

FIRST REPORT OF CACTUS WEEVIL (*Cactophagus spinolae* Gyllenhal) (COLEOPTERA: CURCULIONIDAE) FEEDING ON PITAHAYA (*Selenicereus undatus*) (Haw.) D.R. Hunt (CACTACEAE) IN GUERRERO, MEXICO

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ABSTRACT

This is the first report of *Cactophagus spinolae* feeding and causing damage to the stem, vascular fleshy tissue, flower bud and fruit of pitahaya (*Selenicereus undatus*) plants in the urban area of the state of Guerrero, Mexico.

Keywords: pitahaya plants, damage, cactus weevil, feeding.

INTRODUCTION

Selenicereus undatus is a member of the genus *Selenicereus*, known for its edible fruits that are given names such as pitahaya, pitaya, or red dragon fruit. It is native to Mexico and cultivated in tropical and subtropical countries such as Taiwan, southern China, Israel, Thailand, Australia, the United States of America, and Malaysia (Mizrahi and Nerd, 1999). In Latin America, pitahaya is produced in subtropical and tropical regions; and in the wild, it can be

found in Venezuela, Colombia, Brazil, Costa Rica, Ecuador, and Mexico (Santarrosa, 2013).

In Mexico as well as in other countries, the cultivation of dragon fruit has expanded in the past twenty years (Castillo-Martínez et al., 2016). In recent years, the area of pitahaya production has increased, being exported to Europe as fresh fruit and as frozen pulp to the United States (OIRSA, 2000).

This species has a wild distribution on the Pacific slope of Mexico, from Sonora to northern Guatemala, where it is not widely cultivated

when compared to other species (Sosa et al., 2020). Bárcenas-Abogado et al., (2002) have indicated that the pitahaya crop develops from 0 to 2000 m.a.s.l., with 300 mm of annual precipitation, with optimal conditions of average annual temperatures of 17 to 30 °C.

Pitahaya is affected by causative agents of diseases and insects that negatively impact the phytosanitary quality of the fruit for exports and local commercialization. With respect to pest insects affecting this crop, Jiménez et al., (2020) have identified nine orders and forty families of insects. The most dominant families are Phycitidae, Noctuidae, Chrysopidae and Hesperidiidae. Meanwhile, Ramírez-Delgadillo et al., (2011) reported the presence of cactus weevil *Cactophagus spinolae* Gyllenhal (Coleoptera: Curculionidae) in three species and a subspecies of pitahaya of the genus *Hylocereus* in Morelos, Mexico. The objective of this study was to document *C. spinolae* feeding as well as the damage caused to pitahaya plants of *S. undatus* in an urban area of the municipality of Tixtla de Guerrero, state of Guerrero, Mexico.

MATERIALS AND METHODS

The presence of *C. spinolae* was documented in pitahaya plants *Selenicereus undatus* in an urban area (Los Amates) of the municipality of Tixtla de Guerrero (17°35'11.8'' N and 99°23'7.24236'' W, 1, 356 m.a.s.l.) (Fig. 1), state of Guerrero, Mexico. Adults and larvae of *C. spinolae* were collected directly from two pitahaya plants every 15 days from May to August 2022. The samples were placed in plastic bottles and 70% alcohol was used as a preservative. Subsequently, they were sent to the Faculty of Agrotechnological Sciences of the Autonomous University of Chihuahua, Chihuahua, Mexico, for taxonomic identification.

RESULTS AND DISCUSSION

The larvae (n=10) of *C. spinolae* were observed feeding on the vascular cylinder of mature stems (Fig. 2A). Adults (n=30) were observed feeding on immature stems (Fig. 2B), flower buds (Fig. 2C) and fruits (Fig. 2D). In the fruits (Fig. 3A and 3B) and flower buds (Fig. 3C), adults generate holes through which other pathogens such as bacteria may enter. Ramírez-Delgadillo et al., (2011) and Bravo-Avilez et al. (2014) reported similar damage in other pitahaya species in Mexico.

C. spinolae eggs (n=15) were observed (Fig. 4A) inside the mature stem or fleshy plant tissue of pitahaya plants *S. undatus*. Likewise, the presence of puparium or cocoons (n=5) was documented (Fig. 4B) in fibers of the plant vascular tissue.

Based on the record of adults, eggs, larvae, and pupae, it can be concluded that the pitahaya plant *S. undatus* is a main host of *C. spinolae*.

Cárdenas-Ramos and Mandujano (2021) have described that *C. spinolae* has herbivorous habits because it feeds on the young cladodes and the areoles. It is a florivore that partially consumes the perianth and eliminates the whole gynoecium of the floral buds. Furthermore, it acts as a frugivore when feeding on the pulp of ripe fruits. Similarly, this insect is considered a generalist herbivore of stems because it feeds on a wide range of plants of the genus *Cereus*, *Cylindropuntia*, *Ferocactus*, *Hylocereus*, *Selenicereus*, *Opuntia*, *Pereskioopsis*, and *Stenocereus*, and leaves (genus *Agave*) of succulent species of the families Cactaceae and Asparagaceae (Ramírez-Delgadillo et al., 2011; Romo, 2012; Bravo-Avilez et al., 2014; López-Martínez et al., 2016a; Ruiz-Moreno, 2018). Furthermore, it is considered a specific pest of the genus *Opuntia*, feeding on the margin of young cladodes, with oviposition preferences in basal cladodes (Orduño-Cruz y Vanegas-Rico, 2018). *C. spinolae* is an herbivore that attacks the vegetative structures of succulent species (Cerón-González et al., 2012). The larva feeds as a borer on host internal tissue, while adults feed on new shoots, continuous and multiple invasions can kill the infested plant (López-Martínez et al. 2016b). Bravo-Avilez et al. (2014) mentioned that even though this weevil is considered an important pest in many species of *Opuntia* and few studies have reported its presence in other cacti, *C. spinolae* may be likely to adopt new hosts, and thus continuous monitoring is required to detect its presence in other cacti in Mexico. This work expands the record of hosts and damage caused by *C. spinolae* in Mexico.

CONCLUSIONS

This work provides new records on the distribution of *C. spinolae* in Mexico, being the first report of this species feeding on pitahaya in the state of Guerrero, Mexico. The damage caused by this species to plants of *S. undatus* is documented. Future research is required to determine the real percentage of damage caused by larvae and adults of this weevil on fruits and stems of the pitahaya crop, including urban areas and commercial orchards. Similarly, the biology of the insect needs to be further explored in order to develop pest management strategies.

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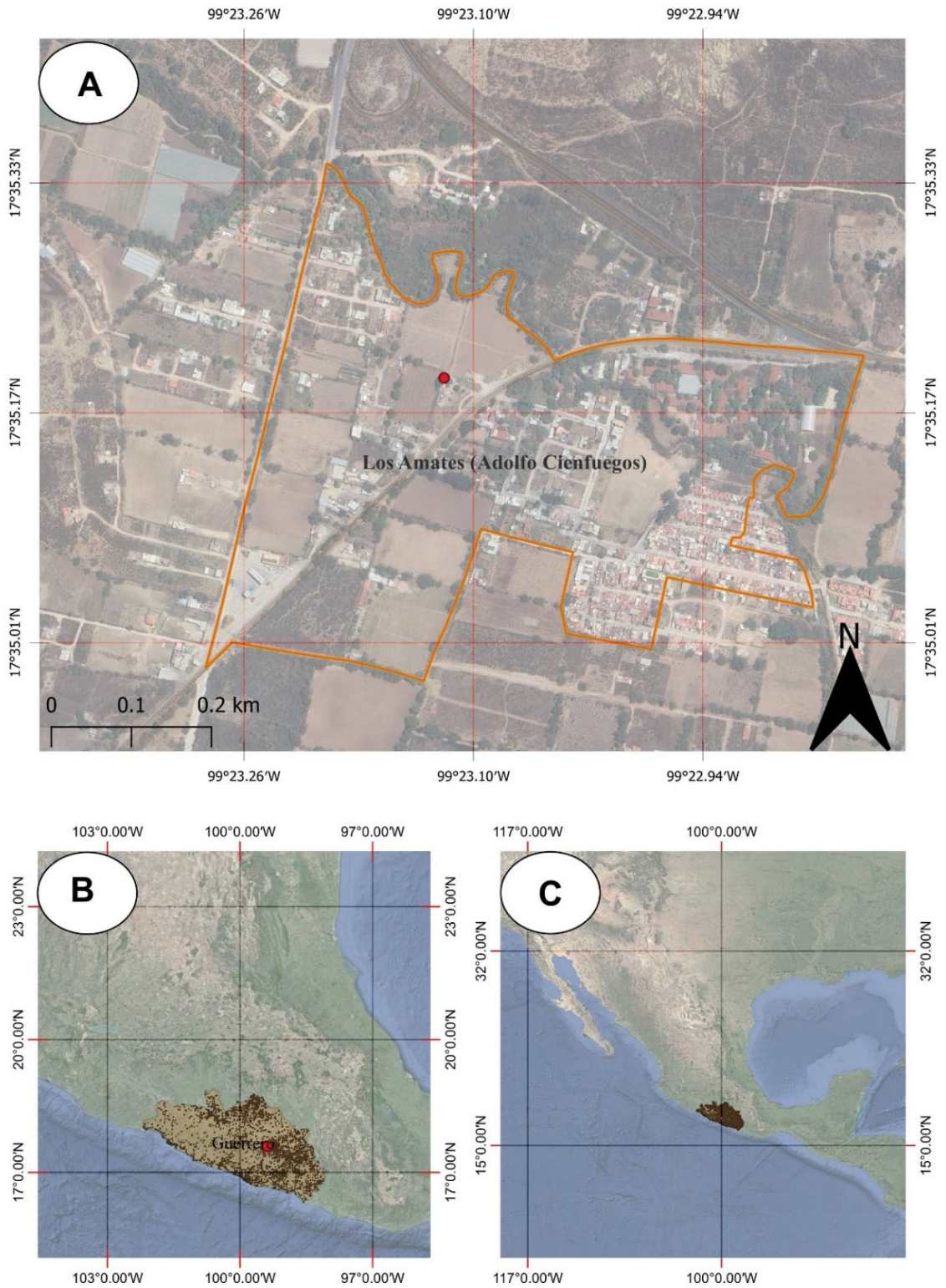


Fig. 1. Geographic location of the study area where *Cactophagus spinolae* (Coleoptera: Curculionidae) was sampled in pitahaya plants. A) Geographic location of the sampling site in the urban area "Los Amates"; B) Geographic location of the urban area "Los Amates", state of Guerrero; and C) Geographic location of the state of Guerrero, Mexico.

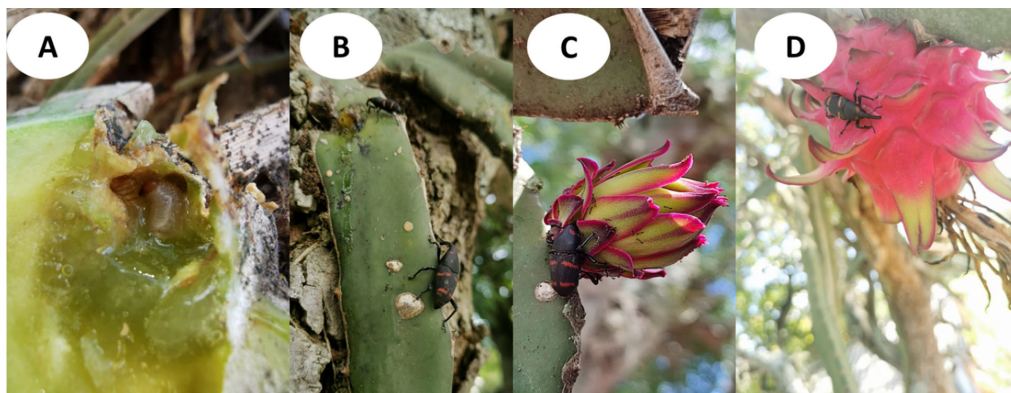


Fig. 2. A) Larvae and B, C, D,) Cactus weevil (*Cactophagus spinolae*) feeding on pitahaya plants. Photograph by Araceli Chino-Cantor.

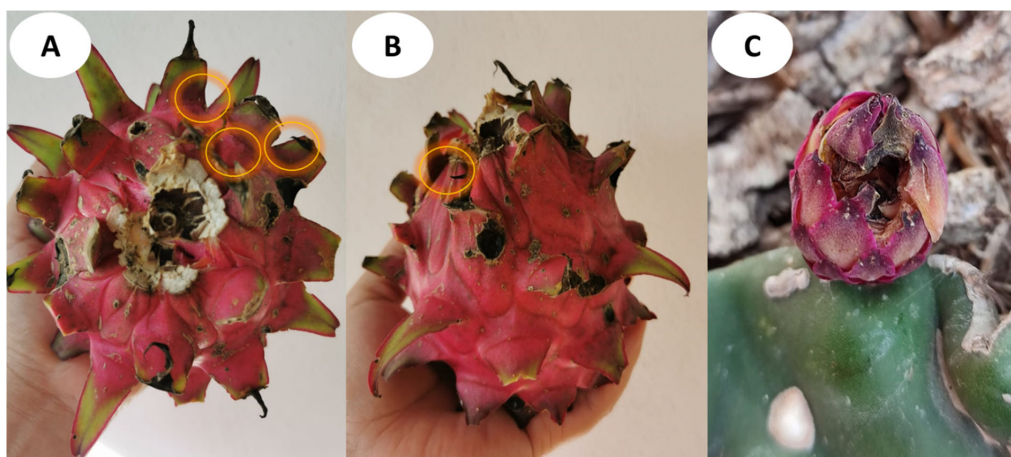


Fig. 3. A, B) Damage caused by Cactus weevil (*Cactophagus spinolae*) in fruits and C) floral bottom. Photograph by Araceli Chino-Cantor.



Fig. 4. A) eggs and B) Puparium of the cactus weevil (*Cactophagus spinolae*) in pitahaya. Photograph by Araceli Chino-Cantor.

the taxonomic classification of the cactus weevil; and to Dr. Ramón Cuevas Guzmán and M.C. Luis Guzmán Hernández, who belongs to the Department of Ecology and Natural Resources of the University Center of the South Coast of the University of Guadalajara (Mexico), for his help in the identification of pitahaya species.

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