'Cavalier'[z]	93.3	94.2	227.6	138.4	88.5	6.8	2.4
94-16	80.9	82.3	70.8	78.0	49.8	9.8	2.8
94-18	72.2	56.9	79.3	69.5	34.7	22.0	2.8
94-21	85.2	114.6	33.5	89.6	47.9	12.4	2.6
94-29	43.2	111.5	16.7	71.1	42.9	23.0	2.8
94-54	43.2	108.0	69.9	73.7	28.4	3.2	2.6
94-91	74.9	135.8	51.5	84.1	50.0	5.6	2.8
94-123	84.6	126.9	39.9	83.8	49.3	16.6	2.8
94-174	62.8	82.3	26.2	57.1	36.9	2.4	2.2
94-183	57.1	53.8	29.9	46.9	29.1	2.6	3.0
94-191	60.0	86.5	61.9	69.5	26.6	5.8	1.4
94-192	47.5	62.2	10.3	40.0	43.4	6.4	2.4
F value	1.02	0.96	1.57	1.55	1.29	2.17	1.77
P value	0.45	0.512	0.098	0.104	0.223	0.013	0.05
$LSD_{0.10}$	---	---	118.0	72.7	---	---	---
$LSD_{0.05}$	---	---	---	---	---	12.9	1.0
			Expt. 5				
'Tifway'	161.6	48.9	107.2	128.3	99.6	18.2	1.2
'TifEagle'	142.1	109.0	114.9	97.7	91.6	8.6	2.0
'Cavalier'[z]	221.1	102.1	102.2	149.2	138.4	13.2	1.6
94-7	63.0	221.0	67.1	61.5	50.2	8.8	2.2
94-22	120.6	56.0	95.0	84.3	72.8	12.6	1.4
94-25	81.9	304.3	60.4	103.8	72.8	8.2	1.2
94-33	55.5	54.0	23.2	46.1	63.2	9.2	1.8
94-63	165.0	55.1	67.8	97.2	64.2	13.8	1.8
94-74	60.4	106.0	80.9	59.4	88.6	7.2	2.2
94-96	132.0	77.7	129.8	113.8	97.6	3.4	0.8
94-111	104.6	106.9	61.3	93.6	82.8	9.0	1.4
94-132	109.3	48.0	69.9	81.7	76.4	11.2	1.2
94-147	67.9	30.9	100.0	54.9	49.6	20.2	1.6
94-161	93.9	67.2	98.8	77.6	103.0	14.4	1.2
94-172	109.0	46.8	29.3	74.5	113.8	18.4	2.0
94-193	33.6	53.5	57.5	32.1	70.2	20.4	1.4
F value	1.32	0.80	0.60	1.19	0.52	0.42	1.13
P value	0.22	0.68	0.86	0.30	0.91	0.97	0.35

[z]Zoysiagrass.

from 6.7% to 88.8% depending on turfgrass entry, this difference was nonsignificant ($P > 0.05$). Measurable differences in top growth were observed 2 weeks after infestation and for the total 4-week period. Most entries grew less than did noninfested controls. Two selections (HI-1 and 561-79), however, grew more when infested with mole crickets when top growth for the entire 4-week period was evaluated. Selections that were least affected for the total 4-week period were PI-509018, 'Excalibur', SIPV-1, HI-1, HI-2, and 561-79. Of these selections, HI-1, HI-2, and 561-79 maintained the highest percentage of normal growth after 4 weeks. Selections most affected by cricket infestation were Glenn Oaks 'Adalayd', SIPV-2, PI-509021, PI-509022, and PI-509023.

Greenhouse evaluations, Expts. 4 and 5. Among bermudagrass entries evaluated in Expts. 4 and 5, responses of 'TifEagle' and especially 'TifSport' were similar to that of 'Cavalier' zoysiagrass; these elements had the most consistent increases in percentage top growth despite root damage from tawny mole cricket feeding (Table 4). Few significant differences in growth response were observed in either trial, although the mean increase in total percentage top-growth dry weight of noninfested controls ranged from 32% (94–193) to 149% ('Cavalier') during Expt. 5 (Table 4). Significant differences in cricket survival and egg production were observed in Expt. 4 but not in Expt. 5, apparently reflecting variation not only in response of crickets to cultivar, but also in ovipositional status of crickets in trials.

Field evaluations. Expt. 6. Few significant differences in mole cricket infestation were observed for the 14 field plot assessments made during 1996–1998 (Table 5). Significant block effects were observed on each date, indicating a highly aggregated population on one end of the field. The field was bounded by railroad tracks on one side; train traffic vibrations may have influenced mole cricket distribution. Mole crickets revealed by soap flush averaged 0–2.25 per plot. However, these differences were nonsignificant ($P > 0.05$). The fewest tunnels during the first year of establishment were observed in plots containing D-8 bermudagrass, PI-299042, 561-79, HI-14, HI-2, and 'Salam' paspalums. During 1996, 'Temple 2', 'TifEagle', 'Tifdwarf', 'Fidalayel', 310-79, and 'Utah 2' had the most tunnels, whereas during 1997 and 1998, AP-10, D-8, HI-39, D-24, 'TifSport', 'Tifway', and PI-299042 had the fewest. Mole cricket activity was greatest in 'Tifdwarf', 'Mauna Kea', 'Excalibur', Temple-1 K8, PI-509018-2, PI-509018-1, SIPV-2, PI-509022, and Utah 1 during this period.

A range in turfgrass response to mole cricket injury was demonstrated among the grass taxa evaluated in the greenhouse, laboratory, and field experiments described here. Generally, despite fairly large numerical differences in mole cricket injury to tops and roots, few significant differences among entries were observed. Although high levels of resistance were not identified in any of the entries evaluated, 'TifSport' and 'TifEagle' bermudagrasses and 561-79, HI-1, HI-39, and AP-10 seashore paspalums were most tolerant to injury.

Table 5. Tawny mole cricket (TMC) damage to *P. vaginatum* and *Cynodon* species accessions in field plots.

	No. TMC tunnels/plot 1996–97					Damage rating[z] 1997–98			
Entry	27 May	4 June	15 June	26 June	23 May	26 May	26 June	1 Oct.	5 May
				Seashore paspalum					
SIPV-1	0	0	0.14	0.29	0.43	0.86	0.29	0	0.14
SIPV-2	0	0	0	0.57	1.14	1.0	0.57	0.57	1.29
HI-1	0.29	0	0.57	0.14	0	0.58	0.71	0.14	0.57
HI-2	0	0	0.14	0.14	0.57	0.57	0.43	0.57	1.29
'Excalibur'	0	0	0.43	0.29	0.14	0.29	0.43	0	1.71
'Fidalayel'	0.14	0	0	0.86	0.43	0.43	0.71	0.71	0.71
'Adalayd'	0	0.14	0	0.29	0.14	0.43	0	0.43	0.43
Temple 1	0.14	0	0	0.29	2.71	1.43	0.29	0.29	0.86
Temple 2	0	0	0	1.43	0.86	0.29	0.71	0	1.29
'Mauna Kea'	0	0	0.14	0.29	0.29	0.71	1.0	.14	1.71
PI-509018-1	0	0	0.14	0.29	0.71	1.43	1.57	.14	1.29
PI-509018-2	0.43	0	0	0.43	4.29	2.14	1.14	2.14	1.86
PI-509018-3	0	0	0	0.43	0.14	0.29	0.86	0.29	0.43
Taliaferro	0	0.43	0.14	0.29	0	0.86	0.57	0.14	1.0
PI-509020	0	0	0	0.14	1.0	0.71	0.43	0.71	0.86
PI-509021	0	0	0.29	0.29	0	1.0	0.43	0	0.29
PI-509022	0	0.14	0	0.29	0	0.71	0.86	0.29	1.71
PI-509023	0.14	0	0	0.43	1.0	0.14	0.43	0.86	1.14
310-79	0.29	0.14	0.43	0.71	0.71	0.42	0.29	0.29	1.14
561-79	0	0.43	1.43	0	0.29	0.86	0.14	0.57	1.29
PI-299042	0	0	0	0	0	0.57	0.43	0	0.14
PI-377709	0	0	0	0.57	0	0.14	0.29	0.29	0.89
HI-39	0	0	0	0.14	0.29	0	0.14	0	0.14
'Tropic Shore'	0.29	0	0.29	0.29	0	0.14	0.29	0.29	0.86
AP10	0.43	0.86	0	0	0.14	0.14	0.43	0.14	0.29
AP14	0	0	0.86	0.29	0.71	0.57	0.29	0	0.86
'Salam'	0	0.14	0	0	0.29	0.29	0.71	1.29	1.14
FSP1	0	0	0	0.29	0.43	0.57	0.57	0.14	0.71
Utah 1	0	0.28	0	0.43	0	1.14	0	0.29	1.14
Utah 2	0	0	0.14	0.71	0.71	0.86	0.57	0.57	0.86
K3	0	0	0.29	0.43	0.14	0	0.86	0.43	0.71
K8	0	0	0	0.57	1.43	1.29	0.57	0	0.14
PI-28960	0	0	0	0.43	1.71	0.29	0	0	0.29
PI-29193	0	0	0.14	0.57	0.43	0.57	0.71	0	0.29
HI-14	0	0	0.14	0	4.29	0.86	0.86	0.14	0.86
				Bermudagrass					
'TifEagle'	0	0	0	1.14	0.86	0.86	0.86	0	0.29
'Tifdwarf'	0	0	0	1.14	0.43	0.71	1.43	1.86	2.71
D24	0	0.43	0.23	0.43	0	0	0.14	0	0.14
D5	0.14	0	0.43	0.57	0.57	2.15	0.86	0.29	1.29
'Tifway'	0	0	0	0.29	0	0	0	1.0	0
'TifSport'	0.14	0	0	0.14	0	0.14	0	0.14	0.14
D8	0	0	0	0	0.14	0	0	0	0
Range	0.43	0.86	1.4	1.4	4.3	2.1	1.6	2.1	2.7
P	0.53	0.59	0.18	0.36	0.22	0.09	0.65	0.10	0.06
LSD	NS	NS	NS	NS	NS	1.0	NS	NS	1.1

[z]Damage rating of 0 (no tunnels per m^2 grid) to 9 (at least 1 tunnel in each of 9 divisions of a m^2 grid).
[NS]Nonsignificant.

Literature Cited

Braman, S.K., A.F. Pendley, R.N. Carrow, and M.C. Engelke. 1994. Potential resistance in zoysiagrasses to tawny mole crickets (Orthoptera: Gryllotalpidae). Fla. Entomol. 77:302–305.

Burton, G.W. 1966a. Tifway (Tifton 419) bermudagrass. Crop Sci. 6:93–94.

Burton, G.W. 1966b. Tifdwarf bermudagrass. Crop Sci. 6:94.

Burton, G.W. 1985. Registration of Tifway II bermudagrass. Crop Sci. 25:354.

Cobb, P.P. and T.P. Mack. 1991. A rating system for evaluating tawny mole cricket, *Scapteriscus vicinus* Scudder damage (Orthoptera: Gryllotalpidae). J. Entomol. Sci. 24:142–144.

Duncan, R.R. 1999. Environmental compatibility of seashore paspalum (Saltwater couch) for golf courses and other recreational uses. II. Management protocols. Intl. Turfgrass Soc. Res. J. 8(2):1216–1230.

Hanna, W.W. and J.E. Elsner. 1999. Registration of TifEagle bermudagrass. Crop Sci. 39:1258.

Hanna, W.W., R.N. Carrow, and A.J. Powell. 1997. Registration of Tift 94 bermudagrass. Crop Sci. 37:1012.

Hein, M.A. 1961. Registration of varieties and strains of bermudagrass, III. (*Cynodon dactylon* (L.) Pers.). Agron. J. 53:276.

Nickle, D.A. and J.L. Castner. 1984. Introduced species of mole crickets in the United States, Puerto Rico, and the Virgin Islands (Orthoptera: Gryllotalpidae). Ann. Entomol. Soc. Amer. 77:450–465.

Potter, D.A. and S.K. Braman. 1991. Ecology and management of turfgrass insects. Annu. Rev. Entomol. 36:383–406.

Quisenberry, S.S. 1990. Plant resistance to insects and mites in forage and turf grasses. Fla. Entomol. 73:411–421.

Reinert, J.A. 1982. A review of host resistance in turfgrasses to insects and acarines with emphasis on the southern chinch bug, p. 3–12. In: H.D. Niemczyk and B.G. Joyner (eds.). Advances in turfgrass entomology. Hammer Graphics, Piqua, Ohio.

Reinert, J.A. and P. Busey. 1984. Resistant varieties, p. 35–40, In: T.J. Walker (ed.). Mole crickets in Florida. Univ. of Florida Agr. Expt. Sta. Bul. 846.

SAS Institute. 1985. SAS user's guide: Statistics, vers. 5 ed., SAS Inst., Inc., Cary, N.C.

Walker, T.J. 1982. Sound traps for sampling mole cricket flights (Orthoptera: Gryllotalpidae: *Scapteriscus*). Fla. Entomol. 65:105–109.

Walker, T.J. 1984. Mole crickets in Florida. Florida Agr. Expt. Sta. Bul. 846.

Walker, T.J. and D.A. Nickle. 1981. Introduction and spread of pest mole crickets: *Scapteriscus vicinus* and *Scapteriscus acletus* reexamined. Ann. Entomol. Soc. Amer. 76:507–517.

Watson, J.R, H.E. Kaerwer, and D.P Martin. 1992. The turfgrass industry, p. 30–87. In: D.V. Waddington, R.N. Carrow, and R.C. Shearman (eds.). Turfgrass No. 32 in the series 'Agronomy'. Madison, Wis.