Host plants of pentatomids affecting rice fields in Puerto Rico[1]

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ABSTRACT

A host plant survey for rice stinkbugs was conducted on commercial rice fields in Puerto Rico. Alternate host plants for the five stinkbug species consistently collected from rice fields were identified. Ten plant species were identified as alternate host plants. *Oebalus pugnax* (F.) displayed the narrowest host range and was collected only from *Sorghum bicolor* (L.) Moench and *Sorghum halepense* (L.) Pers. The two most abundant stinkbug species, *Mormidea angustata* Stål and *Oebalus ypsilon-griseus (De Geer)*, exhibited a similar preference or host plant range. Nearly twice as many stinkbugs were collected from weedy fields (560 insects) than from weed-free fields (362 insects).

RESUMEN

Plantas hospederas de los pentatómidos de los arrozales de Puerto Rico

Un estudio de plantas hospederas de chinches apestosas se realizó en arrozales comerciales de Puerto Rico. Se identificaron los hospederos alternos de cinco especies de pentatómidos presentes en los arrozales. Diez plantas se identificaron como hospederas alternas. *Oebalus pugnax* (F.) fue el que menos hospederos tuvo, ya que solo se colectó en *Sorghum bicolor* (L.) Moench y *Sorghum halepense* (L.) Pers. Las dos especies de chinches apestosas más abundantes, *Mormidea angustata* Stål y *Oebalus ypsilon-griseus* (De Geer), tuvieron un rango similar de hospederos. En promedio, se coleccionaron casi dos veces más chinches en arrozales infestados con yerbajos (560) que en arrozales sin yerbajos (362).

INTRODUCTION

The importance of alternate hosts in the development of stinkbug populations on rice has been studied by Bowling (1), Ingram (4), Douglas and Ingram (3), Kennard (6), and Pathak (9). In Puerto Rico five stinkbugs species, *Mormidea angustata* Stål, *Mormidea cubrosa* Dallas, *Oebalus grisescens* Sailer, *Oebalus pugnax* (F.), and *Oebalus ypsilon-griseus* (De Geer) have been associated with rice fields. The pest status, alternate hosts and seasonal abundance of these five stinkbug species recovered from Puerto Rico rice fields are still unknown.

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The seasonal occurrence of *O. pugnax* in rice fields has been studied by Douglas (2), Odglen and Warren (8), and Jones and Cherry (5). Injurious stinkbug populations develop on grasses in the field and nearby areas and migrate to rice plants later during the season (3,4,6). As the grain hardens and the crop approaches maturity, the insects move to younger rice fields, or to wild grasses (6). Migration from adjacent habitats is considered an important factor in the development of injurious *O. pugnax* populations in Texas rice fields (1).

Despite the importance of alternate hosts in the development of injurious stinkbug populations on rice fields, little is known about the wild hosts of pentatomids affecting rice in Puerto Rico. Wolcott (11) collected *M. angustata* and *M. cubrosa* from weeds and leguminous plants in the western part of Puerto Rico, but the plant species were not reported. According to Martorell (7) *Crotalaria retusa* L., *Dioscorea sp.* and *Pisum sativum* L. serve as hosts for *M. angustata. Gossypium barbadense* L. is the only alternate host reported for *M. cubrosa* in Puerto Rico (7). The objectives of the research reported here were to identify the alternate hosts of the five stinkbugs consistently collected from Puerto Rico rice fields and assess their abundance in weed-free and weedy fields.

MATERIALS AND METHODS

A host plant survey was conducted at commercial rice fields in Vega Baja. Insects were observed from a distance (1 to 1.5 m) to determine if the plant served as food, shelter, oviposition site or more than one of these alternatives. Observations were made early in the morning (900 h), at (1200 h) noon, and late in the afternoon (1600 h). Plants on which pentatomids were observed were collected and preserved for identification. Collected plants were identified by H. A. Liogier (Plant Taxonomist, Botanical Garden, University of Puerto Rico, Río Piedras, Puerto Rico).

In a separate study, adult pentatomids and nymphs were collected to determine the relative abundance of stinkbugs on clean (no weeds) and weedy fields. All samples were collected at Vega Baja, Puerto Rico, from June to September. A total of 160 samples (10 samples per week; 5 from weedy fields, 5 from clean fields) were collected. Each field was sampled weekly with a standard insect net (38.1 cm diameter). Each sample consisted of 100 sweeps randomly collected. Each horizontal stroke with the net in either direction was considered as one sweep. One sweep was made with each forward step. Sampling began at least 10 m into the field, from the roadside, and was centered between the field levees to avoid possible edge effects (2,5).

RESULTS AND DISCUSSION

Ten plant species were identified as alternate hosts for the five stinkbug species consistently collected from rice fields in Puerto Rico (table 1). Nine belong to Gramineae family and one, *Cyperus iria* L., to the Cyperaceae. The lack of broadleaf weeds in table 1 is the result of propanil applications which selectively control these weeds. It is not known how the insects will behave in the presence of broadleaf alternate hosts because propanil application is a common practice among rice farmers.

All stinkbug species, except *O. pugnax*, were collected or observed feeding on *C. iria*. *Oebalus pugnax*, displayed the narrowest host range and was collected from only two plant species, *Sorghum bicolor* (L.) Moench and *Sorghum halepense* (L.) Pers. Both, *S. bicolor* and *S. halepense* have been reported as alternate hosts of *O. pugnax* (10). It is not known why *O. pugnax* was not collected from the other plant species listed in table 1, although they were readily available during the study period.

The two more abundant stinkbug species, *M. angustata* and *O. ypsilon-griseus*, exhibited a similar preference or host plant range. Both stinkbug species were collected from all plant species except *S. bicolor*. *Digitaria ciliaris* (Retz.) Koeler served as alternate host for *O. ypsilon-griseus*, but not for *M. angustata*. *Oebalus grisescens* was not seen or collected on any of the three *Digitaria* species commonly observed on

TABLE 1.—*Host plants for five pentatomid species affecting rice fields in Puerto Rico, 1986*

Host plant (Family/species)	Insect species[1]				
	M.a.	*M.c.*	*O.y-g.*	*O.p.*	*O.g.*
Cyperacae *Cyperus iria* L.	X[2]	X	X	–	X
Gramineae					
Digitaria bicornis (Lam.) Roem. & Schult	X	–	X	–	–
Digitaria ciliaris (Retz.) Koeler	–	–	X	–	–
Digitaria sanguinalis (L.) Scop.	X	–	X	–	–
Echinochloa colona (L.) Link	X	X	X	–	X
Eriochloa puntacta (L.) Desv.	X	X	X	–	X
Eleusine indica (L.) Gaertn.	X	X	X	–	X
Panicum muticum Forsk.	X	–	X	–	X
Sorghum bicolor (L.) Moench	–	–	–	X	–
Sorghum halepense (L.) Pers.	X	–	X	X	X

[1] *M.a.* = *Mormidea angustata*
M.c. = *Mormidea cubrosa*
O.g. = *Oebalus grisescens*
O.p. = *Oebalus pugnax*
O.y-g. = *Oebalus ypsilon-griseus*

[2] X indicates host plant; – indicates non-host plant.

rice fields; thus, apparently this plant species is not a preferred host for *O. grisescens*.

Mormidea cubrosa exhibited the narrowest host range collected from four plant species: *C. iria*, *Echinocloa colona* (L.) Link, *Eriochloa punctata* L. Desv., and *Eleusine indica* (L.) Gaertn. *Mormidea cubrosa* was observed feeding on *C. iria* and *E. colona* within rice fields, but seldom feeding on rice panicles.

Nearly twice as many stinkbugs were collected from weedy fields (560.2 insects) than from weed-free fields (362.2 insects, table 2). These results are in accordance with previous reports (4,6,10) indicating that injurious stinkbug populations develop on weeds and migrate to rice fields later during the season. These results emphasize the importance of weed control programs in controlling stinkbug populations on rice fields in Puerto Rico.

Oebalus ypsilon-griseus was the most abundant species, and also the only species with almost equal abundance on weedy (295.3 insects per 100 sweeps) and weed-free fields (274.2 insects per 100 sweeps). The data suggest that *O. ypsilon-griseus* may be developing on rice fields and not migrating from nearby weeds. Smith et al. (10) reported the development of four generations of *O. pugnax* in Louisiana rice fields. The first two generations develop on weeds; the last two generations, (called resident generation), originated from migratory *O. pugnax*, but developed on rice.

During the early morning *M. angustata*, *O. ypsilon-griseus* and *O. grisescens* were observed on the lower parts of the plants, near the soil surface in areas of high weed density and thick canopy such as that provided by *Panicum muticum* Forsk. Thick canopy plants provide shelter and protection against predators, heat and desiccation. Later during the day, the insects move to the upper parts of the plants and panicles and could be observed mating and moving from plant to plant. Farmers usually apply insecticides during the early hours of the morning (600-800

TABLE 2.—*Mean number of* Mormidea angustata *Stål*, Mormidea cubrosa *Dallas*, Oebalus grisescens *and* Oebalus ypsilon-griseus *collected on weed-free and weedy rice fields. Vega Baja, Puerto Rico, 1986*

Species	Mean number of insects in[1]	
	Weed-free	Weedy
Mormidea angustata	60.6	120.7
Mormidea cubrosa	2.2	4.0
Oebalus ypsilon-griseus	274.2	295.3
Oebalus grisescens	25.2	140.3
Total	362.2	560.3

[1]Means represent number of insects per 100 sweeps.

h). At this time insects are protected inside the lower parts of the plant and are not fully exposed to the insecticide.

Insects were observed mating at all times during the day (except during the early hours of the morning) and in all host plants. Insecticide applications and scouting during the late evening will be more effective as insects are actively mating and feeding on the panicles.

Oviposition was recorded only for *Oebalus ypsilon-griseus* and *M. angustata*. Preliminary data showed a preference for rice panicles rather than foliage or stems for oviposition. Oviposition was not recorded on any of the weed species on which the insects were observed.

All species displayed a preference for weedy fields as compared to clean rice fields (table 2). Probably the abundance of weeds within the field attracted more *M. angustata* and *O. grisescens*. *Oebalus ypsilon-griseus* ovipositional preference for rice panicles probably accounted for the similar insect population on rice and weeds (table 2).

Information provided here will benefit field survey personnel, since sampling sites and times for stinkbug adults and eggs on rice fields have now been determined. This study provides important and new information on stinkbug alternate host plants. To our knowledge this is the first report of *M. angustata*, *M. cubrosa*, *O. ypsilon-griseus* and *O. grisescens* alternate hosts in Puerto Rico rice fields.

Additional studies are needed to determine the effects of weed control on the development of injurious stinkbug populations and to study the host preference of the five pentatomid species in our study. Research is also needed to study the life cycle and pest status of the local stinkbug populations.

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