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

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ABSTRACT

The stink bug, *Oebalus insularis* (Stal), was first observed in Florida rice fields in 2007. An extensive survey was conducted during 2008 and 2009 to determine the relative abundance and population biology of *O. insularis* in Florida rice fields. It occurred in 100% of all fields sampled and constituted 20% of all stink bugs collected. Data from this study show that *O. insularis*, a well known rice pest in Caribbean islands, Central America, and South America, is now widespread in Florida rice fields. This is the first report of this species being found in commercial rice fields in the United States.

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

RESUMEN

El chinche hediondo de arroz, *Oebalus insularis* (Stal), fue observado primeramente en campos de arroz en la Florida en el 2007. Se realizo un sondeo extensivo durante el 2008 y el 2009 para determinar la abundancia relativa y la biologia de la poblacion de *O. insularis* en campos de arroz en la Florida. El chinche ocurrio en 100% de todos los campos muestreados y constituyó 20% de todos los chinches hediondos recolectados. Los datos de este estudio indica que *O. insularis*, una plaga de arroz bien conocida en las Islas Caribeñas, Centroamérica y Sudamérica, esta presente en forma generalizada en los campos de arroz en la Florida. Este es el primer informe de que esta especie de chinche fue encontrada en campos comerciales de arroz en los Estados Unidos.

Although many different insects can be found in rice fields in Florida, stink bugs are currently considered the most important pest. Green et al. (1954) reported finding 4 species of stink bugs in Florida rice fields, but gave no information on their relative abundance. More recently, Genung et al. (1979) reported that 5 species of stink bugs could be found in rice in Florida, 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 Florida rice based on extensive surveys. In the latter study, 4 species were found with the rice stink bug, *Oebalus pugnax* (F.), the dominant species comprising >95% of the total stink bug population.

The stink bug, *Oebalus ypsilongriseus* (DeGeer), was first observed in Florida rice fields in 1994. An extensive survey was conducted during 1995 and 1996 with sweep nets to determine the relative abundance and population biology of *O. ypsilongriseus* in Florida rice fields. It occurred in 100% of all fields sampled, and constituted 10.4% of all stink bugs collected (Cherry et al. 1998). Data from that study showed that *O. ypsilongriseus*, a well known rice pest in South America (Del Vecchio & Grazia 1992; Pantoja et al. 1995), was widespread in Florida rice fields (Cherry et al. 1998).

During 2007, a new stink bug was observed in high numbers in Florida rice fields. The authors suspected the new stink bug to be *Oebalus insularis* (Stal). This identification was confirmed by Dr. Susan Halbert of the Florida Division of Plant Industry. *Oebalus insularis* is known to be a rice pest in South America (Pantoja et al. 1999), Mexico, Central America, and the Caribbean islands (Sailor 1944). Because of the economic importance of *O. insularis*, this study was conducted to document the establishment of *O. insularis* in Florida rice fields.

MATERIALS AND METHODS

Methods used in this study were similar to those reported by Jones & Cherry (1986) and Cherry et al. (1998) to allow a comparison in stink bug abundance over time between the 3 studies. Four commercial rice fields in southern Florida were sampled each year with sweep nets (38.1 cm diameter) during the 2008 and 2009 growing seasons. Each field was about 16 ha and fields were located throughout the rice growing area to obtain a representative sample of insect populations in the area. Fields also represented a range of normal planting dates ranging from Mar through May in both years. Growers applied insecticides for stink bug control as they deemed necessary so that application times varied considerably. The 8 fields were harvested twice (first crop and ratoon crop).

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Sampling began 6 weeks after planting and continued through to ratoon harvest. Samples were taken from about 1000 to 1500 h (EDT). Each field was sampled weekly; each sample consisted of 100 consecutive sweeps (180°). Each horizontal stroke with the net in either direction was 1 sweep and 1 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 2008 and 2009 was determined from the total number of nymphs and adults of each species collected during the 2 years. Three species of *Oebalus* were most numerous totaling 92% of all stink bugs. Because of their abundance in this study and the general importance of *Oebalus* as rice pests in many rice growing areas of the world, additional analyses were conducted on the 3 *Oebalus* species. The abundance of each of the 3 *Oebalus* species at different crop stages was determined. The 3 crop stages were pre-heading (first crop), heading (first crop - heading to harvest), and ratoon (first harvest until second harvest). Heading in the ratoon crop is more uneven than in the first crop, so pre-heading and heading were not analyzed separately. A Least Significant Difference test (SAS 2009) was used for each *Oebalus* species to compare abundance during the 3 crop stages.

Results and Discussion

The most abundant stink bug was the important pest, *O. pugnax* (Table 1). Interestingly, the relative abundance of this species in Florida rice was 96% in 1983-1984 (Jones & Cherry 1986), 89% in 1995-1996 (Cherry et al. 1998), and 54% in 2008-2009. Although exact reasons are not known, the declining relative abundance of *O. pugnax* may have been caused by an influx of the newer stink bug pests, *O. ypsilongriseus* and *O. insularis* now found in Florida rice. There was a high adult/nymph ratio for *O. pugnax* and other stink bug species. This is explained by noting that growers did apply insecticides during first crop heading and ratoon crops killing adults and nymphs present in the fields. Thereafter, adult populations came from rapid immigration of adults back into rice fields. This is consistent with Jones & Cherry (1986) who reported that population densities of *O. pugnax* can increase rapidly when large numbers of adults immigrate into Florida rice fields.

Oebalus insularis was the second most abundant species comprising 20% of all stink bugs caught. *Oebalus insularis* was found in sweep net samples from all 8 of the rice fields sampled during 2008 and 2009. These data show that this pest is now well established and widespread in Florida rice fields. Sailor (1944) noted that *O. insularis* was first recorded in Florida in 1932. This species was not reported in Florida rice in any earlier publications including the more recent extensive surveys of Jones & Cherry (1986) and Cherry et al. (1998). Why *O. insularis* has recently moved into Florida rice fields is unknown. Information on the biology and damage caused by *O. insularis* is found in Guharay (1999) and Pantoja et al. (1999).

The third most abundant species was *O. ypsilongriseus*. This species was first reported in Florida rice in 1998 (Cherry et al. 1998). The 3 species of the *Oebalus* complex are all reported rice pests and clearly the most abundant pests in Florida rice being 92% of all stink bugs caught. The other species, *Euschistus ictericus* (L.), *Mormidea pictiventris* Stal, and *Nezara viridula* (L.) comprise 4% abundance and have been noted previously in Florida rice by Genung et al. (1979) and Jones & Cherry (1986).

The abundance of the 3 *Oebalus* species at different crop stages is shown in Table 2. Few stink bugs of any of the 3 species were found in pre-

Table 1. Relative abundance of stink bugs found in southern Florida rice fields in 2008 and 2009.

Species	Adults	Nymphs	Total	
			Number	%
E. ictericus	2	0	2	<1
M. pictiventris	49	0	49	4
N. viridula	10	4	14	1
O. insularis	200	27	227	20
O. pugnax	550	68	618	54
O. ypsilongriseus	181	30	211	18
Unknown	22	10	32	3
Total	1014	139	1153	100

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TABLE 2. ABUNDANCE[1] OF 3 *OEBALUS* SPECIES AT DIFFERENT CROP STAGES IN FLORIDA RICE.

	First Crop		
	Pre-heading	Heading[2]	Ratoon[3]
O. insularis	0.1 ± 0.2 A	2.0 ± 3.8 AB	3.3 ± 9.4 B
O. pugnax	0.8 ± 2.3 A	8.9 ± 10.3 B	6.4 ± 13.1 B
O. ypilongriseus	0 ± 0 A	0.3 ± 0.6 A	4.0 ± 8.7 B
Total	0.9 ± 2.4 A	11.2 ± 12.2 B	13.7 ± 28.5 B

[1]Mean ± SD total stink bugs (nymphs + adults) caught in 100-sweep sample. Means in a row followed by the same letter are not significantly different (alpha = 0.05) based on the Least Significant Difference Test (SAS 2009).
[2]Heading = start of heading until first harvest.
[3]Ratoon = first harvest until second harvest.

heading rice in the first crop. Typically, Florida rice growers do not sample or spray insecticides at this time, so these numbers reflect the natural occurrence and not stink bug populations suppressed by insecticides. These data are consistent with previous literature since *O. insularis* (Pantoja et al. 2000), *O. pugnax* (Foster et al. 1989), and *O. ypsilongriseus* (Cherry et al. 1998) are all known primarily to be pests of rice during heading as the rice panicle develops. These data show that Florida rice growers do not need to sample for stink bugs or apply insecticides for their control after planting during the pre-heading period of the first crop.

In spite of intermittent insecticide spraying at the initial heading of rice in the first crop and through the ratoon crop, numbers of all 3 species of *Oebalus* were higher during this period than the earlier pre-heading period. This is expected since all 3 species attack the emerging rice panicle, and some panicle emergence takes place almost continuously after the early pre-heading period in Florida rice. Of the 3 species, *O. ypsilongriseus* showed the largest increase in the later ratoon crop. This is consistent with Cherry et al. (1998) who observed that in Florida, the older the rice field, the more *O. ypsilongriseus* would be expected in the field.

As a last note, both *O. insularis* and *O. ypsilongriseus* are widespread in Florida rice fields. However, these species have not been reported in commercial rice fields in other states. Rice growers and rice researchers should be aware of the possible spread of these pests into other rice producing states.

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