Revista Mexicana de Ciencias Forestales Vol. 17 (94)
Marzo - Abril (2026)

DOI: 10.29298/rmcf.v17i94.1609

Research note

First record of the *agave* weevil (*Scyphophorus acupunctatus* Gyllenhal) on wild *sotol* populations (*Dasylirion* spp., Asparagaceae) in the state of *Chihuahua*

Primer registro del picudo del agave (*Scyphophorus acupunctatus* Gyllenhal) en sotol silvestre (*Dasylirion* spp., Asparagaceae) en Chihuahua

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Fecha de recepción/Reception date: 10 de octubre de 2025.
Fecha de aceptación/Acceptance date: 8 de febrero de 2026.

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Abstract

Sotol stands, a rosette-forming plant from the *Chihuahuan* Desert that is industrially exploited to produce an alcoholic beverage emblematic of the state, are under pressure from drought, extraction, and, recently, the arrival of a new highly destructive insect pest. This study is the first known report of the presence of the *agave* weevil in *Chihuahua*, an insect already taken as one of the main pests of *agave* in the central-western part of the country, causing plant mortality in *sotol* stands. The death of the affected plants is gradual, and the severity of the damage is distinguished from a distance by the discoloration of the dead plants which imparts a straw-colored contrast to the *sotol* stands. Fieldwork in some of them in *Buenaventura* and *Coyame*, *Chihuahua*, in 2024 and 2025, made it possible to observe the damage symptoms and the presence of the insect (pupae and adults) for subsequent identification in the laboratory. Intensive sampling is recommended in the different *sotol*-producing regions to accurately map the location and severity of damage, and then to apply and adapt some of the control measures already tested in the *agave* regions of Mexico.

Keywords: Bulb, damage, *Chihuahuan* Desert, rosette shrubland, *sotol* pest, symptoms.

Resumen

Los rodales de sotol, planta rosetófila del Desierto Chihuahuense aprovechada industrialmente para la producción de una bebida alcohólica emblemática del estado, están bajo la presión de la sequía, la extracción y, recientemente, el arribo de un insecto con alto potencial destructivo conocido como picudo del maguey. El presente trabajo constituye el primer registro conocido de la presencia de *Scyphophorus acupunctatus* (picudo del agave) en Chihuahua, que afecta poblaciones silvestres de sotol. Insecto considerado como la principal plaga de los agaves en el centro-oeste del país, y que causa la mortalidad de plantas en las poblaciones de sotol. La muerte de las plantas atacadas es gradual, y la severidad del daño se distingue a distancia por la decoloración de los individuos muertos que imparte un contraste de color pajizo a los rodales de sotol. En los trabajos de campo realizados en Buenaventura y Coyame, Chihuahua, en 2024 y 2025, se observaron los síntomas del daño y se recolectaron muestras del insecto (pupa y adultos) para su posterior identificación en laboratorio. Se recomienda realizar muestreos intensivos en las diferentes regiones productoras de sotol para mapear con precisión la ubicación y la severidad de los daños, para posteriormente aplicar y adaptar algunas de las medidas de control validadas en las regiones agaveras de México.

Palabras clave: Bulbo, daños, Desierto Chihuahuense, matorral rosetófilo, plaga del sotol, síntomas.

Development of the topic

This study constitutes the first known record of *Scyphophorus acupunctatus* Gyllenhal in the state of *Chihuahua* in wild populations of *Dasylirion* spp., a rosette-forming plant native to Northern Mexico and the Southern United States of America, used to make a distilled beverage known as *sotol. Sotol* stands in *Chihuahua* have been experiencing recurrent droughts for several years, are under pressure from industrial harvesting, and now face the threat of this high-impact insect.

This weevil is one of the main pests of *agaves*, present in 20 *Agave* L. species across 15 Mexican states (Rodríguez et al., 2019). Recéndiz-De la Mora et al. (2024), in compiling information on the distribution of this insect in different regions and biomes of Mexico, reported the presence of *Scyphophorus acupunctatus* in *Agave* spp. in *Chihuahua*, but did not record *Dasylirion* spp. in the host list; this coincides with the

descriptions by Solís-Aguilar et al. (2001) and Valdés-Rodríguez et al. (2004) for various species of the genus, which is a regular component of some *sotol* stands in Northern *Chihuahua*, to the point that certain *agave* species are harvested and processed together with *sotol.*

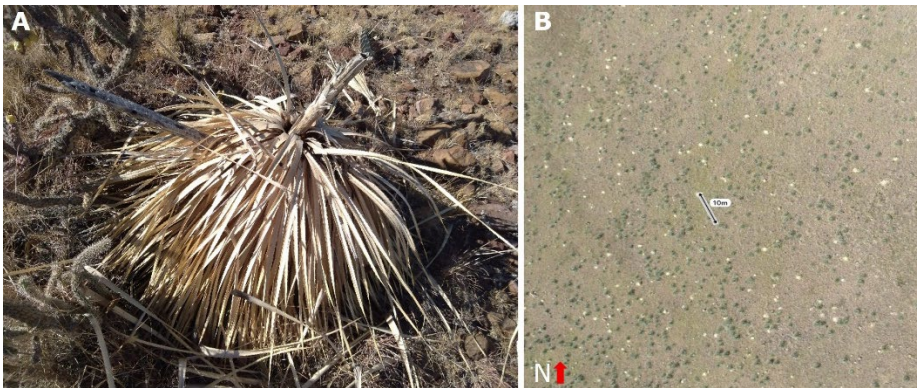
In the last four years, through field surveys and sampling, this insect was detected on wild *sotol* plants in the Northern (*Buenaventura-Nuevo Casas Grandes*) and Eastern (*Coyame*) regions of the state of *Chihuahua*. In these areas, *sotol* grows in rosette-forming desert scrubland associated with grasslands, *Agave lechuguilla* Torr., *Fouquieria splendens* Engelm., *Larrea tridentata* (DC.) Coville, and various cacti. It thrives in dry, semi-arid, and arid climates, at altitudes of 1 200 to 1 600 m, with an average annual temperature of 18 to 21 °C, and annual rainfall fluctuating between 390 and 435 mm (García, 2004). The soils are of the Calcisol and Cambisol types (Instituto Nacional de Estadística, Geografía e Informática [INEGI], 2007a, 2007b).

The taxonomic identification of *Scyphophorus acupunctatus* was made using the keys and specialized works of Vaurie (1971), Romo and Morrone (2012), and Chamorro et al. (2016), who indicate that the *Scyphophorus* genus comprises only two species: *S. acupunctatus* (*agave* weevil) and *S. yuccae* Horn (cassava weevil). Based on the keys used, *Scyphophorus acupunctatus* is characterized by a robust, finely dotted, shiny black body; a funiculus with six segments; an antennal club with a truncate or concave apex; second and third antennomere of equal length; a small scutellum; a second tarsomere that is not excavated; and an exposed pygidium.

Based on field sampling in four 1 000 m^2 quadrants carried out from February to May in 2024 and 2025 and the use of a drone (DJI Phantom® 4-Pro) at 120 m high over 6 ha stands of *sotol*, with 85 % overlap of images in both directions, longitudinal and horizontal (DJI® camera with 20-megapixel model Exmor R CMOS RGB sensort Sony®), a mortality of 20 to 50 % was estimated in the evaluated area.

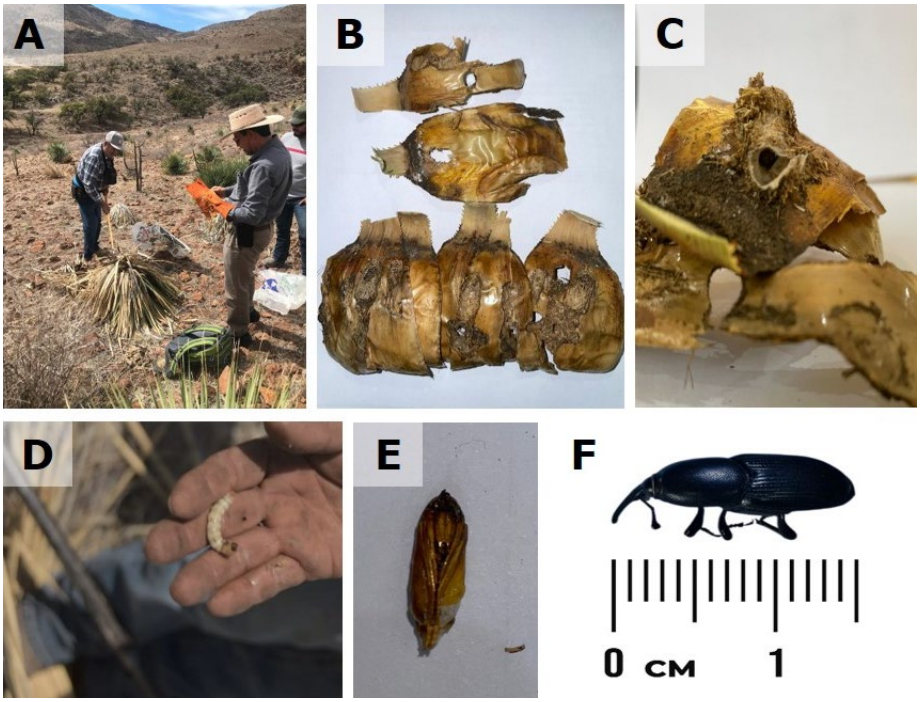
The death of the *sotol* plant occurs gradually, over a period of 5 to 6 months, as observed between successive visits. It is associated with perforations at the base of the leaves and boring tunnels followed by bulb rot, the primary food source for this insect, where both larval and adult stages have been found. The leaves of affected plants hang to the ground

and, as they discolor, turn a straw-like color (Figure 1A), imparting a pattern of whitish spots to the *sotol* stands when observed from heights or distances of up to 500 m (Figure 1B). Perforations and fibrous cocoons were also observed at the base of the leaves and in the pupae of damaged *sotol* plants (Figure 2).



A = Dead *sotol* plant; B = Spatial pattern of mortality in RGB image at 120 m high in *Buenaventura* (29°46’31” N, 107°36’15” W), *Chihuahua*, in 2021.

Figure 1. Symptoms of *Scyphophorus acupunctatus* Gyllenhal attack at the plant and stand level.



A = Field samples taken in 2024 (29°46’31” N, 107°36’15” W in *Buenaventura*; and 29°17’44.9” N, 105°19’38.3” W in *Coyame*); B = Typical insect perforations at the base of leaves; C = Typical insect perforations in the pupation cocoon, nested at the base of a leaf; D = *Agave* weevil larva (image courtesy of Mr. Fernando Porras); E = Pupa; F = Adult.

Figure 2. Field samples and symptoms of *Scyphophorus acupunctatus* Gyllenhal infestation in *Buenaventura*, *Chihuahua*.

This pest is multivoltine, exhibits overlapping generations, and has been detected primarily from February to May. Similar results have been reported by Figueroa-Castro (2009) in commercial plantations of *Agave tequilana* F. A. C. Weber. The main damage to the bulb is caused by the larvae, which are whitish, weevil-like, and cause multiple borings until they lead to the bulb's death.

Furthermore, Ruiz-Vega et al. (2017) and the *Dirección General de Sanidad Vegetal* (DGSV, 2016) mention that the adult weevil, in addition to damaging plant tissues, is a vector of pathogenic microorganisms such as *Erwinia* sp. bacterium, which causes soft rot, and fungi such as *Fusarium* sp., which cause leaf tips to dry out.

From the high potential for damage posed by this new pest in *Chihuahua*, a monitoring campaign is recommended to assess the presence, extent, and severity of *agave* weevil infestation throughout the year and in regions with wild *sotol* populations. Furthermore, it is recommended to adapt and implement legal control measures (increased controls on the transport of raw materials), cultural measures through the destruction of harvesting waste and infested plants (Reyes-Muñoz et al., 2024), ethological measures using pheromones, and biological measures using natural enemies, without ruling out chemical control for areas of severe infestation. An alternative is the installation of pheromone-baited traps, which allows for pest monitoring to determine peak populations and facilitates the planning of management strategies. Valdés-Rodríguez et al. (2004) recommend introducing plant tissue samples into pheromone traps to increase insect attraction and capture.

Acknowledgments

The authors would like to thank the staff of the Phytopathology Laboratory of the *Facultad de Ciencias Agrotecnológicas de la Universidad Autónoma de Chihuahua* (School of Agrotechnological Sciences at the Autonomous University of *Chihuahua*), for the technical support for the identification of the insect and the taking of images of the samples. To Doctors Jesús Miguel Olivas García and José Álvaro Anchondo Nájera for their support in field sampling.

Conflict of interest

The authors declare no conflict of interest.

Contribution by author

Julio César Anchondo Páez: field sampling and writing of the manuscript; Raúl Narváez Flores: field sampling, identification of the insect and writing of the manuscript; Miguel Olivas Pérez: field sampling and review of the manuscript; Francisco Ochoa Modesto: field sampling.

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