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Bauhinia variegata (Fabaceae) dieback caused by *Praelongorthezia praelonga* (Hemiptera: Ortheziidae)

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Tree species used in urban forestry are more predisposed to phytophagous insects and diseases due to the stress caused by air pollution, poor soils, and urban microclimate (Flückinger & Braun 1999). *Bauhinia variegata* L. (Fabaceae), is one of the most commonly used exotic trees for urban forestry and landscaping in Brazil. It is a semi-deciduous species, a native of India, and introduced for use in gardens and sidewalks (Lorenzi et al. 2003).

Bauhinia variegata has moderate growth, tolerates frost, and can reach up to 10 m in height (Lorenzi et al. 2003). This plant can grow on most soil types and starts to bloom when 2 to 3 yr old (Bhardwaj et al. 2015). *Bauhinia variegata* has antibacterial (Mishra et al. 2013) and antifungal properties (Bach et al. 2014), and is used in grazing areas (Habib et al. 2016), biomonitoring of environmental pollution (Fleck et al. 2016; Cardoso et al. 2017), and health treatments (Abbasi et al. 2015; Chan & Ng 2015; Kulkarni & Garud 2016).

Herbivorous insects may damage trees, especially when cropped in monoculture systems, in regions with their host plant target-species (Zanuncio et al. 1993, 2003). Phytophagous arthropods feeding on *B. variegata* include mites (Daud et al. 2007), the seed borer *Caryedon serratus* (Olivier) (Coleoptera: Chrysomelidae) (Nilsson & Johnson 1992), the twig girdler *Oncideres saga* (Dalman) (Coleoptera: Cerambycidae) (Peres Filho et al. 1992), and the mealybug *Praelongorthezia praelonga* (Douglas) (Hemiptera: Ortheziidae) (Garcia 1999).

Praelongorthezia praelonga is a polyphagous species, and feeds on plant species from more than 30 families, including citrus and ornamental plants (Kondo et al. 2013). This mealybug damages plants directly by feeding, and indirectly by inducing sooty mold formation on the leaves (Kondo et al. 2013). Outbreaks of this insect can deplete the host sap, leaving plants weak, and even killing them (Kondo et al. 2013). *Praelongorthezia praelonga* is native from Central and South America, and this large geographical range makes this pest a potential invasive species in other areas, as reported in the Democratic Republic of Congo (Kondo et al. 2013).

Since the beginning of 2016, attack and mortality of *B. variegata* trees by *P. praelonga* have been observed in several regions of Montes Claros municipality, Minas Gerais State, Brazil. Here we reported the damage and potential mortality of *B. variegata* trees by *P. praelonga* in urban landscapes at Montes Claros, a region characterized by Cerrado region. Moreover, we document other insect species associated with the *P. praelonga* outbreak.

Seventeen *B. variegata* trees were surveyed along an approximately 2,000 m long street in the Montes Claros City, Minas Gerais State, Brazil (16.751000°E, 43.885200°S; 643 masl). The first survey was carried out in Sep 2016 and the second, a yr later. The trees evaluated were of different ages, and were planted among other tree species. The diameter at 1.3 m from the ground of all trees evaluated (attacked or not) was measured with mm tape, and the tree height was estimated using a 1.5 m rod. The incidence, injury characteristics, mortality rate, and crown parts with *P. praelonga* also were evaluated on these trees.

The feeding behavior of *P. praelonga* and its damage on *B. variegata* leaves were observed during the evaluations. The *P. praelonga* damage severity was evaluated in the whole *B. variegata* tree, using a scale from 0 to 3: (0) no injuries and without mealybugs, (1) one-third of the crown attacked, (2) two-thirds of the crown attacked, and (3) crown completely attacked or tree death.

Insects feeding on honeydew produced by *P. praelonga* were sampled during the tree evaluations. Individuals of the mealybug *P. praelonga* and were collected from the leaves, killed, preserved in 70% ethanol, and sent to Ana Lúcia Benfatti Gonzalez Peronti and Demian Takumasa Kondo of the Graduate Program in Agronomy of the Universidade Estadual Paulista, Jaboticabal, São Paulo, Brazil, for species identification.

The mean diameter and height of 17 *B. variegata* trees evaluated were 23.98 ± 1.63 (SE) cm and 6.02 ± 0.31 m, respectively.

Praelongorthezia praelonga individuals suck the sap on the abaxial *B. variegata* leaf parts or on its soft branches (Figs. 1B, 2A), leading to sap exudation (Fig. 1C) and sooty mold development. This mealybug also was observed on *B. variegata* trunks and fruits (Fig. 2B, C). When attacked, the plant leaves began to dry gradually (Fig. 1A) until abscission and, in some cases, the tree became totally dried and died, whereas the undamaged ones did not show these symptoms.

Praelongorthezia praelonga was found on 41.2% (n = 7) of *B. variegata* trees evaluated during 2016. The average damage severity caused by this insect in 2016 was level 1 (0–3 scale), with 23.5% of trees with level 3 infestation, 11.8% with level 2, 5.9% with level 1, and the remaining ones were uninjured (level 0). One tree died in the first yr (Fig. 2B). A total of 58.8% of the trees harbored this insect in 2017. Among trees attacked by *P. praelonga*, 35.3% of them displayed level 3 of infestation symptoms, whereas 17.6% displayed level 1. About 47.1% of the trees were uninjured. Mortality in 2017 reached 11.8%, with 2 dead trees displaying levels 2 and 3 in the previous yr.

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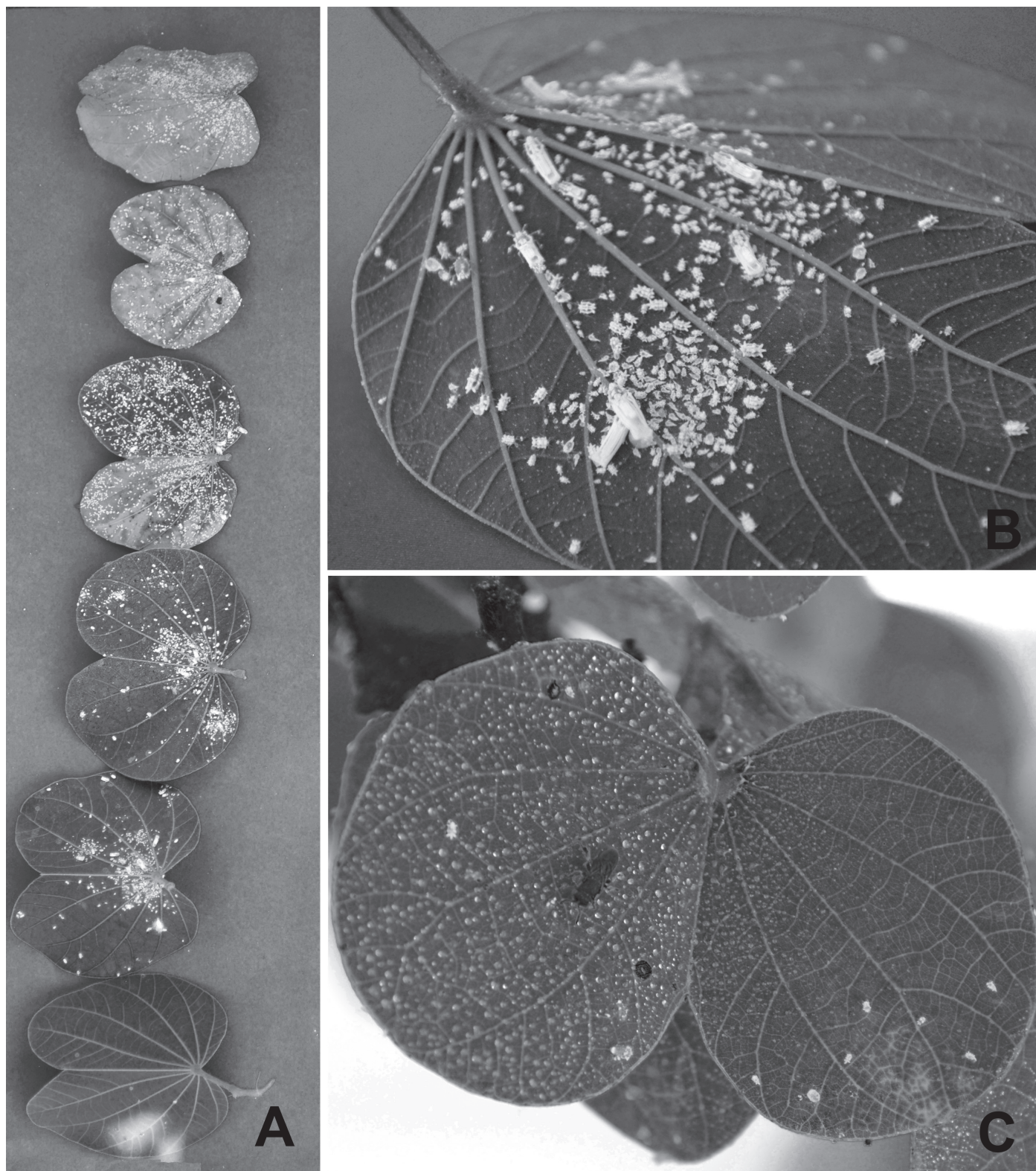


Fig. 1. Gradual damage by *Praelongorthezia praelonga* (Hemiptera: Ortheziidae) on *Bauhinia variegata* (Fabaceae) leaves (A), nymphs and adults feeding on the sap on the abaxial part of leaves (B), and *Trigona spinipes* (Hymenoptera: Apidae) foraging on nectar secretion on the adaxial leaf parts (C).

Apis mellifera L. (Hymenoptera: Apidae) and *Trigona spinipes* (F.) (Hymenoptera: Apidae) workers foraged on the nectar expelled on the adaxial side of *B. variegata*-damaged leaves (Fig. 1C), and on the *P. praelonga* honeydew.

The increase in the occurrence and damage severity by *P. praelonga* and the *B. variegata* tree mortality from 2016 to 2017 may be attributed to this pest, and the water deficit between 2015 and 2017 in Montes Claros increased this impact. However, the evaluation period

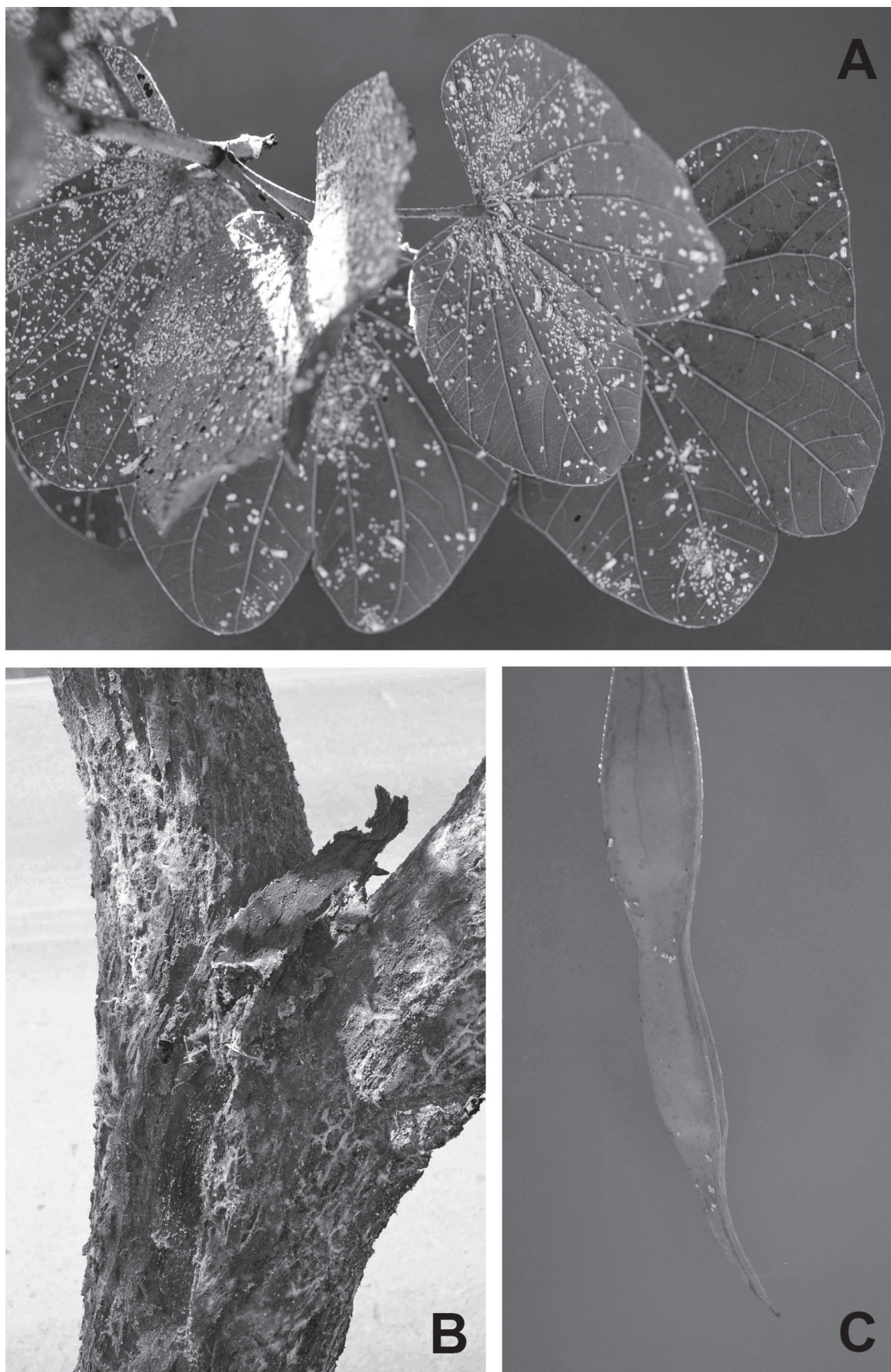


Fig. 2. *Praelongorthezia praelonga* (Hemiptera: Ortheziidae) on both leaf sides (A), trunk (B), and fruits (C) of *Bauhinia variegata* (Fabaceae).

was too short to evaluate the effects of precipitation on the incidence of this insect. Hydric deficit weakens plants, making them more vulnerable to sap-sucking insects such as mealybugs and scale insects (Koricheva & Larsson 1998). Tree mismanagement, such as poor pruning, may also have increased their stress (Christiansen & Fjone 1993; Långström & Hellqvist 1993), and the lack of control and management may have additionally allowed *P. praelonga* populations to rise. Fallen dried leaves, carried by the wind with a large number of these mealybugs attached, are probably the principal dispersal mode of this pest to healthy trees.

The presence of *P. praelonga* on 41.2% and 58.8% of the *B. variegata* trees, resulting in 5.8 and 11.8% mortality in 2016 and 2017, respectively, strongly suggests the potential of this insect as a pest, as observed in almost 85% of *B. variegata* trees attacked in urban areas of Goiânia municipality, Goiás State, Brazil (Garcia 1999). *Bauhinia variegata* tree mortality reached 40% in this region after four consecutive years of damage by *P. praelonga*, including death of seedlings from this tree species (Garcia 1999). *Praelongorthezia praelonga* killed other tree species in urban forestry (e.g., *Spathodea campanulata* Beauv.; Bignoniaceae), as well as ornamental plants and citrus (Kondo et al. 2013).

The damage by *P. praelonga* endangers *B. variegata* trees used for urban forestation. The problems also include the sanitation costs (i.e., cutting down dead trees), removing tree debris from the streets, planting new trees, and the reduced aesthetic value of injured trees. The damage and mortality potential, and its easy dispersal, makes *P. praelonga* a possible quarantine pest in tropical countries that use their hosts in landscaping, forestry, or agriculture.

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Summary

Bauhinia variegata (Fabaceae), an exotic tree used in urban forestry and landscaping in Brazil, is predisposed to damage by phytophagous insects, especially under stress conditions. The mealybug *Praelongorthezia praelonga* (Douglas 1981) (Hemiptera: Orthezidae) is a generalist pest. Here we report damage and potential mortality of *B. variegata* trees by *P. praelonga* in the urban environment at Montes Claros municipality, Minas Gerais State, Brazil. This insect damages the host directly through feeding, and indirectly by supporting growth of sooty mold over the leaves. A total of 17 *B. variegata* trees were surveyed in a main street of Montes Claros during 2016 and 2017. *Praelongorthezia praelonga* was observed in 41.2% of the trees in 2016, including 23.5% of them with the crown completely attacked, 11.8% with two-thirds of the crown attacked, 5.9% of them with one-third of the crown attacked, and the remaining without injuries. *Apis mellifera* L. and *Trigona spinipes* (F.) (Hymenoptera: Apidae) were associated with this pest outbreak, feeding on the honeydew secreted by the mealybugs. The presence, damage severity, and mortality of *B. variegata* trees by *P. praelonga* suggest a possible phytosanitary threat by this mealybug in urban forestry.

Key Words: Hemiptera; invasive species; mealybug; urban forestry

Sumário

Bauhinia variegata (Fabaceae), uma árvore exótica utilizada na arborização urbana e paisagismo no Brasil, é predisposta a danos por insetos fitófagos especialmente em condições de estresse. A cochonilha *Praelongorthezia praelonga* (Douglas, 1981) (Hemiptera: Orthezidae) é uma praga generalista. Neste estudo, nós registramos os danos e a mortalidade potencial de árvores de *B. variegata* por *P. praelonga* no ambiente urbano no município de Montes Claros, estado de Minas Gerais, Brasil. Esse inseto danifica os hospedeiros diretamente, pela alimentação e, indiretamente, pela formação de fumagina sobre as folhas. Um total de 17 árvores de *B. variegata* foi vistoriado em uma das principais avenidas de Montes Claros, durante 2016 e 2017. *Praelongorthezia praelonga* foi observada em 41,2% das árvores em 2016, com 23,5% delas com a copa toda atacada, 11,8% com dois terços da copa atacada, 5,9% com um terço da copa atacada, e o restante sem injúrias. *Apis mellifera* L. e *Trigona spinipes* (F.) (Hymenoptera: Apidae) foram encontradas associadas com essa praga, se alimentando do honeydew secretado pela cochonilha. A presença, severidade de danos e mortalidade de árvores de *B. variegata* por *P. praelonga* sugere uma possível ameaça fitossanitária dessa cochonilha para a arborização urbana.

Palavras Chaves: arborização urbana; cochonilha; espécie invasora; Hemiptera

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