

NEW PLANT ASSOCIATIONS FOR *Monalonion velezangeli* (HEMIPTERA: MIRIDAE) IN GREEN URBAN AREAS OF BOGOTÁ (COLOMBIA)

Nuevas asociaciones de plantas para *Monalonion velezangeli* (Hemiptera: Miridae) en áreas verdes urbanas de Bogotá (Colombia)

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ABSTRACT

Monalonion velezangeli Carvalho and Costa (Hemiptera: Miridae) is a polyphagous plant bug recognized as one of the most important pest species of coffee and avocado in rural regions of Colombia. *M. velezangeli* is reported for the first time in green urban areas in the high Andean city of Bogotá (Colombia). Specimens were collected on eight species of urban trees planted in the city, of which five represent new plant associations for *M. velezangeli*. The plant species *Schinus molle* L. (Anacardiaceae) is for the first time reported as new host plant damaged by *M. velezangeli* under urban conditions.

Keywords: Mírid bug, phytophagous, urban ecosystem, urban trees.

RESUMEN

Monalonion velezangeli Carvalho and Costa (Hemiptera: Miridae) es un mírido polífago reconocido como una de las especies plaga más importantes del café y el aguacate en regiones rurales de Colombia. *M. velezangeli* es reportado por primera vez en áreas verdes urbanas en la cordillera de los Andes en la ciudad de Bogotá (Colombia). Los especímenes fueron recolectados en ocho especies de árboles plantados en la ciudad, de los cuales cinco representan nuevas asociaciones de *M. velezangeli*. La especie *Schinus molle* L. (Anacardiaceae) es por primera vez reportada como nueva planta hospedera afectada por *M. velezangeli* bajo las condiciones urbanas.

Palabras clave: árboles urbanos, ecosistema urbano, fitófago, míridos.

Monalonion Herrich-Schaeffer is a genus of the subfamily Bryocorinae (tribe Monaloniini) with Neotropical distribution (Namyatova *et al.*, 2016), which comprises 16 valid species (Schuh, 2002; Schuh, 2013). In Colombia, there are six recorded species (Distant, 1917; Schuh, 2002; Giraldo and Benavides, 2012; Schuh, 2013), although a detailed survey of those present in the country and their distributions has never been carried out. *Monalonion* species from Colombia, known exclusively from rural areas, are: *M. annulipes* Signoret, *M. atratum* Distant, *M. columbiensis* Carvalho, *M. dissimulatum* Distant, *M. itabunensis* Carvalho, and *M. velezangeli* Carvalho and Costa (Distant, 1917; Carvalho, 1972; Carvalho, 1984; Carvalho and Costa, 1988; Schuh, 2002; Schuh, 2013).

Some of these *Monalonion* species are important pest species of cacao (*Theobroma cacao* L., Malvaceae) (Abreu, 1977), guava (*Psidium guava* L., Myrtaceae) and avocado (*Persea americana* Mill., Lauraceae) in Central and South America (Distant, 1917; Wille, 1944; Wheeler, 2000). *Monalonion velezangeli* is also a pest of the economic importance of coffee (*Coffea arabica* L., Rubiaceae) in Colombia (Giraldo and Benavides, 2012).

Monalonia velezangeli was described from specimens collected in 1984 in Antioquia on avocado orchards (Carvalho and Costa, 1988). *Monalonia velezangeli* is a polyphagous plant bug associated in Colombia with 14 plant species of Myrtaceae (5), Rubiaceae (2), Lythraceae (1), Clusiaceae (1), Rosaceae (1), Malvaceae (1), Melastomataceae (1), Anacardiaceae (1), and Theaceae (1), which include economically important fruit, ornamental, and forest plantations (Giraldo and Benavides, 2012; Londoño *et al.*, 2014; Rodas *et al.*, 2014)(Table 1).

Monalonia velezangeli is characterized by its mostly black and dark yellow body, the presence of two or more red markings on the forewing membrane, and the white band on the femora (Carvalho and Costa, 1988; Giraldo *et al.*, 2010; Fig 1a-1b). It might be confused with *M. parviventre* Herrich-Schaeffer by the red spots on the forewing membrane and with *M. atratum* by the color of the femora (Carvalho, 1972; Carvalho and Costa, 1988).

Many species of *Monalonia* exhibit polychromatism (Carvalho, 1972; Costa *et al.*, 2008), including *M. velezangeli* (e.g., Giraldo *et al.*, 2010), as exemplified by the coloration of the type series of *M. velezangeli*, in which most of the paratypes are mostly dark yellow in contrast to the mostly dark holotype (Carvalho and Costa 1988; J.A. Quiroz, pers. comm.).

Bogotá is a city located in the high Andes of Colombia at 2650 meters above sea level (4°35'56"N; 74°04'51"W). This is the largest city of Colombia with over 7 million people and approximately 1637 km² of extension. Due to this high elevation, Bogotá has a cold climate (average 17 °C) with two wet periods in the year occurring between March to May and September to November. Bogotá has many public and private green areas including parks, greenways, wetlands, and others (Alcaldía Mayor de Bogotá, 2017).

Entomological surveys focusing on urban trees planted in public parks and greenways in the northern portion of Bogotá were carried out irregularly, from May 2016 to March 2018, using sweep nets and entomological aspirators.

All specimens were identified using original descriptions and taxonomic keys (Carvalho, 1972; Carvalho, 1984; Carvalho and Costa, 1988). Collected specimens exhibit polychromatism, as documented before (Carvalho and Costa, 1988). Examined specimens are as follow 3 males and 1 nymph on *Liquidambar styraciflua*, 2 males, 1 nymph on *Pittosporum undulatum*; 1 male on *Ficus americana subs. andicola*; 2 males and 2 females on *Quercus humboldtii*; 1 nymph on *Acca sellowiana*; 1 female on *Prunus serotina*; 6 males, 5 females and 1 nymph on *Lafoensia acuminata*; 6 males and 1 nymphs *Schinus molle*; 1 nymph in *Cedrela montana*; all deposited in the Entomology collection of the Museo Javeriano de Historia

Table 1. Plant associations of *Monalonia velezangeli* Carvalho and Costa (Hemiptera: Miridae) in Colombia.

Family	Species	Horticultural uses
Altingiaceae	<i>Liquidambar styraciflua</i> L. ^{a,b}	Ornamental
Anacardiaceae	<i>Mangifera indica</i> L.	Fruit
	<i>Schinus molle</i> L. ^{a,b}	Ornamental
Clusiaceae	<i>Clusia</i> spp.	Ornamental
Fagaceae	<i>Quercus humboldtii</i> Bonpl. ^{a,b}	Ornamental
Lythraceae	<i>Lafoensia acuminata</i> L. ^a	Ornamental
Malvaceae	<i>Theobroma cacao</i> L.	Fruit
Melastomataceae	<i>Tibouchina lepidota</i> Baill	Ornamental
Meliaceae	<i>Cedrela montana</i> Moriz ex Turcz ^{a,b}	Wood
Moraceae	<i>Ficus americana subs. andicola</i> (Standl.) C.C.Berg) ^{a,b}	Ornamental
	<i>Acca sellowiana</i> (O Berg) Burret ^a	Fruit
	<i>Psidium cattleianum</i> Sabine	Fruit
	<i>Psidium guajava</i> L.	Fruit
Myrtaceae	<i>Syzygium oleosum</i> (F Muell) B Hyland	Ornamental
	<i>Eucalyptus grandis</i> W. Hill ex Maiden	Wood (Plantation crop)
Pittosporaceae	<i>Pittosporum undulatum</i> Vent. ^{a,b}	Ornamental
Rosaceae	<i>Rubus glaucus</i> Benth.	Fruit
	<i>Prunus serotina</i> Ehrh. ^{a,b}	Ornamental
Rubiaceae	<i>Ladenbergia magnifolia</i> (Ruiz & Pav.)	Ornamental
	<i>Coffea arabica</i> L.	Fruit
Theaceae	<i>Camellia sinensis</i> (L)	Ornamental/ Herb

Species with ^a indicates all the plants present in Bogotá; ^b New plant association.

Natural Lorenzo Uribe S.J., of the Pontificia Universidad Javeriana (MUPJ_ENT), with catalog numbers MPUJ_ENT 0058309–MPUJ_ENT 0058344.

Monalonia velezangeli was found on different botanical species planted in public green areas of Bogotá. This is also the first report of this mirid species in an urban ecosystem at such a high altitude, which is noteworthy given that in Colombia most published records are below 2000 ma.s.l (Ramírez-Cortés *et al.*, 2008) with occasional ones up to 2300 ma.s.l. in rural areas (Torres Jaimes *et al.*, 2012). These records from Bogotá might represent recent introductions of *M. velezangeli*, and if so, they could be further evidence that environmental conditions are changing in Bogotá.

We also document for the first time the association of *M. velezangeli* with five new plant families (Pittosporaceae, Moraceae, Altingiaceae, Fagaceae and Meliaceae), increasing the number of reported species known for Colombia and other Andean countries from 14 to 19 (Table 1). *Monalonia velezangeli* was also collected on *Lafoensia acuminata* (Lythraceae), which was recorded previously as a host plant for this species (Londoño *et al.*, 2014). Given the complex relationship between plants and Miridae (Wheeler, 2001), it is usually difficult to clearly assess if a plant species truly

represents a host plant. Occasional occurrences of adults on various plants might represent visitors or indicate that they use the plant as an alternative feeding resource. In Bogotá, *L. acuminata*, *L. styraciflua* and *S. molle* can be considered host plants of *M. velezangeli* because we consistently found nymphs on these plants. Because nymphs cannot fly to reach other trees, we assume that their presence in a given plant species are an indication of true host plants, because these plants species might support nymphal development (Wheeler, 2016). Further studies are required to assess which plant species are better hosts for the reproduction of *M. velezangeli*.

Among the new plant species associated with *M. velezangeli* in Bogotá, the false pepper (*S. molle*) was observed injured by this plant bug. The damage was observed on the leaves and twigs of the tree, especially on young tissues; it is characterized by the presence of reddish-brownish necrotic lesions around the insect feeding site. As a result, dried leaves and twigs begin to appear (Fig. 1c-1e). These symptoms resemble those reported by Rodas *et al.* (2014) on *Eucalyptus grandis* W. Hill ex Maiden, mainly on young trees, and by Giraldo and Benavides (2012) in other hosts such as guava, avocado and coffee. Moreover, tissue malformations are commonly observed, particularly on young stems,



Figure 1. (a) Female of *Monalonia velezangeli*; (b) Male of *Monalonia velezangeli*; (c) Urban tree strongly affected by *Monalonia velezangeli*; (d) Dried leaves with reddish-brownish coloration; (e) Twig with necrotic lesions; (f) Twig malformation affecting bud development.

inhibiting the formation of new buds (Fig. 1f). Both nymphs and adults seem to be responsible for the damage to *S. molle*, even when low levels of infestation by *M. velezangeli* were recorded. It is possible that morphological damage on this host tree is also related with secondary infections by phytopathogens. Recently it has been observed symptoms related to pathogenic infection by *Verticillium* spp. in shoots on several population of *S. molle* in green urban spaces in Bogotá (G.L. Sánchez, pers. comm.). Further studies to test this hypothesis are needed as well as studies that evaluate if the new plants species associated with *M. velezangeli* are used as feeding resources or also as oviposition substrates. Moreover, studies on the biology of *M. velezangeli* and its role as a pest in urban trees in Bogotá are necessary.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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