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Nota científica

New record of the boxelder bug *Boisea trivittata* in Argentina suggests a rapid spread

Nuevo registro de la chinche del arce *Boisea trivittata* en Argentina sugiere una rápida dispersión

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Abstract
This study documents the presence of the boxelder bug *Boisea trivittata* (Say, 1825) (Hemiptera: Rhopalidae) in the city of San Juan, Argentina. In May 2024 (austral autumn), twelve specimens of *B. trivittata* were identified and deposited in the collection of the Institute of Basic Sciences at the National University of San Juan. This species, native to North America, is not considered a pest in its native range, and its introduction to South America was first reported in Santiago, in 2020. Our record adds to the first report of the species in Argentina, documented in the city of Mendoza in April 2024. This study provides relevant information on the species and discusses potential management strategies.

Keywords:
Alien species, Invasive species, Rhopalidae, Chinche del Maple.

Resumen
En este trabajo se documenta la presencia de la chinche del arce *Boisea trivittata* (Say, 1825) (Hemiptera: Rhopalidae) en la ciudad de San Juan, Argentina. En mayo de 2024 (otoño austral), se identificaron doce especímenes de *B. trivittata*, los cuales se encuentran depositados en la colección del Instituto de Ciencias Básicas de la Universidad Nacional de San Juan. Esta especie, originaria de América del Norte, no es considerada una plaga en su rango de distribución nativo, y su introducción en Sudamérica fue reportada por primera vez en Santiago. Nuestro registro se suma al primer reporte de la especie en Argentina, realizado en la ciudad de Mendoza en abril de 2024. En este trabajo se presenta información relevante sobre la especie y se discuten posibles estrategias de manejo.

Palabras clave:
Especies exóticas, Especie invasora, Rhopalidae, Boxelder bugs.

Introduction

Boisea trivittata (Say, 1825) (Hemiptera: Rhopalidae), commonly known as the boxelder bug, populist bug, or cotton stainer, is a species of the family Rhopalidae native to North America (Yoder, 1989). This species primarily feeds on plant fluids, with a preference for the seeds of maple trees (Sapindaceae: Acer), although it has also been documented on other hosts such as *Aesculus, Tilia, Spiraea, Iris, Tulipa*, and Cactaceae, all of which are present in the region. Additionally, it occasionally attacks crops, causing moderate damage (Yoder 1989). The activity of these insects increases in late summer, when they aggregate in large numbers on their hosts to feed (Yoder 1989). During the winter, adults seek shelter under leaf litter, emerging the following spring to lay eggs (Yoder 1989). This species is also considered an urban pest, as in the fall, it tends to invade houses in large numbers, staining surfaces with its feces (Yoder 1989).

In 2020, *B. trivittata* was detected in South America for the first time, specifically in Santiago, Chile, where it is believed to have arrived through unintentional air transportation (Faúndez et al. 2020). Since then, its distribution range has expanded rapidly within Chile (Faúndez 2023a). More recently, the presence of this insect was reported in Argentina, in the province of Mendoza, where it is thought to have arrived overland from Chile (Faúndez et al. 2024) (Figure 1). This study reports, for the first time, the presence of *B. trivittata* in the province of San Juan and discusses its potential implications for the region.

Argentina's economy is heavily reliant on agriculture, making it particularly vulnerable to the detrimental effects of invasive species (Duboscq et al. 2021). This vulnerability is especially evident in the province of San Juan, where invasive insect species significantly impact the economy by causing substantial production losses and increasing management costs (Ovruski & Schliserman 2012). Notably, *B. trivittata* has been observed feeding on key crops such as grapes and pistachios (Michailides et al. 1988; Schaefer & Panizzi 2000), which are crucial to the agricultural output of San Juan (Plat & Gallo 2023). This paper documents the presence of *B. trivittata* in city of San Juan, Argentina, provides relevant information about the species, and discusses possible management strategies. Early detection and accurate data will facilitate the implementation of more effective management practices (Mehta et al. 2007).

Figure 1 Hypothetical invasive way of ***Boisea trivittata*** in South America. Records from iNaturalist (red squares), and the first intrusion in South America (Santiago, Chile) via airplane in 2020 (orange dotted line). Invasion pathway via land transportation to Mendoza (Argentina) (green dashed line). The latest displacement to San Juan (by land) (cyan solid line), and the new record (cyan hexagon) from the capital city of San Juan (Argentina).

Material and methods

We received a call from a family reporting an infestation of an unknown bug in a house in San Juan province on May 7, 2024, (austral autumn). Their main concern was that it could be a Chagas disease vector such as the kissing bug (*Triatoma infestans* (Klug, 1834)). We carefully looked for specimens under tree bark, leaf litter, cardboard, and other suitable habitats in the house and a 200-meter perimeter in the neighborhood, the survey took 4 hours in total. Insects were captured by hand and brought to Instituto de Ciencias Básicas (ICB) of the Universidad Nacional de San Juan. The identification of the specimens was carried out using the keys by Chopra (1967); Hoebeke & Wheeler (1982); Pall & Coscarón (2012), and Carroll (2020). *Boisea trivittata* has a conspicuous coloration, appearing black dorsally with red eyes and ocelli. A vertical orange line in the center of the pronotum, as well as along its lateral and posterior margins, and on the hemelytra are distinctive characters (Figure 2). It is easily distinguished from *B. rubrolineata* (Barber 1956; Carroll 2020) by the lack of pigmentation on the elytral veins. Besides the coloration pattern, it differs from the native genus *Jadera* (Rhopalidae) by having a buccula that does not reach the base of the head.

Results

Twelve specimens (eight males and four females), from San Juan city, were positively identified as *B. trivittata* (Figure 2). They were found in aggregations under the bark of a dead *Fraxinus excelsior* (Linnaeus 1753) [Oleaceae] tree and in two households next to the tree (coordinates: 31° 32' 32.93'' S, 68° 33' 15.23''W, 653 m of altitude). No more individuals were detected in the rest of the trees surveyed or households in the neighborhood. Samples were deposited in the biological collection of ICB under the identification code ECRA-I-175.

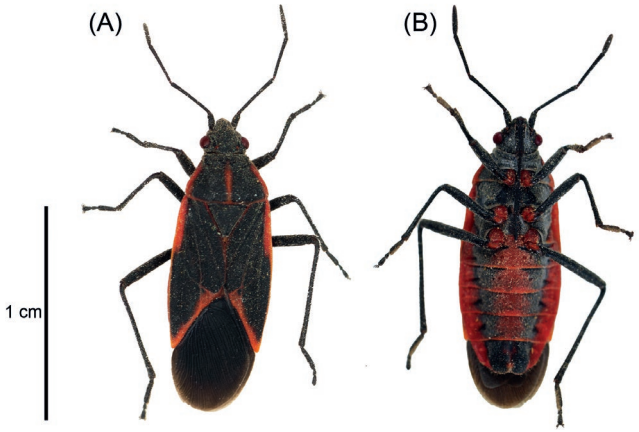

Figure 2 ***Boisea trivittata*** individual captured in the San Juan province, Argentina. A) dorsal view. B) ventral view.

Discussion

Boisea trivittata does not cause significant crop losses in the Northern Hemisphere, although severe damage to fruits such as apples, grapes, plums, pears, pistachios, and strawberries has been reported (Knowlton 1951; Wheeler 1982; Michailides et al. 1988; Yoder 1989; Schaefer & Panizzi 2000). Similar impacts could potentially occur in Argentina. Therefore, it is advisable to monitor invasive populations in their new distribution area, as *B. trivittata* has demonstrated high host flexibility (Carroll & Loye 2012). The potential of this species to become problematic for crops (such as those mentioned above), public trees, or native species should not be underestimated. Many invasive species become harmful outside their native range when they encounter novel ecosystems where limiting ecological factors, such as predators or diseases, are absent (Mehta et al. 2007). Pests are particularly relevant in this region, as agriculture is the primary economic activity. Argentina is severely affected by biological invasions, which cause extensive environmental and economic damage. In 2016, these damages were estimated at US$4.3 million, equivalent to 0.76% of the GDP—comparable to the national health budget (US$4.6 million) (Duboscq-Carra et al. 2021).

In San Juan, invasive insect pests are a major cause of agricultural production losses. For instance, *Lobesia botrana* (Denis & Schiffermüller, 1775) and *Ceratitis capitata* (Wiedemann, 1824) are among the leading causes of crop damage, also limiting trade opportunities (Ovruski & Schliserman 2012; Aguirre Zapata et al. 2022), which further exacerbates the economic impact.

In addition to its potential as an agricultural pest, *B. trivittata* is known to cause direct problems for humans due to its gregarious behavior, making it a recognized urban pest. With the seasonal drop in temperatures, these insects seek refuge inside human dwellings, where their excrement stains surfaces such as walls and fabrics (Yoder 1989). Additionally, they may cause incidental bites as a defensive response to handling or accidental contact (Faúndez 2023b). These bites do not produce severe symptoms, typically causing brief stinging pain accompanied by minor localized swelling (Faúndez 2023b). Another source of conflict associated with this insect, specific to the region, is its resemblance to vectors of Chagas disease, such as the kissing bug (*Triatoma infestans*) (Carrizo Páez et al. 2008). Reports of *B. trivittata* inside households may lead to fear and distress, as observed in a family that recently contacted us.

The cities of Mendoza and San Juan are geographically close (<160 km) and share a high flux of people and goods, including potential *B. trivittata* hosts such as horticultural products, ornamental plants, and firewood. Therefore, we suggest that the species was inadvertently transported through one of these means, following the pathway proposed in Figure 1. The boxelder bug is closely associated with *Acer* trees, which are present in both cities as part of public afforestation projects for streets and parks. Among the species found in these cities are *Acer negundo, A. palmatum,* and *A. pseudoplatanus* (Martínez Carretero 2022), with the first being the preferred host of *B. trivittata*. Furthermore, both provinces belong to the Cuyo region, which has an arid climate with hot summers and mild winters (Kottek et al. 2006), similar to other areas colonized by this species, such as the southwestern United States, northern Mexico, and central Chile (Yoder 1989; Faúndez 2024). The primary limiting factor for the occurrence of this species is minimum winter temperatures. Therefore, we expect *B. trivittata* to spread rapidly toward the northeast while expanding more slowly toward Patagonia, where colder winters will force it to rely on urban microhabitats for overwintering. In summary, the Cuyo region, as well as most of the country, appears to provide a suitable habitat for the establishment of *B. trivittata*.

Several control methods have been proposed for this species, categorized as mechanical, chemical, and biological. Mechanical methods include the removal of preferred host trees and overwintering sites such as leaf litter and dead trees (Schaefer & Panizzi 2000). Regarding chemical control, no specific compound has proven to be particularly effective or ineffective against *B. trivittata*. However, on exterior surfaces, recommended compounds include carbaryl, azadirachtin, and pyrethroids such as bifenthrin and cypermethrin (Mampe 1972; Houseman & Barrett 2008). Finally, biological control methods include the use of commercial strains of the entomopathogenic fungus *Beauveria bassiana* (Balsamo-Crivelli 1836) (Reinert et al. 1999).

Fortunately, the invasion appears to be recent, and early detection enables more effective management strategies. The National System of Pest Surveillance and Monitoring (SINAVIMO) has already been alerted to the presence of this species in Mendoza (Faúndez et al. 2024) and San Juan (ID number: 1267). In the early stages of a biological invasion, control measures are more successful, as populations are typically smaller and confined to specific areas. Once a critical threshold is surpassed, the effort required to manage the species increases exponentially, making control operations more complex and economically burdensome (Mehta et al. 2007). Furthermore, a swift response from authorities could reinforce border controls to prevent further spread to new provinces or neighboring countries.

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