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Physalis angulata L. (Solanaceae): a potential host-plant of stink bugs *Edessa meditabunda* F. (Hemiptera, Pentatomidae)

***Diones Krinski*[1,2]**

[1]Programa de Pós-graduação em Zoologia, Departamento de Zoologia, Universidade Federal do Paraná – UFPR, CP 19020, Jardim das Américas, CEP 81531-980, Curitiba, PR, Brazil
[2]Corresponding author: Diones Krinski, diones.krinski@ufpr.br

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Abstract: *Physalis angulata* is native to South America. In Brazil is popularly known as camapú, balãozinho, juá-de-capote, bucho-de-rã, camambu, mata-fome, bate-testa and balão-rajado. Even being a species with wide ecological adaptation the studies on pest insects associated with these plants are incipient. Thus, this study reports for the first time the occurrence of stink bugs *Edessa meditabunda* on plants *P. angulata* in the Amazon region.
Keywords: *insect-pest, plant-reservoir, stink bug wing-black, Neotropical region.*

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Resumo: *Physalis angulata* é nativa da América do Sul. No Brasil é popularmente conhecida como camapú, balãozinho, juá-de-capote, bucho-de-rã, camambu, mata-fome, bate-testa e balão-rajado. Mesmo sendo uma espécie com ampla adaptação ecológica, os estudos sobre a presença de possíveis insetos pragas associados a estas plantas são incipientes. Desta forma, este trabalho relata pela primeira vez a ocorrência de percevejos *Edessa meditabunda* em plantas de *P. angulata* na região amazônica.
Palavras-chave: *inseto-praga, planta reservatório, percevejo asa-preta, região Neotropical.*

Introduction

The genus *Physalis* L. (Solanaceae) is originating from the Andes, with tropical cosmopolitan distribution, occurring from southern North America to South America, with centers of diversity in Mexico, United States and Central America (Fischer & Martínez 1999, Silva & Agra 2005). For Brazil, are recognized 11 species of *Physalis* (D'Arcy et al. 2005), with distribution in the various regions of the country, especially in the Amazon and the Northeast, where are found six species. The majority of species is wild, but some species are cultivated in countries such as Colombia, Mexico, China, Japan and recently in Brazil. These countries has as main consumer market the European countries, mainly of fresh fruits, because its fruits are used as food and also in pharmaceutical industry (Thomé & Osaki 2010, Lorenzi and Matos 2002, Florez et al. 2000).

Physalis angulata (Linnaeus 1753) is native to South America and in Brazil is popularly known as camapú, balãozinho, juá-de-capote, bucho-de-rã, camambu, mata-fome, bate-testa and balão-rajado (Muniz et al. 2011) . Even being a species with wide ecological adaptation, information about their cultivation still is scarce (Muniz et al. 2011, Guimarães et al. 2010, Lima et al. 2006, Briguenti & Madeira 2007). This characteristic is contrasting, mainly because *P. angulata* is a species widely used in popular medicine as anti-coagulant, anti-leukemic, anti-mutagenic, anti-inflammatory, anti-spasmodic, antiseptic, analgesic and treatment of diabetes, among others (Lin et al. 1992, Chiang et al. 1992) thus, was expected that more information about their cultivation were available.

Still, Lopes et al. (2006) report that researchs with several species of genus *Physalis* has increased considerably, reflecting its importance to the basic sciences such as Botany, Chemistry, Pharmacology, Toxicology and Genetics. However, studies on inscect pests associated with these plants are incipient (Maia et al. 2009). Therefore, knowledge and identification of species that may cause damage the culture of the cutleaf groundcherry are important to define efficient methods of control, since plants of *P. angulata* may be acting as a refuge for insects pest during the off-season. Thus, this study reports for the first time the occurrence of stink bugs *Edessa meditabunda* (Fabricius) (Hemiptera, Pentatomidae) in *P. angulata* plants in the Amazon region.

Material and Methods

Sampling of stink bugs *E. meditabunda* was conducted manually in plants of the cutleaf groundcherry (*P. angulata*) between January and March 2012, on the farm Florentino, municipality of Novo Progresso, Pará State (7° 7' 45.59" S and 55° 23' 20.99" W). Samples of stink bugs were made in plants located on the edges of rice and soybeans crops. To obtain the data, weekly ten plants were randomly selected, in which it was collected and recorded the quantities and sites of adults, nymphs, and egg masses of *E. meditabunda*.

Results and Discussion

A total of 848 adults, 325 nymphs and 41 egg masses (6 postures parasitized by microhymenopteran) of *E. meditabunda* was collected (Figure 1). It was observed that nymphs are associated with branches of *P. angulata*, while adults were observed on branches and fruits, and egg masses only in leaves, furthermore, the fluctuation of different developmental stages during sampling followed the same pattern (Figure 2). The mean values and standard error of adults, nymphs and egg masses found in each week's collection are presented in Table 1.

Although the cultivation of cutleaf groundcherry to be a newness in Brazil, there are reports of insects that cause damage to some species of *Physalis*, being that most of pest belonging to the order Hemiptera and Lepidoptera. However, the presence of *E. meditabunda* in *Physalis* plants only been recorded in Argentina for *Physalis peruviana* (Linnaeus 1763) (Bado et al. 2005). Other stink bugs are reported for *P. peruviana*, as *Edessa rufomarginata* (De Geer, 1773), *Euschistus heros* Fabricius 1974, *Dichelops furcatus* Fabricius 1775, *Prepos* sp., *Orius* sp., *Dicyphus curcubitaeus* (Spinola, 1852), *Phithia picta* (Drury, 1770), and *Arvelius albopunctactus* (De Geer, 1773), being that the last three were also recorded for *Physalis ixocarpa* Brot. ex Hornem., 1819 (Bado et al. 2005, Rufato et al. 2008, Silva et al. 2009).

According to Silva et al. (2009) the stink bugs *E. rufomarginata* and *P. picta* showed higher frequency of damage to crops *P. peruviana* in various regions of Rio Grande do Sul State, Brazil. The damage caused by *E. rufomarginata* occur due to sucking of sap made in the branches, causing yellowing and sometimes the thickening the stem, and necrosis of leaf tissue. In South America, some species of stink bugs feed on several plants important for the economy (Panizzi et al. 2000) and *E. meditabunda* is one of these pests, being recorded in various plants, including squash, chicory, lettuce, cotton, rice, potato, eggplant, beet, boldo, camapú (cape-gooseberry); chayote, citrus, pea, tobacco, sunflower, cassava, melon, pepper, chili , soybean, rattlepod and tomato (Costa & Link 1974, Buzzi & Miyazaki 1999, Lima & Racca-Filho 1996, Lourenção et al. 1999, Panizzi 2002, Bado et al. 2005, Gonçalves et al. 2008, Golin et al. 2011, Krinski et al. 2012, Krinski & Pelissari 2012, Krinski 2013), generally with reports of economic damage.

Considering, as reported by Lopes et al. (1974), the importance of knowledge of the host plants of a particular group of insects for studies of bio-ecology, population dynamics and predicting the appearance of new pests, and especially for its applicability in agriculture in general, data that report the occurrence stink bug *E. meditabunda* in plants of *P. angulata* are really relevant because this information

Figure 1. *Edessa meditabunda* in plants of *Physalis angulata*, Novo Progresso, Pará State, Brazil, January-March 2012. (A) egg shells surrounded by nymphs of first instars, (B) egg masses parasitized and one parasitoid (C) Adult on the cutleaf groundcherry fruit.

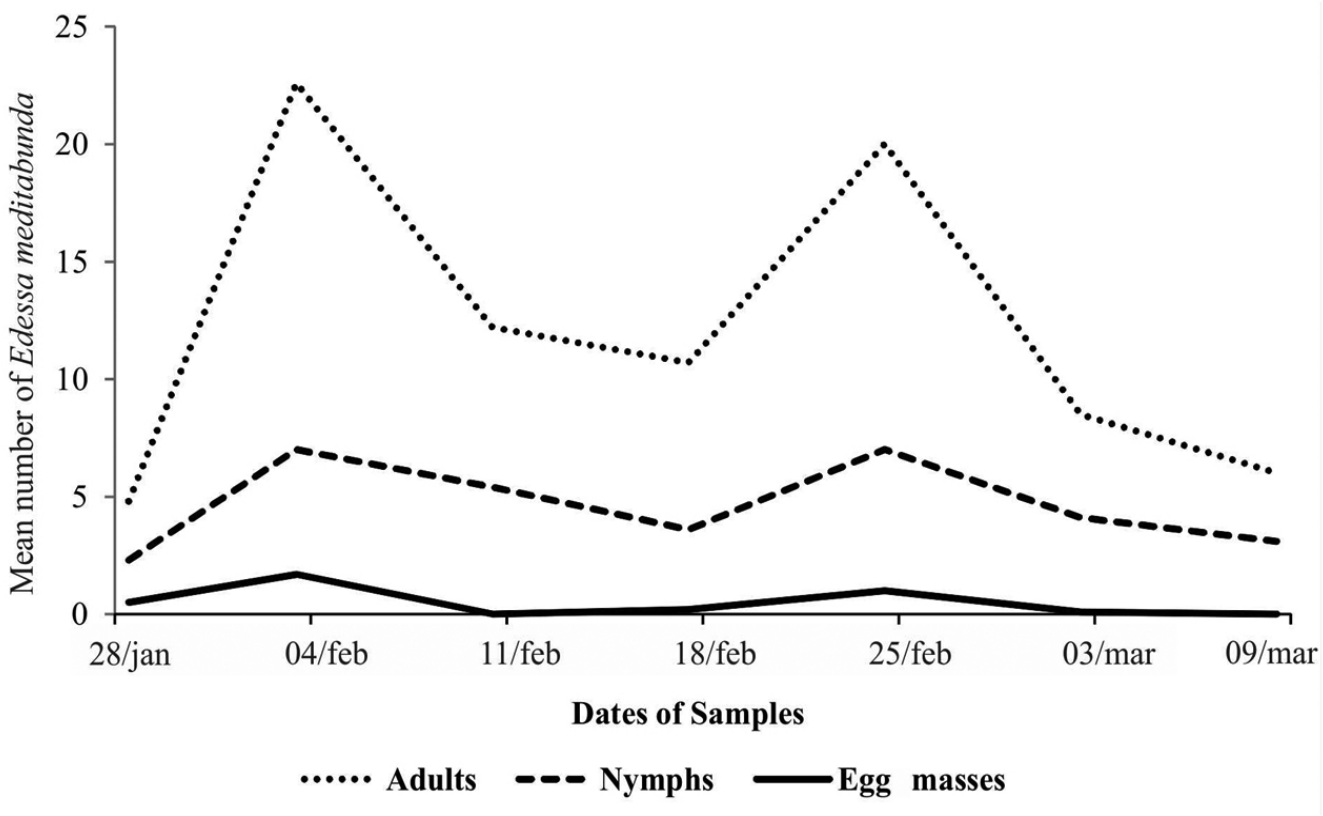

Figure 2. Fluctuation of adults, nymphs and egg masses of *Edessa meditabunda* found in *Physalis angulata* during the sampling period in Novo Progresso, Pará State, Brazil, January-March 2012.

Table 1. Total number and mean of adults, nymphs and egg masses of stink bugs *Edessa meditabunda* collected in *Physalis angulata*, Novo Progresso, Pará State, Brazil, January-March 2012.

Stages	Dates of samplings of stink bugs						
	28/jan/12	03/feb/12	10/feb/12	17/feb/12	24/feb/12	02/mar/12	09/mar/12
	mean ± SE[1] (total)	mean ± SE (total)	mean ± SE (total)	mean ± SE (total)	mean ± SE (total)	mean ± SE (total)	mean ± SE (total)
Adults	4.8 ± 0.44 (48)	22.6 ± 5.47 (226)	12.2 ± 1.97 (122)	10.7 ± 1.25 (107)	20.00 ± 5.18 (200)	8.50 ± 1.76 (85)	6.00 ± 2.61 (60)
Nymphs	2.30 ± 0.79 (23)	7.00 ± 1.65 (70)	5.40 ± 1.27 (54)	3.6 ± 0.58 (36)	7.00 ± 0.98 (70)	4.10 ± 1.39 (41)	3.10 ± 0.64 (31)
Egg masses	0.50 ± 0.27 (7)	1.7 ± 0.86 (17)	0.00 ± 0.00 (0)	0.20 ± 0.13 (1)	1.00 ± 0.45 (13)	0.10 ± 0.10 (2)	0.00 ± 0.00 (0)

[1]standard error (SE).

can be used by producers who cultivate this species. The results of this paper are also important for farmers who grow other crops of agronomic interest, since *P. angulata* is presented as a host plant of stink bug *E. meditabunda* and can provide shelter for these insects during the off-season of various crops of economic interest.

Furthermore, because is common to find *P. angulata* in almost all Brazilian territory, often associated with crops, fruit orchards, gardens and vegetable gardens, this species has been considered as weed (Pittelkow et al. 2009). Then, due this characteristic of invasive plant, the knowledge of insects that occur in cutleaf groundcherry, such as *E. meditabunda* for example, may assist in pest management strategies, since *P. angulata* may be acting as a plant-reservoir of insects pests, especially when is considered plant cycle , which can pass the nine months (Lorenzi 2000, Braga 1976, Cruz et al. 2009, Freitas et al. 2002).

So, this record of *E. meditabunda* indicates that plants of *P. angulata* may represent an important site for breeding and feeding these stink bugs. Therefore, we suggest that additional studies on the biology, ecology and morphology of immature of *E. meditabunda* be realized in cutleaf groundcherry.

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