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SUITABILITY OF SELECTED PLANTS TO THE BEAN PLATASPID, *MEGACOPTA CRIBRIARIA* (HEMIPTERA: PLATASPIDAE) IN NO-CHOICE TESTS

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Bean plataspid, *Megacopta cribraria* (F.) (Hemiptera: Plataspidae), was first reported in northeastern Georgia in the fall of 2009 (Eger et al. 2010), and since then has spread throughout Georgia and into North Carolina, South Carolina, Alabama, Virginia, Mississippi and Florida (Roberts 2011; Suiter et al. 2010a, 2010b; http://www.kudzubug.org/distribution_map.cfm; Medal et al. 2013). This plant-feeding insect is related to the stink bugs (Pentatomidae). Like other pentatomoids, bean plataspids emit a strong defensive odor when disturbed. In its native Asia, one of the *M. cribraria*'s preferred host is kudzu, *Pueraria montana* Lour (Merr.) variety *lobata* (Willd.) (Fabales: Fabaceae). *Megacopta cribraria* is also an agricultural pest of soybean, *Glycine max* Merrill, and other legume plants and various fruit trees (Li et al. 2001; Wang et al. 2004; Eger et al. 2010). In the infested areas of the U.S.A., *M. cribraria* is commonly found feeding on the invasive kudzu plant (Ruberson et al. 2012; Zhang et al. 2012). Additionally, it was reported feeding on caged fig trees, *Ficus carica* L., in a study in Auburn, Alabama (Hu & Carroll 2012). The host range of *M. cribraria* will probably continue to expand as the insect disperses long distances, mainly by transportation routes into the northeastern and western USA. This new non-native invader may have the potential to cause large crop losses (USDA-APHIS 2010).

Adult *Megacopta cribraria* collected in May of 2012 in Alachua County, Florida, (N: 29.639686° W: -82.399092°) were brought to the laboratory of the Florida Department of Agriculture and Consumer Services, Division of Plant Industry in Gainesville for host-specificity tests with sweet orange (*Citrus sinensis* (L.) Osbeck; Sapindales: Rutaceae) seedlings and 11 legume plant species (Fabaceae) commonly found in Florida (Table 1). Host-specificity studies were conducted in a greenhouse during Jul-Oct 2012. A completely randomized design with 5 replications was used. Treatments consisted of single potted plants (30-40 cm height) in vegetative stage in Plexiglas cages. Three pairs of field-collected *M. cribraria* adults were placed into each cage. Cages were made of clear plastic Plexiglass cylinders (15 cm diam, 50-60 cm height). Mesh screening covered the top and 6 holes each 5 cm diam located in pairs at the bottom, middle, and upper parts of the cylinder to allow for air circulation. Test plants were grown from seeds in 3.8 L pots with a mixture of 2 parts

TABLE 1. NUMBER OF EGG MASSES, EGGS, NYMPHS, AND ADULTS OF *MEGACOPTA CRIBRARIA* REARED ON INDIVIDUAL PLANTS OF SWEET ORANGE AND 11 SPECIES OF LEGUMES AFTER BEING INFESTED WITH 3 PAIRS OF *MEGACOPTA CRIBRARIA* ADULTS FOR 42-56 D IN A NO-CHOICE GREENHOUSE EXPERIMENT.

	No. Egg Masses			No. Eggs			No. Nymphs			No. Adults Developed from Eggs		
Plant Tested	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range	Mean	SD	Range
Kudzu	6 a	1.5	4-8	163 a	29.7	119-191	91 a	12.4	76-107	89 a	10.5	76-102
Soybean	5 a	1.8	3-8	128 a	20.7	108-157	85 a	14.6	65-102	81 a	12.6	64-95
Pigeon pea	5 a	1.8	3-7	133 a	26.4	98-172	76 ab	30.9	47-123	75 ab	28.7	47-117
Black-eye pea	3 a	1.6	1-5	101 ab	71.0	17-178	29 bc	26.2	4-71	27 bc	22.2	4-61
Lima bean	1 b	1.1	0-6	23 c	22.0	0-60	5 cd	6.6	0-27	5 cd	6.6	0-27
Pinto bean	1 b	1.7	0-7	31 bc	43.0	0-101	1 d	1.3	0-4	1 d	1.3	0-4
Peanut	0.8 b	1.1	0-2	10 c	22.8	0-51	0	0	0	0	0	0
Jicama	0.2 b	0.4	0-1	3 c	6.7	0-15	0	0	0	0	0	0
Lentil	0	0	0	0	0	0	0	0	0	0	0	0
Mung bean	0	0	0	0	0	0	0	0	0	0	0	0
Chickpea	0	0	0	0	0	0	0	0	0	0	0	0
Orange	0	0	0	0	0	0	0	0	0	0	0	0

Different letters within a column indicate a significant difference at a $P < 0.05$ using LSD.

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top soil and 1 part sand. Slow-release granular fertilizer (14: 14: 14 / N: P: K) at 4.2 g per pot was soil incorporated when seeds were planted. The plants were maintained indoors in a greenhouse on a 16-hour photoperiod (16:8 h L/D) at 24 °C ± 3, 50-70% RH during 8-10 wk, and were provided with water as needed.

At the end of the experiment, the plants were inspected and the number of eggs, and nymphs on each plant were recorded. Nymphs were held during 1-2 wk on the caged test plants until they reached adult stage to determine number of adults that developed from eggs. Data were subjected to an analysis of variance (ANOVA) (SAS 2002), and sample means were separated using the Least Significant Difference (LSD) procedure when appropriate. Standard deviations (SD) were determined for all parameters. Results indicated a significant effect of host plant ($P < 0.05$, LSD test) on the resulting numbers of eggs, nymphs and adults of *M. cribraria* (Table 1). The best development of *M. cribraria* was obtained on kudzu, soybean and pigeon pea, *Cajanus cajan* (L.) Millsp.; (Fabales; Fabaceae). These values differed significantly different ($P = 0.05$) from the development obtained on pinto bean, *Phaseolus vulgaris* L.; lima bean, *Phaseolus lunatus* (L.) and black-eye pea, *Vigna sinensis* L. (Table 1). In this greenhouse study, the number of eggs laid by *M. cribraria* on kudzu (natural host) and soybean did not differ significantly, contrary to the field host range experiment with 12 legume species conducted by Zhang et al. (2012) in which *M. cribraria* preferentially oviposited on kudzu over soybean.

Although it has been suggested that *M. cribraria* could be utilized as a biological control agent of the invasive kudzu, it seems to be causing less damage than the severe visually estimated defoliation (40-60%) made by several immature Lepidopterans including the velvet bean caterpillar, *Anticarsia gemmatalis* (Hübner); soybean looper, *Pseudoplusia includens* (Walker); and fall armyworm, *Spodoptera frugiperda* (J. E. Smith) during summer and fall to this invasive plant in Alachua County, Florida (Medal el al. unpublished data). However, Zhang et al. (2012) in a field experiment conducted near Athens, Georgia found that *M. cribraria* reduced by almost 33% the total biomass of kudzu plants in unsprayed plots compared to plants protected by insecticide applications, indicating that this sucking insect can impact significantly kudzu growth when it is present at high population levels. Kudzu is a perennial vine that is able to reproduce rapidly during the growing season, mainly by vegetative propagation via stolons and rhizomes; thus making it very difficult to control. Soybean crop losses attributed to *M. cribraria* that average 20 to 47% have been reported in South Carolina and Georgia, respectively (Woldvogel & Alder 2012; http://www.kudzubug.org/docs/GA_1-2012_SBGrow.pdf)).

We found that *M. cribraria* did not lay eggs nor did nymphs develop on sweet orange (*Citrus* × *sinensis* (L.) Osbeck), peanut (*Arachis hypogaea* L.), chickpea (*Cicer arietinum* (L.)), lentil (*Lens culinaris* Medikus), mungbean (*Vigna radiata* (L.) Wilczek) and jicama (*Pachyrhizus erosus* (L.) Urb). Jicama has been reported to have toxic foliage and seeds, which are utilized to produce the insecticide rotenone (Narongchai et al. 2005).

These preliminary confined host-suitability tests provide evidence that some economically important agricultural crops are not included in the host-range of this newly introduced plant pest. Further host-specificity tests under field conditions using cultivated crops in addition to native/forage legume plants will be conducted to determine the potential host range of this new invader in the southeastern USA. Further experiments are needed to acquire a more accurate assessment of the potential damage of *M. cribraria* to Florida crops and wild plants.

Summary

Bean plataspid adults, *Megacopta cribraria* (F.) (Hemiptera: Plataspidae) were exposed over a 4-5 week period to 12 potted plant species in a greenhouse. Egg masses were deposited and nymphs completed development to the adult stage on kudzu, soybean, pigeon pea, black-eye pea, lima bean, and pinto bean. However, sweet orange, peanut, chickpea, lentil, mungbean and jicama were not utilized by *M. cribraria* as reproductive hosts. Implications and potential damage to Florida commercial sweet orange and legume crops are reviewed.

Key Words: Kudzu bug, Florida, plant host range, invasive pest

Resumen

Adultos del insecto conocido como 'Bean plataspid', *Megacopta cribraria* (F.) (Hemiptera: Plataspidae) fueron expuestos durante un período de 4-5 semanas a 12 especies de plantas creciendo en macetas en un invernadero. Las masas de huevos fueron depositadas y las ninfas completaron su desarrollo a estado adulto en kudzu, soya, gandul, frijol de vaca, frijol lima, y frijol común. Sin embargo, las plantas de naranja dulce, maní, garbanzo, lentejas, frijol mungo y jícama no fueron utilizadas como hospederos reproductivos por *M. cribraria*. Las implicaciones y daños potenciales a cultivos comerciales de naranja dulce y leguminosas en la Florida son revisadas.

Palabras Clave: Chinche del kudzu, Florida, rango de plantas hospederas, plaga invasora

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