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Notes and Comments

Neopamera bilobata (Hemiptera: Rhyparochromidae), a strawberry pest, arrives in Santa Catarina state, Brazil

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Strawberry (*Fragaria × ananassa*) is among the small fruits with the largest acreage and the greatest adaptation in Brazil. It is generally cultivated on small properties in the states of Minas Gerais (41.4%), Rio Grande do Sul (25.6%), São Paulo (15.4%), Paraná (4.7%), and Distrito Federal (4%), with a total area of 3,500 hectares (Antunes and Reisser Junior, 2007).

Recently, *Neopamera bilobata* Say (1832) (Hemiptera: Rhyparochromidae) was observed at high densities in Paraná (Hata et al., 2019). The species originates in North American countries (ITIS, 2023), with records of occurrence in Central and South America), in hot periods between November and January (Hata et al., 2019).

The species is polyphagous, occasionally reported in tobacco crops and fig seeds (Faúndez, 2022), and despite feeding on strawberry leaves, nymphs only complete their development by feeding on unripe or ripe fruit, causing it to stop growing, stiffening, and drying out when in the early stages of infestation. In case of high infestation, the crown of the plant is also attacked, which causes wilting, leading to production loss (Kuhn et al., 2018).

Eggs of this insect are elongated and yellow and are usually deposited on fruits or the sepals, neck, or crown of the plant (Kuhn et al., 2018). The nymphal stage goes through five instars. In this stage, insects are very agile and move among the plants, making it difficult to capture and visualize them. Nymphs and adults can injure the strawberry plant (Kuhn et al., 2014).

In Santa Catarina state, there are no records of the occurrence of this species. This situation directly implies the correct management when its presence in the region is detected (since the crop, climate, and cultivation system may differ). Therefore, it is essential for studies to report the occurrence of the pest and to check the expansion of the geographic distribution of *N. bilobata*, which will allow future studies of niche modeling of this species and the development of measures for the management and control of the pest.

Thus, *N. bilobata* was sampled in a production area of strawberry cultivar Albion in a semi-hydroponic conventional production system in the municipality of Frei Rogério, state of Santa Catarina (27º 09' 10.7" S and 50º 43' 29.1" W) at 950 m altitude, annual temperature 14,7°C, annual mean of precipitation of 150mm and relative humidity 87% (EPAGRI/CIRAM, 2020).

Insects were collected (n=47), in 3 greenhouses six times every 10 days for 3 months at 2018, using an entomological aspirator on each of 8,600 strawberry plants. Species was identified by comparing the collected specimens with the available literature by Kuhn et al. (2014) and Botton et al. (2016). After being captured, insects were preserved in 70% alcohol and later identified in the laboratory using an entomological key of Hemiptera and a stereoscopic microscope (60x) to observe the morphological characters.

Neopamera bilobata was detected for the first time in the state of Santa Catarina (Figure 1). Adults of this insect are, on average, 0.5 cm long and have four-segmented antennae, the first three are yellowish-brown, and the last is entirely brown (Figure 1A and 1C). The species has the foreleg femurs dilated (Figure 1A) and a double row of spines on its ventral surface (Figure 1B). Sexual dimorphism was observed in the last abdominal segments (1D), with the femurs of males larger in diameter and the spines longer than those of females.

Regarding the environmental condition, *N. bilobata* is absent from places with temperatures up to 16°C, and its optimal development range is between 22 and 28°C, but if it exceeds 30°C, there is a reduction in viability of the life cycle of the species (Kuhn et al., 2018). The justification of the present report is the occurrence of the species in a region of often low temperatures, such as the region of Contestado Catarinense, which has an average annual temperature of 14.7°C. The insect population must have adapted to the altitude, low temperatures, and semi-hydroponic system in Santa Catarina state. In Paraná state, *N. bilobata* occurs mainly in December and January, and its occurrence positively correlates with the average annual temperature (Hata et al., 2020). As for the presence of injuries in strawberries, deformities, atrophy, and drying in fruits at the initial stages were noticed. Malformations in fruits are associated with *N. bilobata* feeding.

There are no regulated insecticides to control *N. bilobata* in Brazil (Agrofit, 2021). However, the combination of another crop with strawberry, such as garlic (*Allium sativum* L.), for example, can reduce the incidence of the pest by

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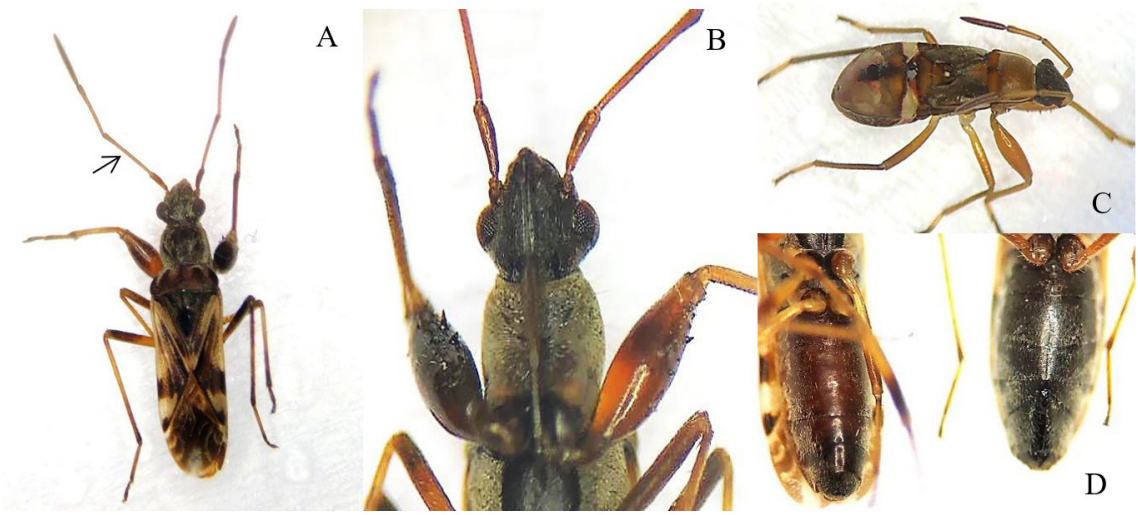

Figure 1. *Neopamera bilobata* from the state of Santa Catarina. A) Male, with the femur of the first pair of legs, dilated; B) Detail: a double row of spines on the ventral surface of the anterior femur; C) Nymph; D) Last abdominal segments of male (left) and female (right).

50% (Hata et al., 2019). In the laboratory, the insecticides azadirachtin and thiamethoxam effectively control nymphs in the first instar (Kuhn, 2014).

Strawberry cultivars whose seeds are embedded in pulp, such as Florida Brilliance, become more difficult to be accessed by *N. bilobata* (Talton et al., 2020). However, the Monterey cultivar seems to be more attacked by this pest. This species has a lower density in the Albion cultivar in the organic system than in the conventional one (Hata et al., 2020). There is a difference between strawberry cultivars and injuries caused to fruits by the insect. The authors also report that *N. bilobata* does not cause damage to unripe fruits due to the change in fruit physiology, as this insect requires the development of achenes for feeding at certain stages (Talton et al., 2020).

This record of *N. bilobata* occurrence in this region with mild temperatures corroborates the understanding of populations' behavior and dispersal. It can be used as a basis for developing studies seeking to implement and improve the integrated management of *N. bilobata* in the strawberry crop.

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