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NEW RECORD OF GRASSHOPPER (ORTHOPTERA: ACRIDIDAE & ROMALEIDAE) DEFOLIATORS AND POPULATION DYNAMICS OF INSECTS ON CROPS OF *HELICONIA* SPP. IN THE AMAZON

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Consumption of ornamental plants and flowers is increasing in developed and developing countries (Landgraf & Paiva 2009). *Heliconia* spp. (Zingiberales: Heliconeaceae), native to Central and South America and some South Pacific islands, are currently grown in nearly all tropical regions worldwide, including Africa and Asia, mainly for their ornamental value (Sultana & Hassan 2008).

Grasshoppers (Orthoptera: Acrididae and Romaleidae) inflict serious damage to plants throughout their development (Franc & Luong-Skovmand 2009). These harmful species are polyphagous and feed voraciously on leaves of several agricultural important crops (coconut, açaí tree, cotton, sugarcane, pastures, etc.) and forests (*Eucalyptus* spp.) (Zanetti et al. 2003), and especially on *Heliconia* spp. species (Watanabe 2007).

Despite the great importance and diversity of insects associated with tropical floriculture in the State of Pará, Brazil, the entomofauna associated with tropical flowers cultivation, particularly in the Brazilian Amazon, are little known. The objective of this research was to quantify the main groups of insects (orders) some of whose species defoliate *Heliconia*, and to characterize defoliator grasshoppers capable of damaging *Heliconia* crops in the northeast of Pará, Brazil.

The research was performed from Aug 2004 to Mar 2005 in 3 cities, i.e., Castanhal, Benevides and Belém, of northeastern Pará, the main producing region of tropical flowers in Pará state. Different insects species were collected with entomological nets while they were feeding on leaves of heliconia, particularly, *Heliconia bihai* (L.) L. cultivar 'Lobster Claw'; *H. wagneriana* Peterson; *H. psittacorum* × *H. spathocircinata* cultivar 'Golden torch' and *H. rostrata* Ruiz & Pavon.

The immature and adult insects were captured in the field in biweekly visits to the cultivation areas. Captured insects were placed in 250 or 500 mL plastic pots and transferred to the Embrapa Amazônia Oriental Entomology Laboratory for identification. Young insects (nymphs and larvae), especially, grasshoppers taken to the laboratory were kept in screened cages with abundant food

until the adults had emerged. Adults collected in field and/or that had emerged in the laboratory were killed and stored in entomological boxes or in flasks with 70% ethyl alcohol, and kept in the Embrapa Amazônia Oriental Entomology Laboratory. Adults of grasshoppers obtained in the laboratory were killed, mounted and identified by taxonomist Dr. Marcos Gonçalves Lhano (Universidade de Montevidéu, Uruguay).

The main groups (orders) of insect pests were recorded in cultivated areas of *Heliconia* spp. in the municipalities Castanhal (Fig. 1A), Benevides (Fig. 1B) and Belém (Fig. 1C), Pará State, Brazil. In these municipalities, the most abundant individuals were representatives of the Thysanoptera (Castanhal), Coleoptera (Benevides) and Hemiptera (Belém) (Fig. 1). Overall, populations of these groups were significantly reduced between Aug and Dec 2004. Because then, the intensification of rains in Dec can be the key factor to cause a resurgence in numbers of individuals collected until Mar of the following year (Fig. 1).

Population decline between Aug and Dec 2004 was also observed in number of individuals of the Orthoptera, whose main representatives were members of the Acrididae (*Cornops frenatum frenatum* (Marshall), and *Eutropidacris cristata* L.) and Romaleidae (*Chromacris speciosa* Thunberg and *Prionolopha serrata* L.). After Dec, there was a gradual increase in the number of these individuals until the end of the trials in Mar 2005 (Fig. 1). Insects belonging to this family are important and should be closely monitored because they have high potential to cause defoliation in different crops (Yu et al. 2011).

These municipalities have soil and climatic conditions favorable to the development of floriculture, generally hot and humid, annual rainfall ranging from 1,600 to 1,800 mm, relative humidity from 70 to 95% and the average annual temperature is 24.1 °C (Castro 1995). However, these climatic conditions also favor the occurrence of insect pests (Reitz 2009). Reports on the occurrence of these insect pests in tropical flowers are scarce in the literature (Assis et al. 2002).

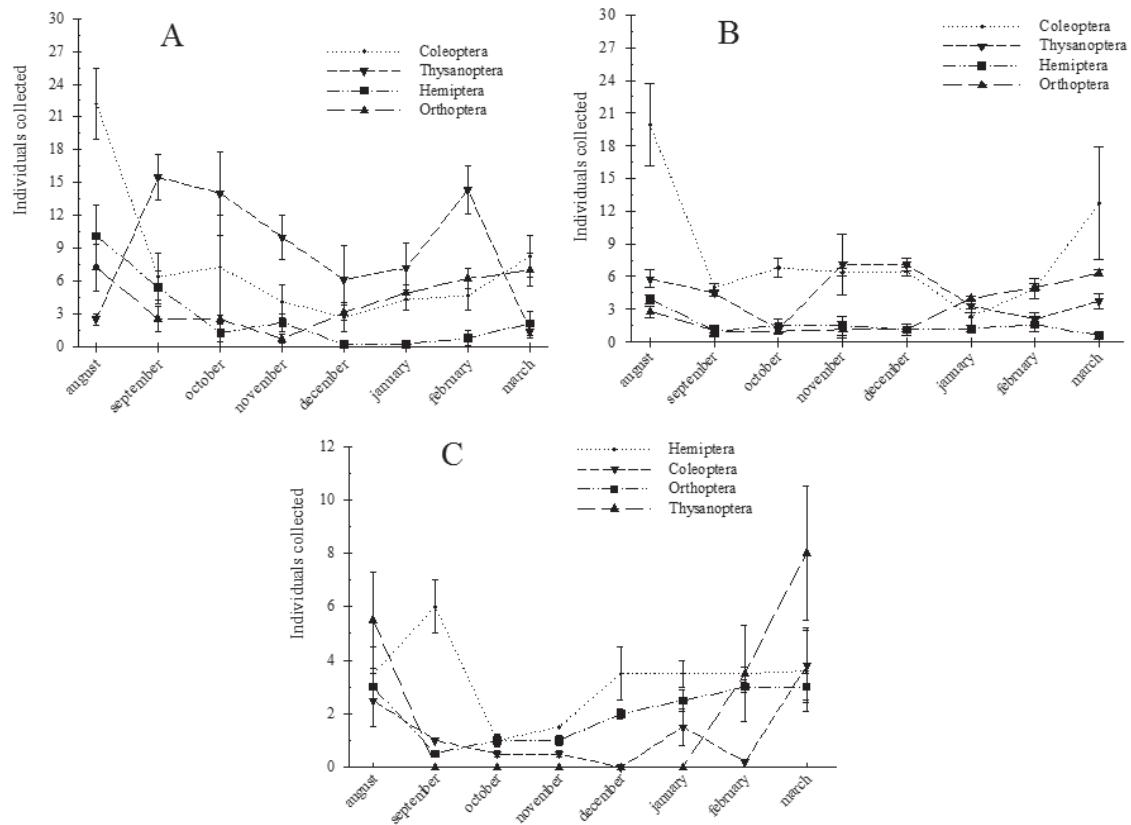


Fig. 1. Number of individuals of insects (Coleoptera, Hemiptera, Orthoptera and Thysanoptera) collected in cultivated *Heliconia* spp., from Aug 2004 to Mar 2005 in the Brazilian municipalities, Benevides (A), Castanhal (B) and Belém (C), Pará state, Brazil.

The species of defoliator grasshoppers were identified as *C. frenatum frenatum*, *E. cristata* L. (Orthoptera: Acrididae), *P. serrata* and *C. speciosa* (Orthoptera: Romaleidae) capable of causing damages to flower crops in the State of Pará, Brazil.

Species of the genus *Cornops* (Orthoptera: Acrididae: Leptysminae) can be found in different habitats, particularly aquatic. There are no reports that individuals from this genus are harmful agroforestry crops of economic importance, however, *Cornops aquaticum* (Bruner) (Orthoptera: Acrididae, Leptysminae) is reported as a beneficial insect with potential to be used in the biological control of plants, such as *Eichhornia crassipes* (Mart.), *E. azurea* (Swartz) Kunth and other Pontederiaceae that are noxious weeds in aquatic environments (natural or artificial) (Junk 1997; Hill & Cilliers 1999). The subfamily Leptysminae is distributed from the southern Nearctic Region (with the genus *Leptysma* Stål) down to central Argentina and Uruguay (Neotropical region), and *Cornops* spp. from southern Mexico to central Argentina and Uruguay and are usually associated to macrophytes (Adis et al. 2007). *Cornops frenatum frenatum*

is considered the main entomological problem in *Heliconia* spp. crops in the State of Pará, because it is the most frequent and numerous species and their adults and nymphs have great defoliation and scraping potential of the husk leaf of these plants (Fig. 2A). This injury causes darkening of the consumed area, inflicting great damages, and negatively reflecting in the final production and in the flowers quality produced for commercialization (Begna & Fielding 2003).

In Brazil, individuals of the genus *Eutropidacris* (Fig. 2B) are found in various environments, such as the Amazon Forest, Atlantic Forest, Cerrado and Caatinga. Damaged species as *Caesalpinia ferrea* Mart. (Fabaceae: Caesalpinioidae), *Cocos nucifera* L. (Arecaceae: Arecaceae), *Copernica cerifera* Mart. (Arecaceae), *Ricinus communis* L. (Malpighiales: Euphorbiaceae), *Mangifera indica* L. (Sapindales: Anacardiaceae), *Quassia amara* L. (Sapindales: Simarubaceae), *Carica papaya* L. (Brassicaceae: Caricaceae), *Persea americana* Mill. (Laurales: Lauraceae), pasture, ornamental plants and plantations of *Eucalyptus urophylla* (Myrtales: Myrtaceae) in Minas Gerais State (Zanetti et al. 2003).

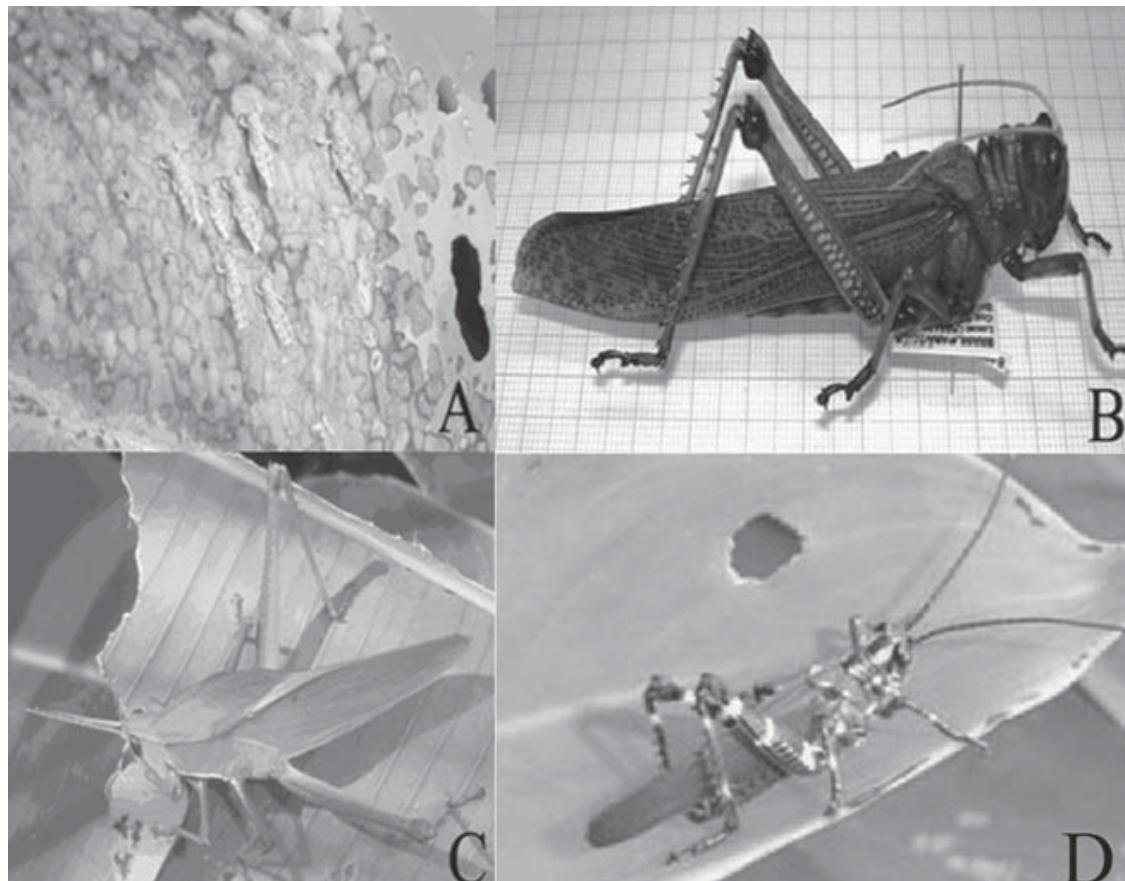


Fig. 2. Grasshoppers and their damage to heliconia. A. Immatures of *Cornops frenatum frenatum* and their damage; B. Adult of *Eutropidacris cristata*; C. Damage of *Prionolopha serrata* on *Heliconia* spp. leaves, and D. Adult of *Chromacris speciosa* on *Heliconia* spp. leaf.

The soldier grasshoppers, *P. serrata* (Fig. 2C) and *C. speciosa* (Fig. 2D), are Neotropical species found from Argentina to Mexico, and they attack plants from different families, including Fabaceae, Solanaceae, Myrtaceae, Poaceae, and Gramineae. Individuals of these species were observed feeding on leaves of the mesquite bean (*Prosopis juliflora* (Sw.) DC., Fabaceae), pigeon pea (*Cajanus cajan* (L.) Millsp., Fabaceae), eggplant (*Solanum melongena* L., Solanaceae), jureuba (*Solanum paniculatum* L., Solanaceae), tomato (*Solanum lycopersicum* L., Solanaceae), *Eucalyptus* sp. (Myrtaceae), sugarcane (*Saccharum officinarum* L., Poaceae) in and on rice (*Oryza* spp., Poaceae) in Peru, causing significant damage to crops in Brazil (Roberts & Carbonell 1982; Vasconcellos 2005; Cisneiros et al. 2012).

Individuals of Coleoptera, Thysanoptera, Hemiptera and Orthoptera were very frequent and grasshoppers of the 4 species (*C. frenatum*, *E. cristata*, *P. serrata* and *C. speciosa*)

were identified in *Heliconia* spp. crops in the Northeast of Pará in the Brazilian Amazon.

ABSTRACT

Despite the expansion of floriculture, little is known about insects associated to this crop in northern Brazil. The objective was to identify the main species of defoliator grasshoppers, associated to crops of *Heliconia* spp. in the northeastern region of State of Pará, Brazil, in the municipalities of Castanhal, Belém and Benevides, from Aug 2004 to Mar 2005. Representatives with higher abundances in these municipalities were the orders Coleoptera, Thysanoptera, Hemiptera and Orthoptera. The collected species of Orthoptera were *Cornops frenatum frenatum* (Marshall) and *Eutropidacris cristata* L. (Orthoptera: Acrididae), *Prionolopha serrata* L. and *Chromacris speciosa* Thunberg (Orthoptera: Romaleidae), which present a substantial potential to damage heliconias crop in northeastern Pará, Brazil.

Key Words: Acrididae, floriculture, population, fluctuation, herbivores, Romaleidae, Pará State

RESUMO

Apesar da expansão da floricultura, pouco se sabe sobre insetos associados à cultura no norte do Brasil. O objetivo foi identificar as principais espécies de gafanhotos desfolhadores, associados a cultivos de *Heliconia* spp. na região Nordeste do Estado do Pará, Brazil, nas cidades de Castanhal, Belém e Benevides de agosto de 2004 a março de 2005. Os representantes com maior abundância desses municípios foram dos herbívoros da ordem Coleoptera, Thysanoptera, Hemiptera e Orthoptera. Os invíduos coletados de Orthoptera foram *Cornops frenatum frenatum* (Marshall) e *Eutropidacris cristata* L. (Orthoptera: Acrididae), *Prionolopha serrata* L. e *Chromacris speciosa* Thunberg (Orthoptera: Romaleidae), que apresentam potencial de danos ao cultivo de culturas de helicônias no Nordeste do Estado do Pará, Brazil.

Palavras Chave: Acrididae, Estado do Pará, floricultura, herbívoros, flutuação populacional, Romaleidae

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