N O T E

First Report of *Caryobruchus gleditsiae* (Coleoptera: Chrysomelidae) on *Brahea berlandieri* in Northeast Mexico[1]

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Herein, we report the first occurrence of the palm seed weevil, *Caryobruchus gleditsiae* Johansson & L. (Coleoptera: Chrysomelidae), from the seeds of the palm, *Brahea berlandieri* Bartlett (Arecaceae) in northeastern Mexico. Our discovery was serendipitous in that our objective in collecting *B. berlandieri* fruits was to create a germplasm bank of different palm species from the state of Tamaulipas, Mexico (Reyes-Zepeda, 2016, Final Technical Report of Project: Manejo y conservación del germoplasma de tres especies de palma de interés comercial en el estado de Tamaulipas, México. Registry: UAT-PTC-186. PRODEP-SEP. México. http://dx.doi.org/10.13140/RG.2.2.31107.84002, accessed 10 April 2020.).

In October 2016, we collected 30 fruits from *B. berlandieri* trees growing at 10 locations in the state (Table 1). Collected fruits were sealed in plastic zipper bags, placed in a cooler at 5 $\pm$ 2°C, and transported to the Population Ecology Laboratory, Applied Ecology Institute, Autonomous University of Tamaulipas. There, ripe fruits were washed with tap water and placed on a sieve (1.0 $\times$ 1.0 $\times$ 0.05 m) inside of an entomologic cage (1.8 $\times$ 1.8 $\times$ 1.8 m), where they remained under field conditions for approximately 25 d. Then, the exocarp and mesocarp were manually removed from the seeds, and seeds were subsequently washed with tap water and dried at room temperature. Once dried, the seeds were placed in properly labeled plastic bottles with an airtight lid and stored in the laboratory. In January 2017, bruchids were observed inside the plastic bottles (Fig. 1A). These had emerged from the palm seeds (Fig. 1B) from a round exit hole. A specimen was identified as *C. gleditsiae*

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Table 1. Location of *B. berlandieri* plants and number of *C. gleditsiae* emerged.

Location	Coordinates	MASL	NRF	NB
Ejido José María Morelos	23°02′57.29” N; 99°54′43.60” W	1,801	30	1
Cañón del Novillo	23°43′17.23” N; 99°15′40.52” W	683	30	2
Cañón de la Peregrina	23°46′09.09” N; 99°15′23.28” W	536	30	1
San Antonio	23°34′55.06” N; 98°18′40.69” W	710	30	2
El Huizachal	23°32′58.95” N; 98°12′35.54” W	1,327	30	1
El Ébano	23°33′04.82” N; 99°01′19.69” W	415	30	2
El Terrero	23°16′01.89” N; 99°05′10.50” W	472	30	2
Pedro Ruíz Molina	23°09′38.13” N; 99°38′50.90” W	1,570	30	1
El Capulín	23°16′53.49” N; 99°40′09.74” W	1,785	30	1
Altas Cumbres	23°37′07.3” N; 99°12′21.73” W	1,161	30	1

MASL, meters above sea level; NI, number of bruchids per 30 seeds; NRF, number of ripe fruits.

(Fig. 1A) using the taxonomic keys of Nilsson and Johnson (1990, Coleop. Bull. 44: 50–59; 1993, Mem. Am. Entomol. Soc. 41: 1–104).

The length of *C. gleditsiae* ranged from 0.74 to 0.84 cm, possibly the size of the seed (7.8–9.2 mm; Fig. 1C). Nilsson and Johnson (1993) reported that the length of *C. gleditsiae* ranges from 7.2 to 12.1 mm in males and 4.3 to 11.0 mm in females. Woodruff (1968, Florida Dept. Agric. Entomol. Circ. 73: 1–21968) mentioned that the size of *C. gleditsiae* partially depends on the size of the host seed.

Caryobruchus gleditsiae is reported from the Antilles, Bahamas, Bermuda, Cuba, Dominican Republic, El Salvador, Guatemala, Honduras, Jamaica, Panama, Spain (Tenerife), and the southeastern United States. In Mexico, it is reported from Campeche, Chiapas, Guerrero, Hidalgo, Michoacan, Nayarit, Oaxaca, Puebla, San Luis Potosí, Sinaloa, Sonora, Tamaulipas, and Veracruz (White, 1983, The Peterson Field Guide Series No. 29. Houghton Mifflin Co., Boston, MA; Nilsson and Johnson 1990; Romero and Johnson, 2004, Coleop. Bull. 58: 613–635; Yus-Ramos, 2019, Boln. Asoc. Esp. Ent. 43: 229–259). Its main hosts are species of *Sabal*, but it also has been reported from species of *Chamaedorea*, *Coccothrinax*, *Copernicia*, *Litona*, *Phoenix*, *Serenoa*, *Thrinax*, *Washingtonia*, and *Yucca* (Nilsson and Johnson 1990, 1993; Johnson et al., 1995, Principes 39: 25–35; Johnson and Romero, 2004, Rev. Bras. Entomol. 48: 401–408; Fernández and González, 2015, Rev. Colombiana Cienc. Anim. 7: 120–129). Adults feed on pollen and nectar from their hosts. The female lays one egg on the outer surface of a seed. Upon hatching, the larva pierces the seed coat and enters the seed. Inside the seed, the bruchid develops through three larval stages and the pupa. Upon emergence from pupation, the adult creates a round hole to exit the seed (Woodruff 1968; White 1983; Johnson et al. 1995).

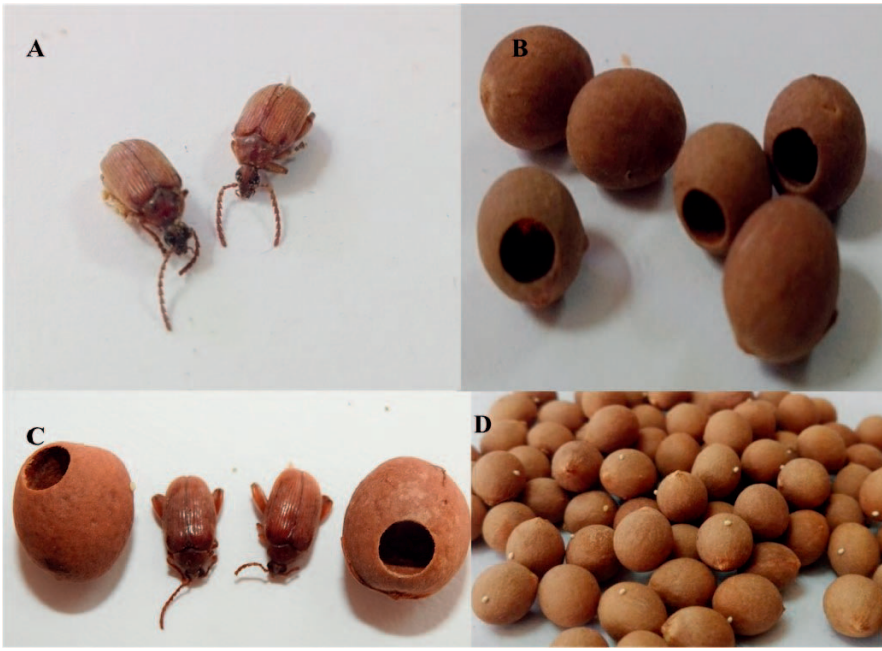

Fig. 1. Emergence of *C. gleditsiae* from *B. berlandieri* seed showing the *C. gleditsiae* female (A), bruchid exit hole in the seed (B), *C. gleditsiae* female and seed *B. berlandieri* (C), and *C. gleditsiae* eggs on *B. berlandieri* seed (D). (Photograph by F. Reyes-Zepeda.)

We observed one to two adult *C. gleditsiae* emerged from the collections of 30 seeds each of *B. berlandieri* (Table 1). Emergence from these seeds indicates that the female oviposited on the seed while it was in fruit on the plant. The state of fruit maturity when the female oviposited on the fruit is unknown; however, Johnson and Romero (2004) grouped bruchids into three guilds according to their oviposition behavior: (1) those that oviposit only on the walls of the fruit; (2) those that oviposit only on mature seeds while the fruit is on the plant; and (3) those that oviposit only on mature seeds that are in the ground. They placed *C. gleditsiae* in their third guild, which is contrary to our observations in that the bruchids emerged from seed that was within ripe fruits collected from the plant. We also observed that, inside the plastic bottles, the seeds had one egg per seed, with a total of up to 139 seeds on which oviposition had occurred; yet, no eggs hatched (Fig. 1D). Johnson and Romero (2004) also reported that *C. gleditsiae* females lay only one egg per seed in *Sabal* species. Although the number of bruchids that emerged is not significant (one to two bruchids in 30 seeds per *B. berlandieri* population), more studies are needed to learn the details of their feeding habits, oviposition behavior, and host plant associations to better understand palm seed weevil.

The palm, *B. berlandieri*, is endemic to the Sierra Madre Oriental. It is found in the states of Coahuila, Nuevo Leon, Tamaulipas, San Luis Potosi, Guanajuato,

Queretaro, and Hidalgo (Quero, 2004, Palmae, Pp. 1–23. *In* Rzedowski, J., and Calderon-de-Rzedowski, G. (eds.), Flora del Bajío y de Regiones Adyacentes, Fascículo 129. Instituto de Ecología, Veracruz, Mexico). Its palm leaves are used to create handicrafts such as hats, baskets, and fans (Quero, 1992, Principes 36: 203–216). It is listed in NOM-059-SEMARNAT-2010 (Norma Oficial Mexicana-Secretaría de Medio Ambiente y Recursos Naturales) under the risk category "Subject to Special Protection" (Pr), which indicates that it may be threatened by factors that negatively affect its viability (NOM-059-SEMARNAT-2010 (Norma Oficial Mexicana-Secretaría de Medio Ambiente y Recursos Naturales)). 2020. NORMA Oficial Mexicana NOM-059-SEMARNAT-2010, Protección ambiental-Especies nativas de México de flora y fauna silvestres-Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio-Lista de especies en riesgo. http://dof.gob.mx/nota_detalle_popup.php?codigo=5173091, accessed 10 April 2020). In this norm are the flora and wild fauna, terrestrial and aquatic, in danger of extinction and threatened and those subject to special protection in Mexico. Very few herbivores have been reported from *B. berlandier*. One is *Pterophylla beltrani* Bolivar and Bolivar (Orthoptera: Tettigoniidae), which feeds on palm foliage (Marez-López, 2020, Southwest. Entomol. 45: 209–216). Ours is the first report of *C. gleditsiae* adults emerging from *B. berlandieri* seeds in northeastern Mexico.

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