Research Note

SPIDERS ASSOCIATED WITH PAPAYA, CARICA PAPAYA *L., IN PUERTO RICO*[1,2]

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Spiders are considered important abundant predators in fruit trees (Dondale et al., 1979; Elizondo, 2002; Riecherdt and Lockley, 1984; Amalin et al., 2001) and annual crops (Durango, 1985; Flores, 1991; Bastidas et al., 1993; 1994a, b, c; Cuevas, 1994; Silva et al., 2003). In spite of representing a large part of the predators present in deciduous crops, little is known about the abundance and species composition of spiders in papaya plantings in the Caribbean region. In Puerto Rico, where papaya is an important crop, most of the entomological work has focused on pest species composition, population dynamics and integrated pest management, but little work has been devoted to biological control of papaya insects (Cruz and Segarra, 1992; Pantoja et al., 2002). Elizondo (2002) and Amalin et al. (2001) reported on spiders' identity and composition in citrus in Costa Rica and Florida, respectively, but little is known about the spider species in less stable tree systems like papaya plantings.

Data on spider species composition, population dynamics, and their contribution in controlling natural pest populations is needed in order to develop integrated pest management (IPM) programs in papaya. The objective of this work was to identify spiders associated with papaya plantings in Puerto Rico and to study their population dynamics.

Sampling was conducted in semicommercial plantings during the 1997 and 1998 papaya growing season at the University of Puerto Rico Agricultural Experiment Stations in Corozal, Lajas, and Isabela. These localities represent the main commercial papaya producing areas of Puerto Rico. The cultivar used in all plantings was Puerto Rico-665, a popular cultivar among local growers. Sampling started 15 days after transplanting papaya in the field and ended when plantings were abandoned or destroyed. Agronomic practices followed the Agricultural Experiment Station recommendations (AES, 1987).

Papaya trees were visited weekly for collecting spiders. Spiders were collected manually or by using a beat net technique (Amalin et al., 2001). Sampling was restricted to 1.2 meters above ground level. Spiders were preserved in 70% alcohol and identified by comparison from specimens at the Museum of Entomology and Biodiversity of the University of Puerto Rico, and with specimens previously identified by Dr. A. Lize (Bastidas et al., 1993).

Nineteen species representing 15 genera and seven families were collected (Table 1) from the three locations. The Araneidae was the most abundant and diverse group, with seven species in six genera, followed by Salticidae, Tetragnathidae and Theridiidae, with

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TABLE 1. *Percentage of spiders collected in papaya orchards at three localities, Lajas, Corozal, and Isabela, in Puerto Rico, 1997-98.*

	Percentage		
Family /Genus/ Species	Isabela	Corozal	Lajas
ARANEIDAE			
Alpaida spp.	0.4	0.2	0.5
Argiope argentata	2.6	0.2	3.6
Argiope trifasciata	0.0	0.0	1.1
Eustala spp.	0.0	1.4	0.0
Gasteracantha cancriformis	0.4	0.2	2.6
Neoscona moreli	0.4	0.1	0.6
unidentified species	0.5	0.2	2.0
MITURGIDAE			
Cheiracanthium inclusum	3.3	1.8	5.5
OXYOPIDAE			
Peucetia sp.	1.0	0.9	1.0
SALTICIDAE			
Avitus longidens	5.0	3.0	0.8
Paraphidippus	0.6	0.0	0.0
unidentified species	0.3	0.3	0.1
TETRAGNATHIDAE			
Leucage sp.	0.4	0.3	0.1
Pleisometa sp.	0.0	0.4	0.0
Tetragnatha sp.	3.5	1.8	1.0
THERIDIIDAE			
Anelosimus sp.	50.0	26.1	51.6
Theridula gonygaster	30.9	55.0	24.0
unidentified species	0.6	7.9	5.5
THOMISIDAE			
Mysumenops pallida	0.1	0.2	0.0

Percentages are by locality.

three species each. The remaining families, Thomisidae, Miturgidae and Oxyopidae, were represented by one genus each.

The highest mean number of spiders was recorded at Corozal with a mean of 10.1 spiders per sample whereas at Isabela the spider population reached 7.1 spiders per sample. The lowest spider density was recorded at Lajas (five spiders per sample). The difference in spider density among localities cannot be explained with current knowledge of spider biology in papaya orchards in Puerto Rico. Prey availability affects spider density and can explain the differences observed among localities (Elizondo, 2002). Aphid density is higher in Corozal than in Isabela (Pantoja et al., 2006). Other factors associated with spider abundance are precipitation (Bastidas et al., 1993; 1994 b, c) and the presence of weeds in the fields (Silva et al., 2003). Weed abun-

dance or precipitation data were not collected in this study. Further research should measure the abundance of weeds and climate effect on spider abundance in papaya orchards.

In Corozal, *Theridula gonygaster* was the most abundant species, representing 55% of specimens captured in that locality (Table 1). *Anelosimus* spp. was the second most abundant species (26.1%). An unidentified species from the Theridiidae represented almost 8% of the total captured from that locality. This unidentified species was collected in all localities.

The species abundance in Isabela was opposite to that in Corozal; in Isabela *Anelosimus* spp. was the most abundant genus (50%) followed by *T. gonygaster* (30.9%). Spider population density in Lajas, where *Anelosimus* spp. (51.6%) and *T. gonygaster* (24.0%) were the predominant species, was similar to that of Isabela.

For all three locations, the highest mean number of spiders was collected during the months of July and August (Figure 1). There was a second population peak in November in Isabela and Lajas. Most spiders were collected between 50 and 100 days after transplanting papayas (Figure 2). In Corozal, spider densities increased throughout the season, with a sharp drop in spider density 67 days after transplanting (between September and October). The factors affecting spider abundance are not clear and cannot be explained with current knowledge on spider density in papaya fields. Since no insecticides were applied at these orchards, we presume population densities are related to prey abundance, other crops available in the area, or climate differences among localities (Pantoja et al., 2006). Citrus orchards were close to the papaya plantings in Corozal, whereas mangos and vegetables were common in Isabela and Lajas, respectively. Spiders are abundant predators in citrus trees (Amalin et al., 2001). Further research should study the contribution of spiders to papaya pest management under field conditions.

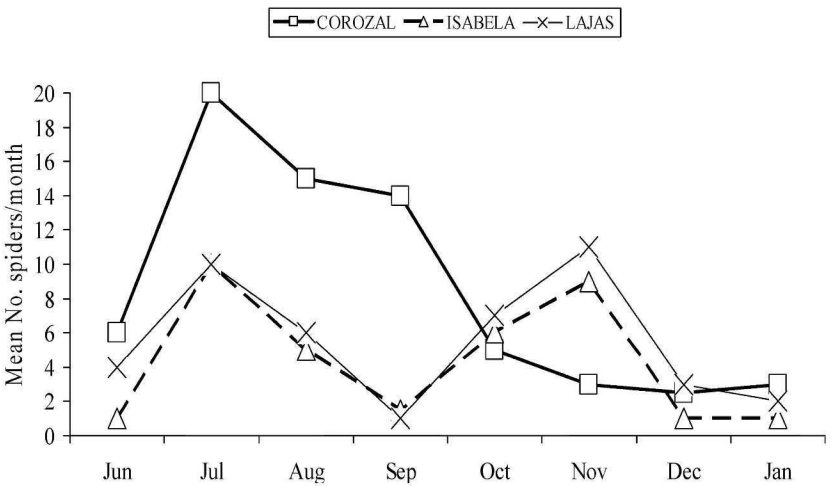

FIGURE 1. Mean number of spiders per month in three localities in Puerto Rico.

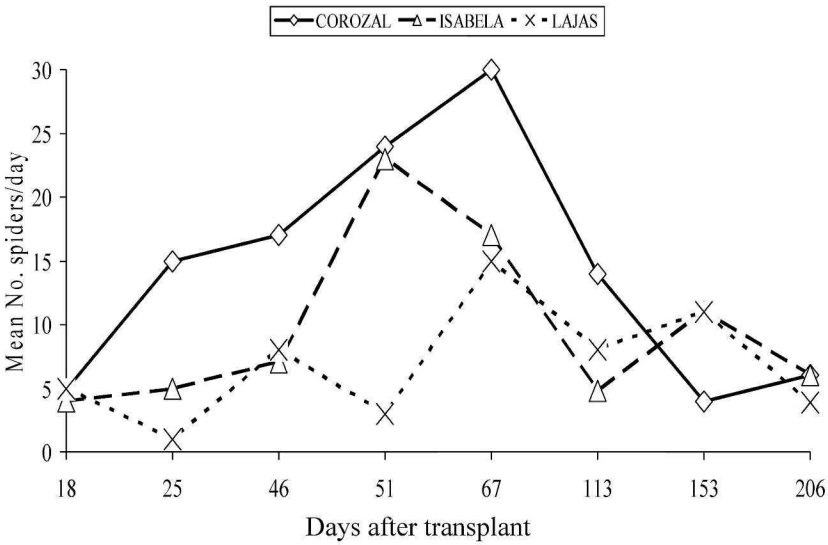

FIGURE 2. Mean number of spiders per day on various days after transplant in three localities of Puerto Rico.

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