ESTABLISHMENT OF A NEW STINK BUG PEST, *OEBALUS YPSILONGRISEUS* (HEMIPTERA:PENTATOMIDAE) IN FLORIDA RICE

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ABSTRACT

The rice stink bug, *Oebalus ypsilongriseus* (DeGeer), was first observed in Florida rice fields in 1994. An extensive survey was conducted during 1995 and 1996 using sweep nets to determine the relative abundance and population biology of *O. ypsilongriseus* in Florida rice fields. It occurred in 100 percent of all fields sampled, and constituted 10.4 percent of all stink bugs collected. Higher numbers of *O. ypsilongriseus* were found as rice fields matured and during the later months of September through November. Data from this study show *O. ypsilongriseus*, a well known rice pest in South America first reported in the United States in 1983, is now widespread in Florida rice fields.

Key Words: rice, Pentatomidae, *Oebalus ypsilongriseus*, stink bug

RESUMEN

La chinche del arroz, *Oebalus ypsilongriseus* (DeGeer), fué notada por primera vez en Florida en campos de cultivo de arroz en 1994. Durante 1995 y 1996, se llevó a cabo una muestrea comprensiva en Florida de *O. ypsilongriseus* en campos de arroz, utilizando redes de azote, para determinar la abundancia relativa y la biología poblacional de esta chinche. Se encontró la chinche en el 100 por ciento de todos los campos muestreados y constituyó el 10.4 por ciento de todos los pentatómidos recolectados. Cantidades mayores de *O. ypsilongriseus* se obtuvieron entre más maduros eran los campos de arroz y también durante los meses de septiembre a noviembre. Datos obtenidos con este estudio demuestran que *O. ypsilongriseus*, una plaga que se conoce bien en Sudamérica y que fué reportada en los Estados Unidos por primera vez en 1983, está extendida ampliamente por los campos de cultivo de arroz en Florida.

Rice (*Oryza sativa* L.) was reintroduced into the Everglades Agricultural Area (EAA) of southern Florida in the 1970s after a 20 year absence. Since then rice pro-

duction has expanded and in 1996 rice was grown on ca. 7,600 ha in the EAA with an estimated value of $9 million. Little is known about the insect pests of the crop in the EAA. Although many different insects can be found in rice fields in the EAA, stink bugs are currently considered the most important pest. Green et al. (1954) reported finding four species of stink bugs in Florida rice fields, but gave no information on their relative abundance. More recently, Genung et al. (1979) reported that five species of stink bugs could be found in rice in the EAA, but again no information was given on their relative abundance or seasonal occurrence. Jones & Cherry (1986) first reported the relative abundance and seasonal occurrence of stink bugs in southern Florida rice based on extensive surveys. In the latter study, four species were found with the rice stink bug, *Oebalus pugnax* (F.), the dominant species comprising >95% of the total stink bug population. The seasonal occurrence of the rice stink bug in the traditional southern United States rice-growing areas has been previously studied by Douglas (1939) and Odglen & Warren (1962). Both adult and nymphal stages of the stink bugs feed on individual grains of rice as the panicle develops (Douglas 1939, Swanson & Newson 1962, Bowling 1979). Stink bug damage to rice is well documented (Douglas & Tullis 1950, Swanson & Newsom 1962, Marchetti 1980).

In October, 1994, a previously unrecorded species of stink bug in Florida rice was observed to be abundant in rice fields on the University of Florida Everglades Research and Education Center at Belle Glade, Florida. Adults of this stink bug were collected and sent to Dr. Frank Mead at the Division of Plant Industry, Gainesville, Florida for identification. The adults were identified by Dr. Mead as *Oebalus grisescens* (Sailor). *O. grisescens* was first recorded in the United States at Homestead, Florida in 1983 (Mead 1983). Mead (ibid.) also stated that the species had no demonstrated economic importance. Since many species of *Oebalus* are known to be rice pests, a survey for *O. grisescens* in Florida rice was initiated in 1995. In March, 1996, Dr. Joe Eger brought the recent publication of Del Vecchio et al. (1994) to the senior author's attention. Based on laboratory studies, Del Vecchio et al. (1994) concluded that *O. grisescens* was the hibernating morph of *Oebalus ypsilongriseus* (DeGeer) and placed Sailor's species in the synonym of *O. ypsilongriseus*. *O. ypsilongriseus* is a known pest of rice in Brazil (Del Vecchio and Grazia 1992) and Colombia (Pantoja 1990). Furthermore, Pantoja et al. (1995) conducted a survey for stink bugs in 13 rice producing countries of Latin America. In their study, *Oebalus ornatus* (Sailor) and *O. ypsilongriseus* were found in seven Latin American countries and had the widest geographical range of stink bug species collected during the study.

The objectives of our study were 1) to report the establishment of *O. ypsilongriseus*, in Florida rice fields and 2) to report the relative abundance and population biology of *O. ypsilongriseus* in Florida rice fields.

Materials and Methods

Methods used in the study reported here were very similar to the Jones & Cherry (1986) study in order to allow a direct comparison in stink bug abundance between the two studies. Eight commercial rice fields in the Everglades Agricultural Area were sampled each year with sweep nets (38.1 cm diameter) during the 1995 and 1996 growing seasons. Two fields were sampled at each of four locations each year. Fields were ca. 16 ha and located throughout the EAA to obtain a representative sample of insect populations in the area. Fields also represented a range of normal planting dates ranging from March through May in both years. Growers applied insecticides for stink bug control as they deemed necessary so that application times varied considerably. Of the 16 fields sampled over the two year period, eight were harvested once (main crop) and eight were harvested twice (ratoon crop).

Sampling began six weeks after planting and continued through harvest. Samples were taken from ca 1000 to 1500 hours (EDT). Each field was sampled weekly; each sample consisted of 100 consecutive sweeps (180°). Each horizontal stroke with the net in either direction was one sweep and one sweep was made with each forward step. Sampling began at least 50 m into the field from the roadside and was centered between the field levees to avoid possible edge effects (Douglas 1939). After collection, insects were frozen for later counting.

The relative abundance of all stink bugs found in rice fields during 1995 and 1996 was determined from the total number of nymphs and adults of each species collected during the two years. Mean number of *O. ypsilongriseus* collected at different times after planting during 1995 and 1996 were analyzed using Tukey's test (SAS 1997). Mean number of *O. ypsilongriseus* collected in different months during 1995 and 1996 were also analyzed using Tukey's test. The relative abundance of *O. ypsilongriseus* to *O. pugnax* was also examined for possible seasonal trends.

Results and Discussion

Oebalus ypsilongriseus was found in sweep net samples from all 16 of the rice fields sampled during 1995 and 1996. These data show that it is well established and widespread in commercial rice fields in southern Florida. The relative abundance of stink bugs found in southern Florida rice fields is shown in Table 1. Similar to the Jones & Cherry (1986) study, the rice stink bug *O. pugnax* was again clearly the predominant species. However, *O. ypsilongriseus* was not reported in earlier studies (Green et al. 1954, Genung et al. 1979, Jones & Cherry ibid.). In this study, *O. ypsilongriseus* is now clearly the second most abundant stink bug being 10.4% of the total relative abundance of all stink bugs.

Numbers of *O. ypsilongriseus* collected at different times after rice planting are shown in Table 2. The lowest number of stink bugs was collected six to nine weeks after planting. This observation is most easily explained by noting that *O. ypsilongriseus* attacks the rice panicle (Kashino & Alves 1994) and rice cultivars grown in Florida during 1995-96 all require more than 70 days to 50% heading. The mean number of *O. ypsilongriseus* in sweep samples consistently increased throughout the six to 28 week sampling period. These data show that in Florida, the older the rice field, the more *O. ypsilongriseus* would be expected in the field.

Numbers of *O. ypsilongriseus* collected in different months in Florida rice fields are shown in Table 3. The fewest number of stink bugs were collected during May and

Table 1. Relative abundance of stink bugs found in southern Florida rice fields in 1995 and 1996.

Species	Adults	Nymphs	Total	
			No.	%
Andrallus spinidens (F.)	27	0	27	<1
Nezara viridula (L.)	1	1	2	<1
Oebalus pugnax (F.)	12,878	1,765	14,643	88.7
Oebalus ypsilongriseus (DeGeer)	1,390	328	1,718	10.4
Unknown	104	7	111	<1
Total	14,400	2,101	16,501	100.0

TABLE 2. *O. YPSILONGRISEUS* COLLECTED AT DIFFERENT TIMES AFTER RICE PLANTING.

Weeks after planting	$\bar{x}$[a]	N[b]	SE	Range
6-9	0.2 a	64	0.1	0-5
10-13	1.8 ab	64	0.5	0-17
14-17	5.8 abc	51	2.1	0-73
18-21	7.7 bc	48	1.6	0-46
22-25	11.0 c	40	2.3	0-61
25-28	25.9 d	17	7.3	0-88

[a]Adults + nymphs per 100 sweeps. Means followed by the same letter are not significantly different (alpha = 0.05) using Tukey's test (SAS 1997).
[b]Number of 100 sweep samples.

June. This observation is expected since few Florida rice fields reached the heading stage during these two months. The mean number of *O. ypsilongriseus* consistently increased in sweep samples from May to November. The relative abundance of *O. ypsilongriseus* to *O. pugnax* is also shown in Table 3. During May, June, and July, *O. pugnax* was 97 to 100% of the stink bugs collected of these two species. However, throughout May to November, *O. ypsilongriseus* generally increased relative to *O. pugnax*. This was especially true in the later October-November samples. Interestingly, *O. ypsilongriseus* actually outnumbered the important rice pest *O. pugnax* in the November samples. Additional data on *O. pugnax* in Florida rice are found in Cherry & Jones (1986).

Numerous factors have been shown to affect stink bug numbers in rice fields. These factors include insecticidal spraying, migration (Douglas 1939), rice heading (Kashino & Alves 1994), and weeds in rice fields (Franqui et al. 1988). Our data show that more *O. ypsilongriseus* are found as rice fields matured and during the later

TABLE 3. *O. YPSILONGRISEUS* AND *O. PUGNAX* COLLECTED IN DIFFERENT MONTHS IN FLORIDA RICE FIELDS IN 1995 AND 1996.

		Mean[b] stink bugs		
Month	N[a]	*O. ypsilongriseus*[c]	*O. pugnax*	*O. y./O. p.*
May	29	0.0 a	0.6	0.00
June	61	0.5 a	16.4	0.03
July	46	2.2 a	64.8	0.03
Aug.	50	5.4 ab	67.4	0.08
Sept.	50	10.5 bc	124.8	0.08
Oct.	38	14.6 cd	25.6	0.57
Nov.	10	23.8 d	6.8	3.50

[a]Number of 100 sweep samples.
[b]Adults + nymphs per 100 sweep samples.
[c]Means followed by the same letter are not significantly different (alpha = 0.05) using Tukey's test (SAS 1997).

months of September through November. Reasons for these population trends are currently not understood and should be determined in future research.

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