



REVIEW ARTICLE

FIRST RECORD OF *Cyclocephala lunulata* BURMEISTER, 1847, CONSUMING RIPE GUAVA FRUITS (*Psidium guajava* L.)

Alejandro Alviter-Aguilar¹, Alejandro Rodríguez-Ortega^{*2}, Pedro Arturo Martínez-Hernández¹, Claudia Inés Alviter-Aguilar³ and Fabián Magaña-Valencia¹

¹ Postgraduate Program in Animal Production, Universidad Autónoma Chapingo, Carretera México-Texcoco km 38.5, Texcoco, Estado de México, C.P. 56230, Mexico; ² Agrotechnology Engineering, Universidad Politécnica de Francisco I. Madero, Tepatepec, Hidalgo, Mexico; ³ Animal Production Engineering, Universidad Politécnica de Francisco I. Madero, Tepatepec, Hidalgo, Mexico

ARTICLE INFO

Article History:

Received 20th June, 2026
Received in revised form
24th July, 2026
Accepted 19th August, 2026
Published online 30th September, 2026

Keywords:

Beetle, White Grub, Phytochemicals, Guava.

*Corresponding author:

Alejandro Rodríguez-Ortega

ABSTRACT

A beetle feeding on ripe guava fruit was observed in guava trees. The damage it caused was evident, as it formed galleries inside the fruit and consumed the entire pulp, leaving only the outer covering. Most of the fruit, regardless of size, was being consumed by adult stages of the beetle. Insects were captured for taxonomic identification, and their biological characteristics were subsequently reviewed in scientific publications. The objective of this evaluation was to report and identify the beetle's taxonomy and describe its biological behavior. The taxonomic review, comparison, and identification determined that the beetle found on the guava fruit was *Cyclocephala lunulata* Burmeister, 1847. This insect is classified as a pest in two of its life cycle stages: larva and adult. It is a bivoltine insect adapted to warm tropical regions, capable of completing two life cycles per year, and the phytochemicals produced by the guava are its primary attractants. It is concluded that the region's agroclimatic conditions provide an ideal habitat for the development and reproduction of *C. lunulata*.

Copyright©2026, Alejandro Alviter-Aguilar et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Citation: Alejandro Alviter-Aguilar, Alejandro Rodríguez-Ortega, Pedro Arturo Martínez-Hernández, Claudia Inés Alviter-Aguilar and Fabián Magaña-Valencia. 2026. "First record of *Cyclocephala lunulata* Burmeister, 1847, consuming ripe guava fruits (*Psidium guajava* L.)", *International Journal of Recent Advances in Multidisciplinary Research*, 13,(09), 12850-12853.

INTRODUCTION

Pests in fruit trees are a highly important limiting factor in guava production (*Psidium guajava* L.). Yield is reduced and the fruit loses economic value. Various insects damage guava plants, and their presence depends on the geographic area, food availability, and the time of year (Amin *et al.*, 2019). Research conducted by Mahmoud *et al.*, (2021) and Kanna *et al.*, (2024) identified aphids, Mediterranean fruit fly, mealybugs, beetles, scales, and trips as guava pests. The genus *Cyclocephala lunulata* Burmeister, 1847, belongs to the group of pests known as white grubs. The most severe damage is caused to plant roots because they host in the soil. In the soil, they feed mainly on organic matter and, in extreme cases, on live plant roots (Stechnauer-Rohringer & Pardo-Locarno, 2010). During their stay in the soil, it is the larval stage that causes the damage. When reaching the adult stage, insects with flight capacity look for a host, mainly plants, where they obtain their food source. The insects are attracted by phytochemicals that ripe guava flowers and fruits release into

the environment (Amin *et al.*, 2019). However, scientific evidence indicates that it is not common for mature stages of *Cyclocephala* to feed on ripening fruits, and finding them in the case of guava may be due to the chemical attractants produced by the flowers and fruits of this plant (Stechnauer-Rohringer & Pardo-Locarno, 2010). In the guava plantations of the agricultural fields of the Academic Unit of Mezitlán in the state of Hidalgo, the presence of beetles feeding on ripe guava fruits was observed, and they were collected for identification and review of their biological behavior. The objective of this research work was to report and identify the taxonomy of the beetle and describe its biological behavior.

Location and method of analysis: The guava tree plantation is located in the agricultural plots of the Academic Unit of Mezitlán, belonging to the Universidad Politécnica de Francisco I Madero, situated at coordinates 20°35'30.7"N 98°46'27.4"W. The climate of the region according to Koppen and modified by Fernández *et al.*, (2018) is sub-warm

temperate, recording an average annual temperature of 20.2°C and a precipitation of 437 mm, concentrating the rainy season from June to September and an altitude of 2,300 m. The region is considered of economic importance due to agricultural activity, mainly green beans (*Phaseolus vulgaris*), zucchini (*Cucurbita pepo*), corn (*Zea mays*), and fruit trees such as walnut trees (*Juglans regia* L.), in addition to having conditions for the production of guava (*Psidium guajava*), mango (*Mangifera indica*), pomegranate (*Punica granatum*), and papaya (*Carica papaya*). These agricultural production systems are developed in the agroecological environment known as the Vega de Meztlán, which is part of the "Barranca de Meztlán" Biosphere Reserve in the state of Hidalgo, Mexico.

Insect identification: The presence of the beetle was in April 2016, a date corresponding to the spring cycle when the tree has mostly ripe fruits and a significant density of developing flowers. In ripe fruits and still on the tree (Figure 1), the beetle feeds on the internal part.



Figure 1. Guava trees (*Psidium guajava*) in fruiting

This beetle punctures the fruits and forms galleries (Figure 2), causing total damage to the fruits. It consumes all the pulp and leaves only the outer shell of the fruits.



Figure 2. Guava fruits showing punctures caused by the beetle

Beetles were collected for later identification in the entomology laboratory of the Academic Unit. Following the reports of Bran *et al.*, (2007) and Stechauner-Rohringer & Pardo-Locarno (2010), the genus and species identification of the pest beetle was performed (Figure 3).



Figure 3. Adult stage of the beetle feeding on the internal part of ripe guava fruits

Taxonomic identification: Considering the report by Bran *et al.* (2007), Stechauner-Rohringer & Pardo-Locarno, (2010), and Guzmán-Vásquez *et al.* (2021) indicating adult characteristics such as: rounded or sinuate anterior margin of the clypeus, antennae with eight or ten segments. They also report that males, unlike females, present thickened protarsi and the inner claw larger than the outer claw, which makes sexual dimorphism accentuated. These characteristics apply to the genus *Cyclocephala* and species *lunulata*, which has the following taxon:

Kingdom: Animalia

Phylum: Arthropoda

Class: Insecta

Order: Coleoptera

Suborder: Polyphaga

Family: Scarabaeidae (or Melolonthidae according to some authors)

Subfamily: Dynastinae

Tribe: Cyclocephalini

Genus: *Cyclocephala* Dejean, 1821

Species: *Cyclocephala lunulata* Burmeister, 1847

Other unique characteristics of the species include a light brown or yellow coloration; however, the black forehead is the determining characteristic. The glaber is hairless and shows a pattern of dark spots. These anatomical structures of the beetle were compared with the Global Biodiversity Information Facility (GBIF) databases, confirming the species identification.

Geographic distribution: This group of beetles is exclusive to America and has more than 350 species distributed from North America to South America (Stechauner-Rohringer & Pardo-Locarno, 2010; Aragón-García *et al.*, 2012; Guzmán-Vásquez *et al.*, 2021; Paz *et al.*, 2022). This genus is the most abundant and diverse of the *Cyclocephala* (Melolonthidae: Dynastinae). In Mexico, 62 species of the genus *Cyclocephala* have been identified (Guzmán-Vásquez *et al.*, 2017). Its importance lies in the fact that adults are pollinators and are related to more than 160 species of angiosperm plants (Moore & Jameson, 2013; Gibernau *et al.*, 1999). It is reported that in exchange for the benefits the plants receive (pollination), they provide food and shelter to the beetles (García-Robledo *et al.*, 2004; Dieringer *et al.*, 2012; Moore & Jameson, 2013; Parizotto & Grossi, 2019; Guzmán-Vásquez *et al.*, 2021; Gómez & Pérez, 2024)

Life cycle: The biological cycle of *Cyclocephala* is considered univoltine, but for the species *lunulata* it is bivoltine (Stechauner-Rohringer & Pardo-Locarno, 2010); this insect presents two life cycles during the year. Its biological behavior partly explains its presence during the spring season in the Mezitlán region. This bivoltine condition applies only to warm equatorial lands, where the insect has food and environmental humidity availability, as well as optimal temperature for its development (Pardo-Locarno *et al.*, 2012).

Cyclocephala females deposit their eggs directly into the soil; their larvae live underground, where they feed on grass roots, decomposing organic matter, or plant petioles (Souza *et al.*, 2015). The beetle's life cycle comprises the stages of adult, egg, larva I, larva II, larva III, prepupa, and pupa, with an average lifespan of 166 days (Figure 4).

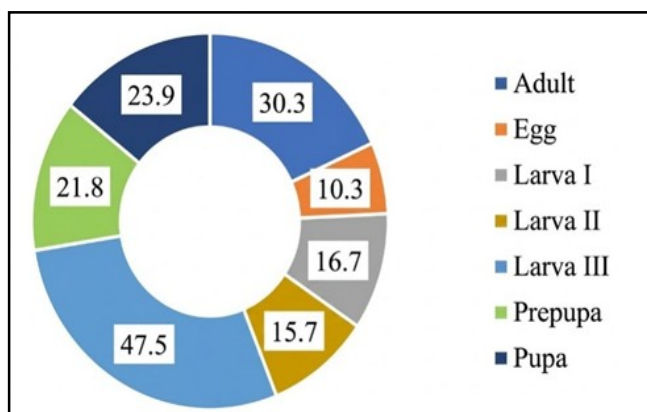


Figure 4. Life cycle (days) of *Cyclocephala lunulata* Burmeister, 1847, taken and modified from Stechauner-Rohringer & Pardo-Locarno (2010)

Food sources of the beetle: *Cyclocephala* is considered an agricultural soil pest insect, where due to its saprophytic characteristics it feeds on organic matter (Dias & Rodrigues, 2018; Díaz Mederos *et al.*, 2006; Moore & Jameson, 2013). It is in the larval stage where it generates the most important damage to agricultural activity (Díaz Mederos *et al.*, 2006). However, some studies like García *et al.* (2009) and Stechauner-Rohringer and Pardo-Locarno (2010) report that *C. lunulata* adults emerge from the soil during two periods of the year, mainly in the rainy season, initially in April and May and subsequently between October and November. It is also mentioned that these insects have crepuscular and nocturnal habits (Aragón *et al.*, 2001; Carrillo Ruiz & Morón, 2003). Exudates generated by the flowers and ripe fruits of some plants are attractants for this insect; among these plants are *Pithecellobium* sp. and *Psidium guajava* (Aragón *et al.*, 2001; Moore & Jameson, 2013). These reports informing that *C. lunulata* is attracted to guava coincide with the behavior of the beetle in this study. Some plants have flowers with ultraviolet blue-purple tones that insects like beetles identify as attractants (Dieringer *et al.*, 2012; Schiestl & Stefan, 2012; Souza *et al.*, 2015). In the case of guava, oils such as α -copaene, β -caryophyllene, and limonene have been identified as the main organic compounds attracting *C. lunulata* (Díaz *et al.*, 2023; García-Díaz *et al.*, 2020). Some evidence in early associations of angiosperm plants with beetles shows that they evolved due to a pre-existing sensory bias in beetles as a result of coevolution (Schiestl & Stefan, 2012). A report by Reverendo *et al.* (2022) mentions that Cyclocephaline beetles on the ground, on grass leaves, or shrubs do not use sex pheromones as attractants, but *Cyclocephala* has or perceives

aggregating odorants, and it is important to continue researching because this group of insects is attracted to the phytochemicals of ripe fruits. Likewise, the frugivorous condition of the adult is reiterated, which allows maintaining its status as a potential pest in guava plantations, with a brief and seasonal impact due to the speed of the reproductive period and short longevity exhibited by adults (Stechauner-Rohringer & Pardo-Locarno, 2010).

CONCLUSIONS

The identification of the beetle feeding on ripe fruits in guava plantations belongs to the genus *Cyclocephala lunulata* L. Burmeister, 1847 and is part of the uncommon pest insects of these fruit trees. It is also concluded that the region's agroclimatic conditions provide comfort for its optimal development.

REFERENCES

- Amin, M. R., Khisa, S., Rahman, H., Jannat, R., & Badruzzaman, M. (2019). Seasonal abundance of major sucking and chewing insects of guava. *Bangladesh Journal of Zoology*, 47(1), 97–105. <https://doi.org/10.3329/bjz.v47i1.42025>
- Aragón-García, A., Morón Ríos, M. Á., Damián-Huato, M. Á., López-Olguin, J. F., Pinson-Rincón, E. P., & Pérez-Quintanilla, J. N. (2012). Fauna de Coleoptera Lamellicornia de la zona cañera del ingenio de Atencingo, Puebla, México. *Acta Zoológica Mexicana (N.S.)*, 28(1), 161–171. <https://doi.org/10.21829/azm.2012.281823>
- Aragón, A., Morón, M.-Á., Tapia-Rojas, A. M., & Rojas-García, R. (2001). Fauna de Coleoptera Melolonthidae en el rancho “La Joya”, Atlixco, Puebla, México. *Acta Zoológica Mexicana (n.s.)*, (83), 143–164.
- Aragón, A., Morón, M.-A., Tapia-Rojas, A. M., & Rojas-García, R. (2001). “La Joya”, Atlixco, Puebla, México. *Acta Zool. Mex. (n.S.)*, 83, 143–164.
- Bran, A. M., Londoño, M. E., & Pardo, L. C. (2007). Morfología de estados inmaduros de tres especies de *Cyclocephala* (Coleoptera: Melolonthidae) con una clave para larvas de tercer estado en Colombia. *Ciencia & Tecnología Agropecuaria*, 7(2), 58–66. https://doi.org/10.21930/rcta.vol7_num2_art71
- Carrillo-Ruiz, H., & Morón, M.-Á. (2003). Fauna de Coleoptera Scarabaeoidea de Cuetzalan del Progreso, Puebla, México. *Acta Zoológica Mexicana (n.s.)*, (88), 87–121. <https://doi.org/10.21829/azm.2003.88881791>
- Dias, B. M. R., & Rodrigues, S. R. (2018). Floral association of adult *Cyclocephala tucumana* Brethes and *Cyclocephala melanocephala* (Fabricius) with passion flowers (*Passiflora edulis* Sims). *Entomo Brasilis*, 11(2), 144–146. <https://doi.org/10.12741/ebrazilis.v11i2.738>
- Díaz Mederos, P., Nájera Rincón, M. B., Lezama Gutiérrez, R., Rebollo Domínguez, O., Flores López, H. E., & Martínez Sifuentes, J. A. (2006). Especies de gallina ciega (Coleoptera: Melolonthidae) y su asociación con factores agroclimáticos y de manejo del maíz en los Altos de Jalisco, México. *Fitosanidad*, 10 (3), 209–215.
- Díaz, V., Moyano, A., Giudice, A., Coll-Araoz, M. V., Pérez-Staples, D., & Abraham, S. (2023). Male exposure to guava volatiles affects female remating behavior in *Anastrepha fraterculus*. *Entomologia Experimentalis et Applicata*, 171(11), 828–837. <https://doi.org/10.1111/eea.13359>

- Dieringer, G., R. L. C., Lara, M., Loya, L., Reyes, P., Journal, I., Dieringer, G., R. L. C., Lara, M., Loya, L., & Reyes-Castillo, P. (2012). *Beetle Pollination and Floral Thermogenicity in Magnolia tamaulipana (Magnoliaceae)* Reviewed work (s): Source: *International Journal of Plant Sciences*, Vol. 160, No. 1 (January 1999), pp. 64-71 Published by: The University of Chicago Press St. 160(1), 64-71.
- Dieringer, G., Cabrera R., L., Lara, M., Loya, L., & Reyes-Castillo, P. (1999). Beetle pollination and floral thermogenicity in *Magnolia tamaulipana* (Magnoliaceae). *International Journal of Plant Sciences*, 160(1), 64-71. <https://doi.org/10.1086/314099>
- Fernández, E. M. A., Granados, J. C., Mayagoitia, A. L., Romero, L. R., de Aluja, A. S., Tavera, F. J. T., Elizondo, G. V., Cantón, B. V., Salinas, E. M., & Rodríguez, I. C. R. (2018). Prefacio a la quinta edición. In *Patología general veterinaria* (pp. 7-8). <https://doi.org/10.2307/j.ctv1xxv3n.2>
- García-Díaz, E., Trejo, R., Tafoya, F., Aragón-García, A., & Elizalde-González, M. P. (2020). Profile of Terpenoid Compounds Mediating a Plant-Herbivore Interaction: Screening by Static Headspace Solid-Phase Microextraction-Gas Chromatography/Q-ToF Mass Spectrometry. *Chemistry and Biodiversity*, 17(11). <https://doi.org/10.1002/cbdv.202000564>
- García-Robledo, C., Kattan, G., Murcia, C., & Quintero-Marín, P. (2004). Beetle pollination and fruit predation of *Xanthosoma daguense* (Araceae) in an Andean cloud forest in Colombia. *Journal of Tropical Ecology*, 20(4), 459-469. <https://doi.org/10.1017/S0266467404001610>
- García, G. L., Ortega-Arenas, L., Hernández, H. G., García, A. A., Nápoles, J. R., & Cortés, R. R. (2009). Descripción de las larvas de tercer instar de melolonthidae (coleoptera) asociadas al cultivo de agave tequilana var. Azul y su fluctuación poblacional en Jalisco, México. *Neotropical Entomology*, 38(6), 769-780. <https://doi.org/10.1590/S1519-566X2009000600010>
- Gibernau, M., Barabé, D., Cerdan, P., & Dejean, A. (1999). Beetle pollination of *Philodendron solimoesense* (Araceae) in French Guiana. *International Journal of Plant Sciences*, 160(6), 1135-1143. <https://doi.org/10.1086/314195>
- Guzmán-Vásquez, H. M., Sánchez-García, J. A., & Hernández-Cruz, J. (2017). El género *Cyclocephala* Dejean, 1821 (Coleoptera: Melolonthidae: Dynastinae: Cyclocephalini) en México. *Entomología Mexicana*, 2(4), 808-812.
- Guzmán-Vásquez, H. M., Sánchez-García, J. A., Hernández-Cruz, J., Rös, M., & Deloya, C. (2021). Los escarabajos Dynastinae (Coleoptera: Scarabaeidae) de Oaxaca, México: lista actualizada de especies y análisis de su distribución. *Revista Mexicana de Biodiversidad*, 92, e923419. <https://doi.org/10.22201/ib.20078706e.2021.92.3419>
- Kanna, S. Suganya, Nivashini, A., Pavithra, I., Piruthiga, B., Praveenchandran, V., Muthiah, C., Saraswathy, S., & Rajangam, J. (2024). Influence of biotic and abiotic factors on pest incidence and natural enemies in guava (*Psidium guajava* L.). *Journal of Advances in Biology & Biotechnology*, 27(7), 648-654. <https://doi.org/10.9734/jabb/2024/v27i71025>
- Mahmoud, H. H., El-rahman, S. F. A., Mahbob, M. A. E., & Ahmed, S. (2021). *Seasonal abundance of the most important insect pests of maize and their natural enemies in Egypt*. 90(1), 27-40. <https://doi.org/10.5604/01.3001.0014.8151>
- Moore, M. R., & Jameson, M. L. (2013). Floral associations of cyclocephaline scarab beetles. *Journal of Insect Science*, 13, 1-43. <https://doi.org/10.1673/031.013.10001>
- Pardo-Locarno, L., González, J., Rafael Pérez, C., Yepes, F., & Fernández, C. (2012). Escarabajos de importancia agrícola (Coleoptera: Melolonthidae) en la Región Caribe colombiana: Registros y propuestas de manejo. *Boletín Del Museo Entomológico Francisco Luis Gallego*, 4(2), 7-24.
- Parizotto, D. R., & Grossi, P. C. (2019). Revisiting pollinating *Cyclocephala* scarab beetles (Coleoptera: Melolonthidae: Dynastinae) associated with the soursop (*Annona muricata*, Annonaceae). *Neotropical Entomology*, 48(3), 415-421. <https://doi.org/10.1007/s13744-018-0647-y>
- Paz, F., Ratcliffe, B. C., & Figueroa, L. (2022). Three new species of *Cyclocephala* (Coleoptera: Scarabaeidae: Dynastinae) from Amazonian Peru and a checklist of *Cyclocephala* species in Peru. *Zootaxa*, 5087(3), 427-440. <https://doi.org/10.11646/zootaxa.5087.3.2>
- Schiestl, F. P., & Stefan, D. (2012). *The evolution of floral scent and olfactory preferences in pollinators : coevolution or pre-existing bias ?* Evolution, 66(7), 2042-2055. <https://doi.org/10.1111/j.1558-5646.2012.01593.x>
- Souza, T. B., Maia, A. C. D., Albuquerque, C. M. R., & Iannuzzi, L. (2015). Biology and management of the masked chafer *Cyclocephala distincta* burmeister (Melolonthidae, Dynastinae, Cyclocephalini). *Revista Brasileira de Entomologia*, 59(1), 37-42. <https://doi.org/10.1016/j.rbe.2015.02.004>
- Stechauner-Rohringer, R., & Pardo-Locarno, L. (2010). Redescrición de inmaduros, ciclo de vida, distribución e importancia agrícola de *Cyclocephala lunulata* Burmeister (Coleoptera: Melolonthidae: Dynastinae) en Colombia. *Boletín Científico. Centro de Museos. Museo de Historia Natural*, 14(1), 203-220.
