

## Record of lonchaeids (Diptera: Lonchaeidae) in municipalities of Alagoas State, Brazil

Registro de lonqueidos (Diptera: Lochaeidae) en municipios del estado de Alagoas, Brasil

JAKELINE MARIA DOS SANTOS<sup>1</sup>, SÔNIA MARIA FORTI BROGLIO<sup>2</sup>, SIMONE SILVA DA COSTA<sup>3</sup>,  
NIVIA DA SILVA DIAS-PINI<sup>4</sup> and PEDRO CARLOS STRIKIS<sup>5</sup>

**Abstract:** Studies on frugivorous flies in Alagoas State, Brazil, have been limited to species of fruit flies (Tephritidae). This paper reports six species of *Neosilba* (Lonchaeidae) in five municipalities of Alagoas State: *Neosilba bella*, *N. certa*, *N. glaberrima*, *N. inesperata*, *N. pendula* and *N. zadolicha*.

**Key words:** *Neosilba*. Frugivorous flies. Host plant. Invasive pest. Diversity.

**Resumen:** Los estudios de moscas frugívoras en el estado de Alagoas, Brasil, se concentran en las especies denominadas moscas de las frutas (Tephritidae). Este reporte se refiere al registro de las especies de *Neosilba* en cinco municipios del estado de Alagoas: *Neosilba bella*, *N. certa*, *N. glaberrima*, *N. inesperata*, *N. pendula* y *N. zadolicha*.

**Palabras clave:** *Neosilba*. Moscas frugívoras. Planta huésped. Plaga invasora. Diversidad.

### Introduction

Lonchaeids are among the most important pests in fruit trees cultivated in the American continent (Uchôa-Fernandes 2012). Larvae of some lonchaeid species are primary invasive pests of fruits, flower buds (Araújo and Zucchi 2002; Santos *et al.* 2004) and may have a significant economic impact on fruit crops (Mac Gowan and Okamoto 2013). Economically-important species of the Neotropical region belong to genera *Dasiops* Rondani, 1856 and *Neosilba* McAlpine, 1962. The genus *Neosilba* is represented by 40 species distributed mainly over the Neotropical region and 25 of them have been reported in Brazil (Aguilar-Menezes *et al.* 2007; Strikis 2011; Galeano-Olaya and Canal 2012; Uchôa-Fernandes 2012).

Surveys of lonchaeids have been increasing in several parts of the world. Most of Lonchaeidae species have been found during surveys when fruits are collected to assess the incidence of tephritid flies. There are few surveys specifically focusing on the identification of lonchaeids mainly because most of the species are secondary pests. Some plant families serving as hosts for *Neosilba* larvae have been identified, such as Malpighiaceae, Myrtaceae, Rutaceae, Anacardiaceae, Annonaceae, Caricaceae, Caryocaraceae, Euphorbiaceae, Combretaceae, Lauraceae, Oxalidaceae, Passifloraceae, Rubiaceae, Rosaceae and Solanaceae (Camargos *et al.* 2011; Strikis and Prado 2009; Araújo and Zucchi 2002).

Although several crops that are cultivated in Alagoas state can serve as hosts for lonchaeids, the only record has been in fruits of *Jatropha curcas* L. (Euphorbiaceae) commonly known as “pinhão-mansô” (Dias *et al.* 2012). In this context, the aim of this work was to survey lonchaeid species and their hosts in five municipalities of Alagoas state therefore

collaborating to extend the limited knowledge on lonchaeid diversity.

The current study was conducted in commercial and domestic orchards of Wild (dry forest) and East regions of Alagoas state, in the districts of Anadia (“Povoado Tabuleiro Grande” - 9°41'6”S, 36°18'24”W, 163 masl); Arapiraca (“Povoado Pé Leve” - 9°45'06”S, 36°39'37”W, 261 masl); Junqueiro (“Povoado Laminha” - 9°54'14”S, 36°28'0”W, 214 masl); Maceió (“Sítio Paraíso” - 9°40'S, 35°42'W, 110 masl, “Sítio Aldeia Verde” - 9,5°35'S, 35°42'W, 65 masl) and Palmeira dos Índios (“Povoado Gavião” - 9°24'58”S, 36°37'52”W, 196 masl), from October 2010 to December 2011.

In order to determine the association of host plant with the fruit fly (Lonchaeidae), sampling of fruits were systematically conducted. Fruits were randomly collected in several heights of fruit tree canopy as well as recently fallen ones that were still in good conditions, *i.e.* not rotten or no openings made by larvae when leaving the fruit. The number of collected fruits varied over the year according to the fructification season of each host as well as fruit availability. Fruits were sampled from 26 plant species, belonging to 14 botanical families (Table 1). Ripe fruits were transported to the Entomology Laboratory of the University of Alagoas (Brazil) then weighed and deposited in trays containing autoclaved sand and covered by *voile* fabric. Puparia were placed on pots containing sand and closed with fabric for their emergence.

A total of 1,501 specimens of lonchaeids (825 females and 676 males) were obtained during 15 months of sampling. They were associated with 16 plant species out of 26 surveyed species (Table 1). Six lonchaeid species were identified: *Neosilba bella* Strikis & Prado 2006, *Neosilba certa* (Walker, 1850), *Neosilba glaberrima* (Wiedemann, 1830), *Neosilba*

<sup>1</sup> Agronomist. Post-doctoral Student. Centro de Ciências Agrárias - Universidade Federal de Alagoas - UFAL, Rodovia BR 104N, km 85, 57100-000, Rio Largo, AL, Brazil, [jackbilu@hotmail.com](mailto:jackbilu@hotmail.com). <sup>2</sup> Ph. D. and professor. Centro de Ciências Agrárias - Universidade Federal de Alagoas - UFAL, Rodovia BR 104N, km 85, 57100-000, Rio Largo, AL, Brazil, [soniamfbroglio@gmail.com](mailto:soniamfbroglio@gmail.com). <sup>3</sup> Agronomist. Doctor. Centro de Ciências Agrárias - Universidade Federal de Alagoas - UFAL, Rodovia BR 104N, km 85, 57100-000, Rio Largo, AL, Brazil, [simone\\_costa85@hotmail.com](mailto:simone_costa85@hotmail.com). <sup>4</sup> Ph. D. Entomologist Researcher Embrapa Agroindústria Tropical, Rua Dra. Sara Mesquita 2270, Bairro Pici, 60511-110. Fortaleza, CE, Brazil, [nivia.dias@embrapa.br](mailto:nivia.dias@embrapa.br); corresponding author. <sup>5</sup> Ph.D. and professor. Instituto de Geociências - Universidade de São Paulo USP, Rua do Lago, Butantã, SP, Brazil, 05508-080, [pcstrikis@gmail.com](mailto:pcstrikis@gmail.com).

**Table 1.** Hosts of lonchaeids in five municipalities of Alagoas state, Brazil. From October 2010 to December 2011.

Family /Host Species	Frugivorous flies (n)
Anacardiaceae	
Mango ( <i>Mangifera indica</i> )	<i>Neosilba certa</i> (1); <i>Neosilba glaberrima</i> (37); <i>Neosilba pendula</i> (1); <i>Neosilba</i> sp. (47)
Siriguela ( <i>Spondias purpurea</i> )	<i>N. pendula</i> (27); <i>Neosilba</i> sp. (39)
Umbu-caja ( <i>Spondias</i> sp.)	<i>Neosilba zadolicha</i> (3); <i>Neosilba</i> sp. (2)
Annonaceae	
Soursop ( <i>Annona muricata</i> )	<i>Neosilba bella</i> (1); <i>N. glaberrima</i> (29); <i>N. pendula</i> (7); <i>N. zadolicha</i> (40); <i>Neosilba</i> sp. (56)
Euphorbiaceae	
Cassava ( <i>Manihot esculenta</i> )	<i>N. pendula</i> (1); <i>Neosilba</i> sp. (1)
Fabaceae	
Inga ( <i>Inga</i> sp.)	<i>N. certa</i> (1)
Malpighiaceae	
Acerola ( <i>Malpighia glaba</i> )	<i>N. bella</i> (3); <i>N. certa</i> (3); <i>N. glaberrima</i> (7); <i>Neosilba inesperata</i> (11); <i>N. pendula</i> (155); <i>N. zadolicha</i> (12); <i>Neosilba</i> sp. (233)
Myrtaceae	
Sour guava ( <i>Psidium cattleianum</i> )	<i>N. bella</i> (1); <i>N. certa</i> (1); <i>N. glaberrima</i> (4); <i>N. pendula</i> (13); <i>N. zadolicha</i> (5); <i>Neosilba</i> sp. (34)
Guava ( <i>Psidium guajava</i> )	<i>N. bella</i> (4); <i>N. glaberrima</i> (16); <i>N. pendula</i> (5); <i>N. zadolicha</i> (18); <i>Neosilba</i> sp. (61)
Jambo ( <i>Syzygium jambos</i> )	<i>Neosilba</i> sp. (1)
Pitanga ( <i>Eugenia uniflora</i> )	<i>N. certa</i> (3); <i>N. glaberrima</i> (3); <i>N. pendula</i> (241); <i>Neosilba</i> sp. (331)
Oxalidaceae	
Star fruit ( <i>Averrhoa carambola</i> )	<i>N. pendula</i> (14); <i>Neosilba</i> sp. (9)
Rhamnaceae	
Jua ( <i>Ziziphus joazeiro</i> )	<i>N. pendula</i> (9); <i>Neosilba</i> sp. (8)
Rutaceae	
Lime ( <i>Citrus</i> sp.)	<i>N. glaberrima</i> (1); <i>N. pendula</i> (1); <i>Neosilba</i> sp. (1)
Orange ( <i>Citrus aurantium</i> )	<i>N. pendula</i> (1); <i>Neosilba</i> sp. (1)
Sapotaceae	
Sapote ( <i>Manilkara zapota</i> )	<i>Neosilba</i> sp. (1)

*inesperata* Strikis & Prado, 2009, *Neosilba pendula* (Bezzi, 1919) e *Neosilba zadolicha* McAlpine & Steyskal, 1982. Female specimens that were not identified at species level are cited as *Neosilba* sp. Although the goal of this study was to survey the lonchaeid hosts, most of the collected fruit were infested by tephritids. However, *Annona muricata* Linnaeus (soursop), *Inga* sp. (inga), *Citrus* sp. (lime), *Citrus aurantium* Linnaeus (orange) and *Ziziphus joazeiro* Martius (jua) were only infested by *Neosilba* spp., and they were considered primary hosts in this survey. *Malpighia glaba* Linnaeus (acerola), despite the fact that was infested by some tephritid, most puparia were identified as *Neosilba* sp. and this fruit tree was also considered a primary host of lonchaeids. Other fruit tree species were considered as secondary hosts.

Among the obtained species, *N. pendula* was found infesting the highest number of collected fruits, 12 hosts out of 16. Infestation by this species has also been recorded in different hosts in other regions of Brazil. In Rio Grande do Norte state, *N. pendula* was recorded in eight species of fruit

tree: *Spondias lutea* Linnaeus (cajara), *Spondias purpurea* Linnaeus (siriguela), *M. glaba*, *Psidium guajava* Linnaeus (guava), *Averrhoa carambola* Linnaeus (star fruit), *Z. joazeiro*, *Citrus reticulata* Blanco (tangerine) and *Fortunella* sp. (kumquat) (Rutaceae) (Araújo and Zucchi 2002). In surveys using McPhail traps in four municipalities of Bahia, *N. pendula* was considered the most common species, representing 56.1 % of the collected specimens (Bittencourt *et al.* 2006). In Pará, the same species was found infesting *Chrysobalanus musicao* Linnaeus (ajuru) (Chrysobalanaceae) and in Roraima, *M. glaba*, *Bellucia grossularioides* Linnaeus (“goiabade-anta”) (Melastomataceae) and *Citharexylum poeppigii* Walp. (“cereja-do-mato”) (Verbenaceae) (Strikis *et al.* 2011). *N. pendula* is the most common species attacking floral buds of *Passiflora edulis* (yellow passion fruits) (Aguiar-Menezes *et al.* 2002).

*Neosilba glaberrima* was found infesting *Spondias* sp., (umbu-caja), *A. muricata*, *M. glaba*, *P. guajava*, *Psidiumcattleianum* (sour guava), *Eugenia uniflora* (pitanga) and *Citrus*

sp. Strikis *et al.* (2011) reported this species infesting up to 20 hosts, such as *A. muricata*, *M. glaba* and *P. guava*. In Bahia state, *N. glaberrima* adults emerged from *M. glaba*, *E. uniflora*, *C. aurantium*, and *Capsicum chinense* (pepper) (Solanaceae) (Melo 2013), whereas in Paraíba the species was found in *C. reticulata* (Lopes *et al.* 2008). As happens for most of frugivorous flies, depending on the hosts, some species prevail over others in terms of number of individuals. Collections of *Jatropha curcas* L. (“pinhão-mansão”) (Euphorbiaceae) in Alagoas state showed that *N. glaberrima* was predominant, representing 52 % of the total, and there is a primary association between the fly and the host (Dias *et al.* 2012).

*Neosilba certa* was recorded in five plant species, although the number of specimens was considerably low. A single specimen was collected in *Spondias* sp., *Inga* sp., *M. glaba* and *P. cattleianum*, and three specimens in *E. uniflora*.

*Neosilba zadolicha* was obtained in *Mangifera indica* (mango), *A. muricata*, *M. glaba*, *P. guajava* and *P. cattleianum*. Earlier surveys pointed out that this species is present in *Spondias* sp., (umbu-cajazeira) in other states of Northeast region (Santos *et al.* 2004) and it was considered a primary pest of commercial *C. reticulata* orchards in Paraíba (Lopes *et al.* 2008). A survey in Mato Grosso do Sul State showed that *N. zadolicha* infests mistletoe fruits (*Psittacanthus acinarius*) (Loranthaceae) (Caires *et al.* 2009). In Jaboticabal-SP, the same species was found in fruits of *Pouteria caimito* Radlk. (Sapotaceae), representing the first record of *N. zadolicha* infesting this host in Brazil (Fernandes *et al.* 2013). In municipalities of the Southeastern Brazil, *N. zadolicha* was obtained from floral buds of *Passiflora alata* (sweet passion fruit) (Aguiar-Menezes *et al.* 2004).

In Rio de Janeiro State, Aguiar *et al.* (2007) showed that *N. certa*, *N. glaberrima* and *N. pendula* infests cultivars of *Coffea arabica* L. in shaded and unshaded systems under organic management.

The lonchaeids *N. bella* and *N. inesperata* infested a low number of hosts, which were three and one, respectively. The first record of *N. bella* in Brazil occurred in 2006 from samples of coffee fruits (*Coffea arabica*) (Rubiaceae) (Strikis and Prado 2006). Then, the lonchaeid has been registered infesting different hosts in other Brazilian states. In Amapá, the species was collected in murici fruits (*Byrsonima crassifolia*) (Malpighiaceae) and it was considered a species of seasonal occurrence (Adaime *et al.* 2012). In Alagoas, *N. bella* was recorded in *J. curcas* (“pinhão-mansão”) (Dias *et al.* 2012), while in South of Bahia, the fly was collected from *M. glaba* and *P. cattleianum*, *E. uniflora* and *Manilkara zapota* (sápota) (Melo *et al.* 2012; Bittencourt *et al.* 2013). In Tocantins, *Neosilba* sp. was found infesting *P. guajava*, *M. glaba*, *Citrus reticulata* (tangerine), *Mauritia flexuosa* (buriti).

Little is known on *Neosilba inesperata* hosts in the literature. The current study showed that this lonchaeid infests only *M. glaba*.

As a conclusion, this study reinforces the fact that lonchaeids present a wide host range by infesting different economically-important hosts.

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