NOTE

Progeny Production, Number of Instars, and Duration of Development of Tawny and Southern Mole Crickets (Orthoptera: Gryllotalpidae)[1]

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Scapteriscus vicinus Scudder and *S. borellii* Giglio-Tos, the tawny and southern mole crickets, respectively, are serious pests of turfgrasses in the southeastern United States. The systematics, reproductive behavior, flight phenology, population estimation, and biological control of both species have been investigated (Forrest, T. G. 1979. Fla. Entomol. 63: 45-53; Walker, T. J. 1984. Florida Agr. Exp. Stn. Bull. 846; Hudson, W. G., J. H. Frank and J. L. Castner. 1988. Bull. Entomol. Soc. Am. 34: 192-198, Hudson, W. G. 1989. Fla. Entomol. 72: 337-343). However, development and implementation of integrated management programs for these pests remains hampered by a lack of knowledge of their basic biology and ecology. This study reports details of the developmental and reproductive biology useful in evaluating field experiments and in designing management strategies.

Night-flying crickets of each species were attracted to speakers broadcasting synthetically produced and amplified species-specific songs and collected during April, 1991, in Tifton, GA. Crickets were transported to Griffin, GA, sorted by species and gender, paired, and confined in 8-cm diam, 15-cm deep PVC pipe cages containing moist sand. Crickets were fed daily a restricted diet of Cricket Chow® (from Purina). Clear plastic petri dish lids were used as the top and bottom closures of the cages. Eggs deposited by females (visible through the clear lower lid) were collected daily. Eggs were transferred to 120-ml plastic specimen cups containing moist sand and monitored daily for eclosion. Nymphs were housed individually in plastic specimen cups and fed Purina Cricket Chow daily. Nymphs were checked daily and were marked with a small spot of white nail polish on the abdomen to permit determination of number of nymphal molts. All crickets were held in environmental chambers (Percival Co., Boone, Iowa) at 27°C, 15:9 (L:D).

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Tawny (n = 28) and southern (n = 27) crickets, respectively, oviposited an average of 3.1 ± 0.3 and 2.4 ± 0.3 clusters. On this diet, tawny mole crickets generally oviposited fewer eggs per cluster (Fig. 1). A mean total of 45.8 ± 5.4 and 58.2 ± 8.1 eggs per female was deposited by tawny and southern crickets during April-July at 27°C, 15:9 (L:D). Worsham and Reed (1912, Georgia Expt. Stn. Bull. 101) reported a range of 20 to 60 eggs deposited by single *S. vicinus* females, with an average of 45 eggs from 15 females. However, Forrest (1986, Ann. Entomol. Soc. Am. 79: 918-924), in a study of 9 *S. borellii* and 11 *S. vicinus*, reported that some individuals produced >450 eggs per lifetime and as many as 10 clutches. Oviposition in that study in Florida began in late April and continued through late July.

Four tawny and 19 southern mole crickets completed development of the original cohorts of 15 and 52 newly eclosed nymphs (Table 1). Eggs required 2-3 weeks to complete development at 27°C. Nymphal development was variable

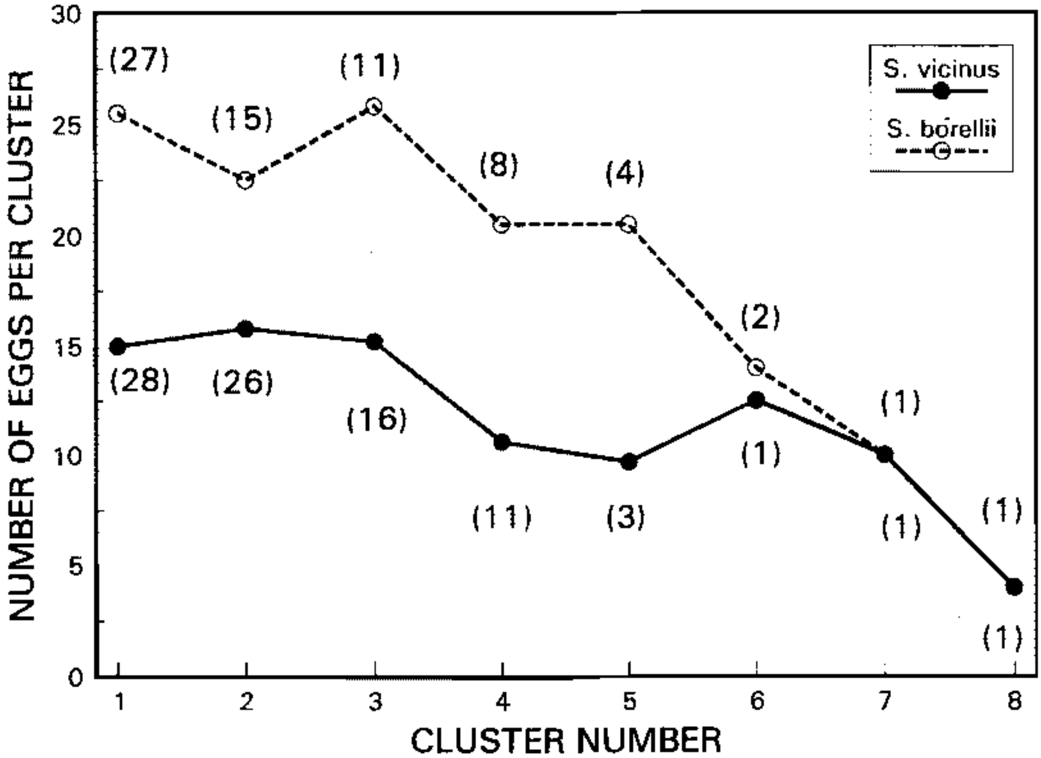

Fig. 1. Comparative egg cluster size for *S. vicinus* and *S. borellii* when fed Purina Cricket Chow. Number of females indicated in parenthesis.

Table 1. Development of *Scapteriscus vicinus* and *S. borellii* at 27°C and 15:9 (L:D) photoperiod.

		mean ± s.d. duration of development in days			
stage	gender	*S. vicinus*	*n*	*S. borellii*	*n*
egg	male	13.5 ± 2.1	2	20.6 ± 3.3	10
	female	16.5 ± 3.5	2	21.5 ± 3.2	9
	unknown	16.8 ± 1.2	11	20.9 ± 1.3	33
first	male	15.5 ± 0.7	2	22.0 ± 4.8	10
	female	12.0 ± 1.4	2	21.6 ± 3.8	9
	unknown	14.2 ± 2.9	11	21.9 ± 6.3	33
second	male	27.0 ± 8.4	2	13.7 ± 4.2	10
	female	23.5 ± 4.9	2	14.7 ± 3.6	9
	unknown	15.4 ± 5.3	11	18.9 ± 6.8	33
third	male	18.5 ± 7.7	2	15.4 ± 1.5	10
	female	31.0 ± 5.6	2	16.3 ± 7.1	9
	unknown	23.4 ± 5.4	11	18.6 ± 6.8	33
fourth	male	36.0 ± 14.1	2	16.9 ± 7.1	10
	female	17.0 ± 1.4	2	19.7 ± 8.0	9
	unknown	25.5 ± 11.9	10	25.9 ± 14.9	32
fifth	male	27.0 ± 4.2	2	20.7 ± 3.8	10
	female	15.5 ± 3.5	2	22.9 ± 5.0	9
	unknown	27.3 ± 10.9	8	24.2 ± 8.5	29
sixth	male	25.5 ± 3.5	2	30.3 ± 10.8	10
	female	18.0 ± 0	2	26.9 ± 14.5	9
	unknown	24.7 ± 10.8	6	28.9 ± 13.3	22
seventh	male	19.0 ± 4.2	2	32.3 ± 14.6	10
	female	25.0 ± 7.1	2	45.8 ± 18.8	9
	unknown	20.8 ± 7.9	5	38.4 ± 10.7	15
eighth	male	28.5 ± 7.8	2	52.9 ± 16.9	9
	female	41.5 ± 10.6	2	58.0 ± 16.7	7
	unknown	31.8 ± 12.8	5	48.0 ± 14.5	7
ninth	male	22.0 ± 0	1	68.3 ± 30.3	3
	female	37.0 ± 0	1	50.0 ± 24.0	2
	unknown	31.5 ± 26.1	2	76.0 ± 19.8	2
tenth	male	–		58.0 ± 0	1
	female	–		–	
	unknown	51.0 ± 0	1	–	

with a range and mean of 23.0-32.5 and 28.3 weeks for tawny crickets and 20.1-40.0 and 31.3 weeks for southern crickets. Number of nymphal instars was also variable as follows: southern crickets 7(3), 8(11), 9(4), 10(1) and tawny crickets 8(2) and 9(2).

Hudson (1987, Fla. Entomol. 70: 403-404) found similar variation in the development of five southern mole crickets. Number of instars varied from 8-10, while development time ranged from 28.2-34.8 weeks at 25°C, 16:8 (L:D). The wide variation in development documented in these studies illustrates the lack of synchrony that poses a difficult challenge for pest management. Variation in development of immatures combined with a prolonged oviposition period limits predictive abilities necessary to optimal timing of control activities. Duration of development of eggs and early instars, however, appears less variable than that of later, more damaging instars. However, laboratory conditions are different than those that are usual in the field. For example, food though constantly available here, was of but a single kind, and temperature was constant. Care, therefore, must be taken in translation of these laboratory results to field application. Greater knowledge concerning the factors influencing selection of oviposition sites by mole crickets remains a critical need in the development of management plans.

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