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Scientific Note

Hidden in plain sight: new distribution and host plant records for the lace bug species *Gargaphia lunulata* (Mayr, 1865) (Hemiptera: Heteroptera: Tingidae) in Brazil

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Abstract. The lace bug species *Gargaphia lunulata* (Mayr, 1865) (Hemiptera: Heteroptera: Tingidae) is a polyphagous pest associated with several plant families, including hosts of agricultural, medicinal, and weedy importance. In this study, we report for the first time the occurrence and damage caused by *G. lunulata* on chanana, *Turnera subulata* Sm. (Passifloraceae), in four Brazilian states. This lace bug was collected and inspected on *T. subulata* in urban areas of the municipalities of Barão de Grajaú (Maranhão), Floriano and São José do Peixe (Piauí), Janaúba (Minas Gerais), and Piracicaba (São Paulo), Brazil, from December 2025 to January 2026. Subsequently, in last April, *G. lunulata* was also collected from Barbados cherry, *Malpighia emarginata* DC. (Malpighiaceae) (new host), in a backyard in the municipality of Americana (São Paulo). On both host plants, this lace bug causes damage mainly to the leaves, which became yellowed, curled, and dried. During inspections, eggs, nymphs, and adults of the pest were found on both host plants, indicating that the life cycle was completed on these host plants. The occurrence of *G. lunulata* was updated to 12 Brazilian states with the inclusion of our records.

Keywords: Malpighiaceae, *Malpighia emarginata*, New host plant, Passifloraceae, *Turnera subulata*.

The lace bug of the genus *Gargaphia* Stål, 1873 comprises approximately 70 species in the New World, is distributed from Canada to Argentina, and some species cause damage to plants of economic importance (Drake & Ruhoff 1965; Henry & Froeschner 1988; Guidoti 2013; Coelho & Da-Silva 2015; Ferreira et al. 2018).

The lace bug species *Gargaphia lunulata* (Mayr, 1865) was originally described as *Monanthia lunulata* without a host plant record, based on specimens collected in the state of Rio de Janeiro, Brazil (Mayr 1865). In South America, this lace bug has been recorded in Argentina (Bosq 1937), Brazil (Mayr 1865), Colombia (Zenner 1970), Paraguay (Drake 1935), and Uruguay (Berg 1884). In Brazil, the species was recorded in nine states, namely Acre (Santos et al. 2017), Alagoas (Silva et al. 1968), Bahia (Bondar 1930), Ceará (Bastos 1972), Minas Gerais (Drake & Hambleton 1934; Silva et al. 1968), Pará (Drake 1935), Paraná (Santos et al. 2017), Rio de Janeiro (Mayr 1865), and Tocantins (Ferreira et al. 2018).

Gargaphia lunulata is polyphagous and has been associated with several commercially important plant species, such as okra, *Abelmoschus esculentus* (L.) Moench (Malvaceae), soybean, *Glycine max* (L.) Merr., bean, *Phaseolus vulgaris* L. (Fabaceae), passion fruit, *Passiflora alata* Curtis and *P. edulis* Sims (Passifloraceae), and guava, *Psidium guajava* L. (Myrtaceae), among others (Drake & Ruhoff 1965; Silva et al. 1968; Santos et al. 2017; Coelho & Da-Silva 2015; Ferreira et al. 2018; Gamboa et al. 2023). However, older host records that had not observed eggs or nymphs (e.g., Drake & Hambleton 1934) may include plants where adults were merely collected by chance.

Chanana, *Turnera subulata* Sm. (Passifloraceae), native to South and Central America, has been introduced into North America, Africa, and Asia (Rocha et al. 2018; Rosário et al. 2023; WFO 2026). *Turnera subulata* has several applications, including (i) in the pharmaceutical industry, due to the presence of bioactive phytocompounds, especially polyphenols; (ii) in traditional medicine, for the treatment of amenorrhea and dysmenorrhea; (iii) in landscaping as an ornamental species; and (iv) as a non-conventional food plant (PANC), through the consumption of leaves and flowers (Lorenzi & Kinupp 2014; Luz et al. 2022; Rosário et al. 2023).

The Barbados cherry, *Malpighia emarginata* DC. (Malpighiaceae), is native to the Caribbean, Central America, and northern South America (WFO 2026). In Brazil, the species has adapted well to commercial cultivation, particularly in the Northeastern Region, where it is widely grown (Farinelli et al. 2021).

Gargaphia lunulata has been recorded in Brazil associated with *Turnera ulmifolia* L. in Tocantins (Ferreira et al. 2018) and with *T. subulata* in Ceará (Moreira et al. 2024). In this country, *G. lunulata* has been known to attack plants of commercial interest since the 1930s, when pioneering studies on this pest were conducted in Bahia, Minas Gerais, and Rio de Janeiro (Bondar 1930; Drake & Hambleton 1934; Lima 1936). On the other hand, this is the first record of *Malpighia emarginata* associated with *G. lunulata* in Brazil.

Although most studies on *G. lunulata* have been conducted in Brazil, its occurrence on *T. subulata* has yet to be investigated in some states of the country, such as Piauí, Maranhão, Minas Gerais, and São Paulo. Therefore, the objective of this study was to update information on the distribution of the pest and its host plants in Brazil.

In December 2025 and January 2026, lace bugs were observed and manually collected from the abaxial surface of leaves of spontaneous *T. subulata* plants. Sampling was conducted in urban areas (Fig. 1) (e.g. sidewalks, roadsides, residential backyards, and highway margins) in the cities of Barão de Grajaú, Maranhão (6°45'18"S; 43°01'21"W; 123 m a.s.l.), Floriano, Piauí (6°45'44"S; 43°00'44"W; 113 m a.s.l.), São José do Peixe, Piauí (7°29'32"S; 42°33'59"W; 177 m a.s.l.), and Piracicaba, São Paulo (22°42'47"S; 47°38'12"W; 537 m a.s.l.). Similar occasional

collections in Americana, São Paulo (22°43'17.13"S; 47°20'45.10"W, 578 m a.s.l.), and Janaúba, Minas Gerais (15°49'15.54"S; 43°17'37.24"W, 533 m a.s.l.) were sampled from *M. emarginata* and *T. subulata* found in domestic backyards in April and July 2026.

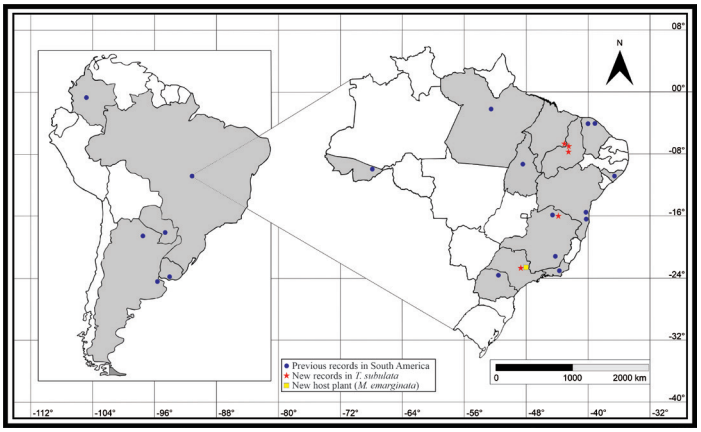

Figure 1. Distribution map of *Gargaphia lunulata* (Mayr, 1865) (Hemiptera: Heteroptera: Tingidae) in South America and Brazil.

The lace bugs were placed in 5.0 mL Eppendorf® tubes containing 99% ethanol, properly labeled with collection data, and transported to the Laboratory of Bioecology and Systematics of Arthropods (BIOESA), Universidade Federal do Piauí, Amílcar Ferreira Sobral Campus (UFPI/CAFS), Floriano, Piauí (specimens from Piauí and Maranhão). Specimens from São Paulo and Minas Gerais were studied at the "Luiz de Queiroz" Entomology Museum (MELQ-ESALQ/USP) of the Escola Superior de Agricultura "Luiz de Queiroz", Universidade de São Paulo (ESALQ/USP), Piracicaba, São Paulo. Ten adult specimens sampled from the three states were prepared as double mounts (point-mounted), labeled, identified, and deposited at MELQ-ESALQ/USP (ESALQENT002336-2345).

The lace bug was identified using the key of Stonedahl et al. (1992), the original description (Mayr 1865), and a photograph of the syntype (Fig. 3C). Morphological terms were assigned based on previous monographs (Drake & Davis 1960; Drake & Ruhoff 1965). The identification of Chanana plant (Fig. 2A) was based on the key of Rocha et al. (2018) and later confirmed by taxonomists. Additionally, we compiled a list of all historical records of *G. lunulata* host plants by locality in Brazil (see S1, Tab. 1).

Figure 2. *Gargaphia lunulata* (Mayr, 1865) (Hemiptera: Heteroptera: Tingidae) on host plant: (A) *Turnera subulata* from Piauí, Brazil; (B) adults and excreta (red arrow) on the abaxial surface of the leaves; (C) leaf chlorosis on the adaxial surface caused by the pest (red arrow); (D) final damage to the leaf caused by the pest.

The lace bugs collected on leaves of *T. subulata* (Fig. 2B) and *M. emarginata* were identified as *G. lunulata*, based on the following morphological characters of adults (Fig. 3A-B): body mostly brown; antennal segment I brown; antennal segments II and III yellow; antennal segment IV yellow in the basal third and brown toward the apex; rostrum brown at the apex; metasternal laminae fused with each other at anterior ends; median and lateral carinae yellow; hemelytron with a dark curved spot on subapical part; legs yellow, with tarsi and tarsal claws brown.

This is the first record of *G. lunulata* infesting and damaging *T. subulata* in Maranhão, Piauí, São Paulo, and Minas Gerais, expanding the known distribution of the pest in Brazil. The occurrence of *G. lunulata* has now been expanded to 12 Brazilian states (Fig. 1), encompassing four of the five geographic regions of the country. There are no records of *G. lunulata* from the Central-West region. Barbados cherry is for the first time associated to *G. lunulata* in Brazil (see S1, Tab. 1).

Gargaphia lunulata infests the abaxial surface of leaves of chanana (Fig. 2B) and Barbados cherry. Eggs, nymphs, and adults were found, and the pest completed its entire life cycle on the host plants.

In infested plants, symptoms of yellowing (chlorosis) were found on the adaxial surface (Fig. 2C), which progressed to curling of the leaf blade (Fig. 2D), followed by drying of the structure. On the abaxial leaf surface, adults were commonly observed together with dark brown to black excreta deposited on the host plant tissue (Fig. 2B). Both young and adult plants were infested by the pest.

Damages (leaf chlorosis), like those observed in *T. subulata* and *M. emarginata*, have also been reported in other host plants of *G. lunulata*, such as, *Arachis repens* Handro (Fabaceae) (Coelho & Da-Silva 2015), *Canavalia ensiformis* (L.) DC. (Fabaceae), *Ruta graveolens* L. (Rutaceae) (Santos et al. 2017), *Passiflora caerulea* L., and *P. edulis* Curtis (Passifloraceae) (Ajmat et al. 2003), among others.

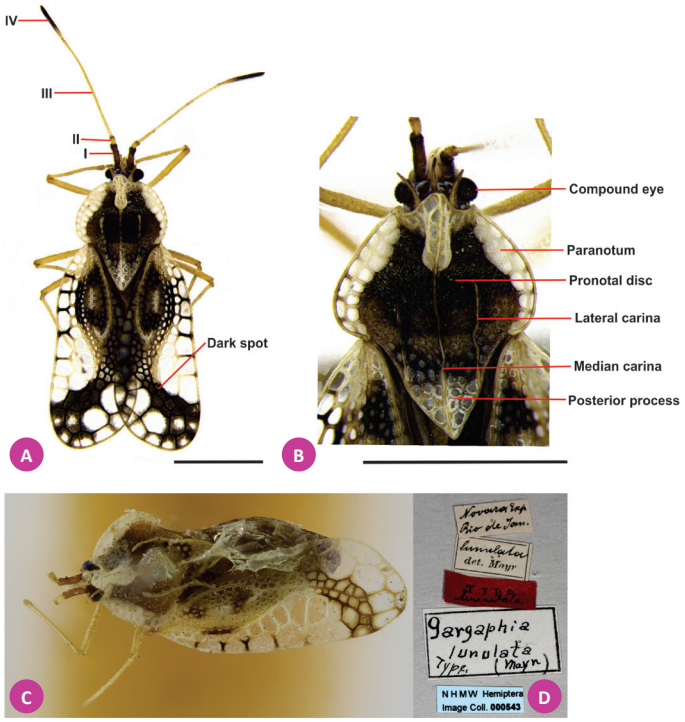

Figure 3. *Gargaphia lunulata* (Mayr, 1865) (Hemiptera: Heteroptera: Tingidae) from Brazil: (A) dorsal habitus; (B) pronotum in dorsal view; (C) syntype in dorsolateral view; (D) label of syntype. Scale bars = 1.0 mm (A, B).

Turnera subulata is widely distributed in Brazil (WFO 2026), occurring in urban areas, along roadsides, in vacant lots, and on sidewalks, among other habitats. Thus, the wide distribution of *T. subulata* may help explain the broad occurrence of *G. lunulata* across several Brazilian localities. *Gargaphia lunulata* is common in northeastern Brazil and has been considered an important pest of passion fruit (*Passiflora* spp.) in Ceará (Bastos 1972). However, it is currently regarded as a pest of minor importance in that state, despite

T. subulata being commonly found in passion fruit production areas throughout Ceará (Moreira et al. 2024).

Gargaphia lunulata has also been associated with other fruit-bearing plants, such as guava, peach tree, passion fruit, and several others hosts plants (see Silva et al. 1968).

We infer that *G. lunulata* is widely associated with *T. subulata* and *M. emarginata* in other localities of northeastern Brazil and possibly throughout the country; however, additional sampling is required to confirm this association. Nevertheless, it is important to note that *G. lunulata* is polyphagous and has already been associated with more than 30 host plants (see S1, Tab. 1), including cultivated, spontaneous, and ornamental species (Santos et al. 2017; Ferreira et al. 2018; Moreira et al. 2024). Among Malpighiaceae, *G. lunulata* has previously been recorded only from *Stigmaphyllon* sp. (Drake & Hambleton 1934; Lima 1936) (see S1, Tab. 1). The records reported here therefore expand the known host range of this pest.

In the present study, *G. lunulata* was recorded on chanana, even in the presence of other known host plants of the pest, such as *P. guajava* (Lima 1936) and castor bean, *Ricinus communis* L. (Euphorbiaceae) (Drake & Hambleton 1934), in the vicinity of some sampled areas. In the state of Ceará, infestations of *G. lunulata* are higher on chanana even when other host plants are present (Moreira et al. 2024). Another aspect to be considered is that this study, conducted in December and January, coincided with the rainy quarter in the northeast region (December-February) (Silva et al. 2013), which may have contributed to the development of both the host plant and the pest. Additionally, older host records without observation of eggs or nymphs (e.g., Drake & Hambleton 1934) may include plants where adults were merely collected by chance. The detection of *G. lunulata* on *M. emarginata* highlights the need to maintain vigilance regarding its occurrence and associated damage to fruit trees as well. Although *M. emarginata* is widely cultivated in Brazil, particularly in the Northeastern Region (Farinelli et al. 2021), the new record of *G. lunulata* on this host (see S1, Tab. 1) highlights the need to monitor this pest in commercial production areas.

Understanding infestation patterns, distribution, and damage—especially of polyphagous pest species such as *G. lunulata*—provides relevant information for advancing different areas of knowledge which, taken together, support and strengthen Integrated Pest Management (IPM) in agroecosystems and subsistence crops. This study highlights the need for phytosanitary monitoring of spontaneous host plants near commercial plantations and home gardens in order to prevent the spread of *G. lunulata.*

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Authors' Contributions

NSS: Conceptualization, Investigation, Methodology, Writing - original draft; JS: Investigation, Writing - original draft; LSD: Conceptualization, Methodology, review & editing; RAZ: Conceptualization; Writing - original draft; Writing - review & editing; ASA: Conceptualization, Methodology, review & editing; MS: Conceptualization, Investigation, Writing - original draft, Writing - review & editing.

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Not applicable.

Supplementary Material

Supplementary data for this article be accessed at doi: https://doi.org/10.17632/6bt2rrnk83.1

Data Availability

The datasets generated during this study are available from the corresponding author upon reasonable request.

Generative AI Statement

The authors declare that no generative artificial intelligence tools were used in the preparation of this manuscript.

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