



True bug *Stenomacra marginella* (Hemiptera: Largidae) associated with Mexican sunflower *Tithonia diversifolia* (Asterales: Asteraceae) in Cerro Punta, Chiriquí, Panama

Chinche *Stenomacra marginella* (Hemiptera: Largidae) asociado con el girasol mexicano *Tithonia diversifolia* (Asterales: Asteraceae) en Cerro Punta, Chiriquí, Panamá

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Abstract

Objectives: To identify both the Asteraceae species found in Cerro Punta, as well as the species of the bug associated with it and to determine if it is a pest insect. **Methodology:** Photographs of leaves and flowers of the plant were taken and three specialists in botany were consulted for the corresponding identification. Additionally, a total of 39 specimens of the bug were collected, which were reviewed in the laboratory, consulting specialized literature and the genitalia of the male was dissected to confirm the adequate identification of the species. **Results:** The Asteraceae species found in Cerro Punta is *Tithonia diversifolia* and the bug corresponds to *Stenomacra marginella* (Herrich-schaeffer, 1850) (Hemiptera: Largidae). This insect has been referred to as omnivore; therefore, it cannot be considered as a pest species; although it could contribute to the balance of the agroecosystem, by serving as an alternative food for predators and parasitoids, in addition to potentially serving as a pest predator. **Conclusions:** The wild Asteraceae species found in Cerro Punta, Chiriquí, Panama, corresponds to *Tithonia diversifolia*. The predominant insect observed on this plant was *Stenomacra marginella*; which can be considered as a stabilizer of the agroecosystem.

Keywords: Asteraceae, biodiversity, forage, Hemiptera, taxonomy

Resumen

Objetivos: Identificar tanto la especie de Asterácea encontrada en Cerro Punta, como la especie del chinche asociado a la misma y determinar si se trata de un insecto plaga. **Metodología:** Se tomaron fotografías de hojas y flores de la planta y se consultó con tres especialistas en Botánica para la identificación correspondiente. Adicionalmente, se colectó un total de 39 especímenes del chinche, los cuales fueron revisados en el laboratorio, consultándose literatura especializada y se disectó la genitalia del macho para poder confirmar la adecuada identificación de la especie. **Resultados:** La especie de asterácea encontrada en Cerro Punta es *Tithonia diversifolia* y el chinche corresponde a *Stenomacra marginella* (Herrich-schaeffer, 1850) (Hemiptera: Largidae). Este insecto ha sido referido como omnívoro, por lo que, no se le puede considerar una especie plaga; aunque podría contribuir con el equilibrio del agroecosistema, al servir como alimento alternativo para depredadores y parasitoides, además de potencialmente servir como depredador de plagas. **Conclusión:** La especie silvestre de Asteraceae encontrada en Cerro Punta, Chiriquí, Panamá, corresponde a *Tithonia diversifolia*. El insecto predominante observado en esta planta fue *Stenomacra marginella*; que se puede considerar como un estabilizador del agroecosistema.

Palabras clave: Asteraceae, biodiversidad, forraje, Hemiptera, taxonomía

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Introduction

The family Asteraceae (Asterales), is an American taxon, diverse in species and benefits to people. According to Del Vitto & Petenatti (2015), this family includes species of industrial, ecological and environmental importance; highlighting as animal fodder the tree marigold or Mexican sunflower (*Tithonia diversifolia* (Hemsl.) A. Gray), due to its high protein content.

Pérez et al. (2009), indicated that *T. diversifolia* is used in grazing or as forage for ruminants and monogastrics; in addition, it can be offered processed as flour or feed and can be stored for long periods. All of this makes it an excellent option in periods of lack of food, especially in tropical countries with scarce inputs and resources.

On the other hand, Asteraceae like the sunflower (*Helianthus annuus* L.), have a diversity of insect species associated with it. In Argentina, bugs (Hemiptera) are important pests during the period of fruiting and grain filling; as *Nezara viridula* L., 1758 and *Edessa meditabunda* (Fabricius, 1794) (Pentatomidae);

Athaumastus haematicus (Stål, 1860) (Coreidae); and *Polymerus ocellatus* (Signoret 1864) (Miridae) (Casuso, 2017).

In Cerro Punta, the main vegetable producing area in Panama, there are wild Asteraceae close to crops. The predominance of a species of bug was observed, forming mating groups in an Asteraceae close to potato crops. Therefore, the objective of this study was to identify the species of Asteraceae, as well as that of the predominant bug in it and to determine if it is a pest.

Methods

Field phase

The study area corresponded to Cerro Punta, Tierras Altas District, Chiriquí, Panama (8°51'20,06" N 82°34'24,21" W, 1926 m asl) (Figure 1). This research was exploratory, carried out between April and November 2021. A photographic record of the habit, leaves and flowers of the plant was collected and sent to three botanists to confirm the identification of the species. Also, insects were manually collected from plants and preserved in ethanol 70%.

Figure 1

Study area location (yellow)



From: Google Earth (2021).

Laboratory phase

To identify the insect species, 39 adult specimens were analyzed at the laboratory of Cerro Punta Agricultural Research Station-Agricultural Innovation Institute of Panama. Then, the male genitalia were dissected and the works of Moreno-García & Cordero (2008) and Báez-Santacruz et al. (2013), were consulted to confirm the species.

Results and discussion

According to the results, the species of wild Asteracea found in Cerro Punta was *Tithonia diversifolia* (Figure 2) and the bug corresponds to *Stenomacra marginella* (Herrich-Schaeffer, 1850) (Hemiptera: Largidae) (Figure 3).

The characters that facilitated the identification of the plant species are: habit and the shape of the leaves. The latter was decisive to distinguish it from other Asteraceae present in Chiriqui. In the case of the bug, the characters that helped to confirm the species were the color and the claspers; according to the works of Moreno-García & Cordero (2008) and Báez-Santacruz et al. (2013).

Although *Tithonia diversifolia* was found in the wild in the study area, this species is

cultivated as a forage alternative for cattle in Panama and has been the subject of multiple studies. Santamaría-Lezcano et al. (2016), evaluated the performance and forage quality of *T. diversifolia*, under different cutting frequencies in Santa Marta, Bugaba – Chiriqui, Panama; finding that increasing cutting frequency improves dry matter yield. On the other hand, Polo & Medina (2021), carried out a similar research in Tocumen, Panama; determining that the increase of dry matter was very marked in the cutting frequencies at 12 and 16 weeks, but the nutritional content of the dry matter was affected.

Knowing more about living fences and wild vegetation is of vital importance, since these parts of the agroecosystem can serve as a refuge for beneficial arthropods; as is the case of *Acacia horrida* (L.) in the Peruvian coast (Collantes et al., 2016) and *Salvia rosmarinus* in Cerro Punta (Collantes and Jerkovic, 2020), to name a few examples. This is related to Messelink et al. (2014), who pointed out that, as an important aspect of conservation biological control, it is necessary to know the plant diversity and the benefits they provide to satisfy the needs of beneficial organisms (shelter and food, mainly).

Báez-Santacruz et al. (2013), pointed out

Figure 2

Flowers and leaves of *Tithonia diversifolia* in Cerro Punta, Chiriqui, Panama



Figure 3

Mating group of *Stenomacra marginella* in *Tithonia diversifolia*, Cerro Punta



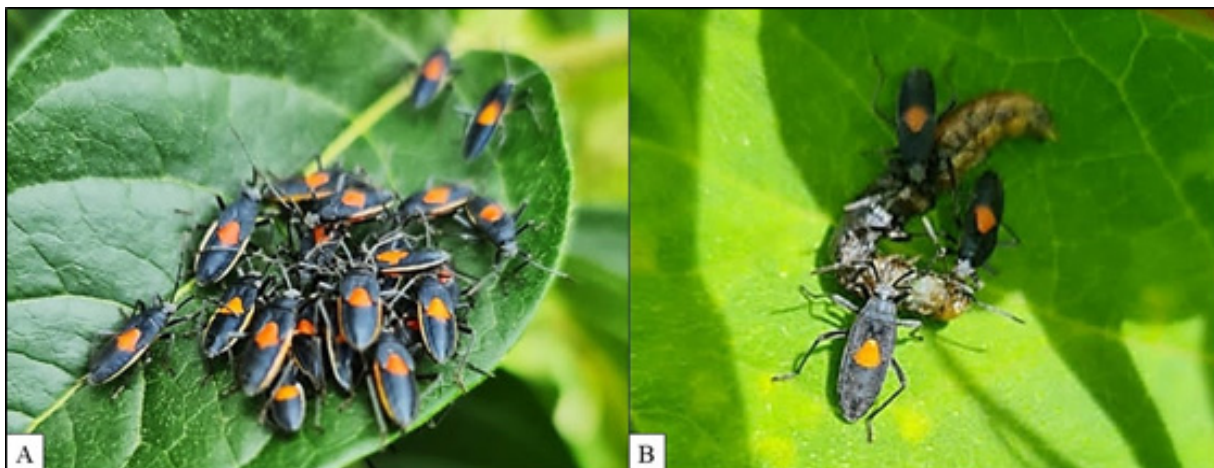
that *S. marginella* forms large groups and is unpleasant in certain places and periods due to its gregariousness (Figure 4a); but it does not cause direct or indirect harm to human beings. Nava-Gervasio et al. (2009) and Fideicomiso para la Administración del Programa de Desarrollo Forestal del Estado de Jalisco (2020) locate it as an omnivorous species, capable of feeding on all kinds of organic matter; as vegetable sap, from its own eggs and nymphs (cannibalism), trees, agricultural crops, and bird droppings;

while Flores & Álvarez (2012) indicated that *S. marginella* is normally phytophagous, but can occasionally prey on other pest insects. The latter was observed during the development of this study, fifth instar nymphs of *S. marginella* feeding on a Lepidoptera larva (Figure 4b).

During this study, different development stages of *S. marginella* (second and fifth instar nymphs and adults) were observed in *T. diversifolia*; therefore, it can be inferred that this plant serves as the host of the insect.

Figure 4

Fifth instar nymphs of *Stenomacra marginella*: A) Gregariousness in wild vegetation; B) Eating a larva of Lepidoptera in *Tithonia diversifolia*



On the other hand, Sermeño-Chicas et al. (2019), indicated that *S. marginella* is widely distributed, from Arizona-US to Brazil; and is found in El Salvador as a phytophagous in coffee plantations, together with other 24 species of bugs (14 phytophagous and 10 predators), from which the family Reduviidae stands out, which feeds on phytophagous bugs. Additionally, Lomeli-Flores et al. (2021), recently reported a parasitoid of *S. marginella* in Mexico. These contributions suggest that *S. marginella* would serve as an ecosystem stabilizer; therefore, it would be necessary in the future to develop research on the possible trophic interactions and behaviors of the insect community associated with *T. diversifolia* in Cerro Punta. This is of utmost importance, when considering the study by Herrera et al. (2021), who carried out a characterization of horticultural farms in Cerro Punta, finding predominance of conventional management based intensively on the use of pesticides; this could break the natural balance and would lead to the emergence of new and more resistant pests.

Conclusions

From the present study, it is concluded that the wild Asteraceae species found in Cerro Punta, Chiriquí, Panama, corresponds to *Tithonia diversifolia*. The predominant insect observed on this plant was *Stenomacra marginella* (Hemiptera: Largidae); which can be considered as a stabilizer of the agroecosystem, as it could serve as an alternative food for predators and parasitoids, in addition to potentially serving as a pest predator.

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