



FIRST RECORDS OF *Neosilba* spp. (Diptera: Lonchaeidae) IN THE STATE OF MATO GROSSO, BRAZIL

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ABSTRACT: Responsible for damage infesting fruits and flower buds, Diptera species of the family Lonchaeidae have caused concern to farmers throughout Brazil. Knowing the abundance of insects in the Amazon region and the scarcity of publications on the species that affect fruit trees in the state of Mato Grosso, this work to carry out a survey of the species associated with the *Neosilba* (Diptera: Lonchaeidae) in the state. Fruit collections were carried out in six municipalities, whose samples were taken to the Entomology Laboratory of the Federal University of Mato Grosso, where they were placed in plastic containers containing expanded vermiculite to accommodate the pupae. After the emergency, the insects were sacrificed and sent for identification. A total of 163 specimens belonging to four species of *Neosilba* were obtained, all reported for the first time in the state of Mato Grosso. *Neosilba inesperata* Strikis & Prado, 2009 is reported for the first time in the Brazilian Amazon. Several new associations between *Neosilba* species and host plants are made for the region.

Keywords: Lance flies; Southern Amazon; distribution; Tephritoidea.

Primeiros registros de *Neosilba* spp. (Diptera: Lonchaeidae) no estado de Mato Grosso, Brasil

RESUMO: Responsáveis por estragos em frutos e botões florais, espécies de dípteros da família Lonchaeidae tem causado preocupação a agricultores em todo o Brasil. Sabendo-se da abundância de insetos na região amazônica e da escassez de publicações sobre as espécies que afetam as frutíferas no estado de Mato Grosso, este trabalho visa realizar um levantamento das espécies associadas ao gênero *Neosilba* (Diptera: Lonchaeidae) no estado. Foram realizadas coletas de frutos em seis municípios, cujas amostras foram encaminhadas ao Laboratório de Entomologia da Universidade Federal de Mato Grosso, onde foram acondicionadas em recipientes plásticos contendo vermiculita expandida para acomodação das pupas. Após a emergência, os insetos foram sacrificados e enviados para identificação. Foram obtidos 163 espécimes pertencentes a quatro espécies de *Neosilba*, todas reportadas pela primeira vez no estado do Mato Grosso. *Neosilba inesperata* Strikis & Prado, 2009 é reportada pela primeira vez na Amazônia brasileira. Diversas novas associações entre espécies de *Neosilba* e plantas hospedeiras são realizadas para a região.

Palavras-chave: Lonqueídeos; Amazônia meridional; distribuição; Tephritoidea.

1. INTRODUCTION

In Brazil, fruticulture is one of the most important elements of the agricultural economy (ALMEIDA et al., 2021). According to FAO (2019), in 2016, Brazil was the third largest fruit producer in the world, after China and India, with 42.3 million metric tons.

The Lonchaeidae family comprises an important group of fruit flies, containing some species associated with the decomposition of organic matter of vegetal source (SOUSA et al., 2021). In the past, they were considered an opportunist group (RAGA et al., 2011). However, more recently, species of the genus *Neosilba* have been reported as primary invaders of some fruit species, obtaining pest status in certain cases (RAGA et al., 2011; ADAIME et al., 2017; GISLOTTI et al., 2017), causing losses that are associated

with the fruits damaged by the infestation of frugivorous flies that occurs during all stages of production and commercial sale (LOUZEIRO et al., 2021).

The first records of the Lonchaeidae family in the Amazon region were made nearly 30 years ago, with reports of the presence of *Neosilba* species in the state of Amazonas (SILVA, 1993). Although the knowledge of this family guesses from much earlier, 1930, it was only around 1975, with the first reports of specimens in commercially important fruits, that there was a growing interest of researchers in their study. Subsequently, the work intensified, as some species of lonqueids assumed the status of primary pests (VIEIRA et al., 2019).

In the Brazilian Amazon, specimens of the Lonchaeidae family have been reported in the states of Amazonas,

Amapá, Acre, Pará, Rondônia, Roraima and Tocantins, in a total of 13 species of the genus *Neosilba* (PEREIRA; ADAIME, 2022). The species *Neosilba glaberrima* (Wiedemann, 1830) and *Neosilba zadolicha* McAlpine & Steyskal, 1982 are the ones with the widest geographic distribution in the Amazon forest and the greatest range of host plants (STRIKIS et al., 2011; PEREIRA; ADAIME, 2022). VIEIRA et al. (2019) reported that the fly/host plant ratio is of great value for studies of the behavior and distribution of frugivorous flies. Thus, the objective of this work was to carry out the first records of species of *Neosilba* (Diptera: Lonchaeidae) in the state of Mato Grosso.

2. MATERIAL AND METHODS

The work was conducted from July 2016 to October 2019, in the municipalities of Guarantã do Norte, Lucas do Rio Verde, Nossa Senhora do Livramento, Nova Guarita, Sinop and Terra Nova do Norte. To obtain the insects, the fruits were collected in all municipalities, according to the availability of going to the field. The collection of fruits allows to assess the level of infestation and accurately identify the association with the host, as well as the abundance and diversity of natural enemies (BATISTA et al., 2019). The fruits were stored in Kraft paper bags, transported to the Entomology Laboratory of the Federal University of Mato Grosso, Campus Sinop. Afterwards, the fruits were transferred to perforated plastic containers, containing a thin layer of expanded vermiculite (2 to 4 cm), to accommodate the pupae, and protected with microscreens that allowed air circulation.

After emergence (maximum 8 hours), containers containing adults were placed in the freezer for five minutes, in order to reduce the insect movement and the facilitate capture. The specimens were removed with the help of tweezers and stored in microtubes, with a 70% alcohol solution, properly labeled and sent for identification (SILVA et al., 2019).

3. RESULTS

A total of 163 specimens of Lonchaeidae belonging to four species were obtained [*Neosilba glaberrima* (Wiedemann, 1830), *Neosilba inesperata* Strikis & Prado, 2009, *Neosilba pendula* (Bezzi, 1919) and *Neosilba zadolicha* McAlpine & Steyskal, 1982] (Table 1). All four of these species are reported for the first time in the state of Mato Grosso. In turn, *N. inesperata* is reported for the first time in the Brazilian Amazon, being associated with four plant species (*Averrhoa carambola* L., *Eugenia uniflora* L., *Eugenia pyriformis* Cambess and *Malpighia emarginata* DC.) (Table 1). This species was considered polyphagous in the state of São Paulo, infesting 20 plant species (RAGA et al., 2015), including those recorded in this work.

Infestation by Lonchaeidae was recorded in fruits of 16 plant species from nine botanical families. Myrtaceae and Annonaceae had the highest number of host species, four and three, respectively (Table 1).

Considering that among the species of *Neosilba* recorded in this work there are species considered pests (*N. glaberrima* and *N. zadolicha*), infesting plant species of economic importance such as *P. guajava*, it is recommended that denser surveys be carried out in the state of Mato Grosso.

4. DISCUSSION

Neosilba glaberrima was associated with fruits of 10 plant species, five of which were new associations for the Brazilian Amazon: *Annona montana* Macfad, *Ficus carica* L., *Inga laurina* (Sw.) Willd., *Psidium cattleianum* Afzel. ex Sabine and *Spondias purpurea* L. (Table 1). *Neosilba zadolicha* was found in fruits of *Psidium guajava* L., in Sinop, and in *Cascabela thevetia* (L.) Lippold, in Nova Guarita. The occurrence of *N. zadolicha* in *C. thevetia* constitutes a new association for the Brazilian Amazon. This species has a wide geographic distribution and range of host plants in Brazil and is considered a pest of fruits cultivated in the Northeast and Southeast regions (RAGA et al., 2015; VIEIRA et al., 2019) and in the North region of the country (CASTILHO et al., 2017, 2019; PEREIRA et al., 2016).

Neosilba pendula was obtained from fruits of *E. uniflora* and *M. emarginata*, and its occurrence in *E. uniflora* is unprecedented for the region. Gisloti (2014) registered the association of this species in registered the association of this species in *P. cattleianum* and *P. guajava*, unlike the results obtained in this work, and Gisloti et al. (2017) also registered the association of this species with 15 host plants, with the exception of *E. uniflora*, which did not present itself as a host plant for this species of lonqueid. Therefore, studying species of Lonchaeidae and their host plants allows knowing possible survival strategies adopted by these insects and their diversity (ALMEIDA, 2016).

5. CONCLUSIONS

Considering that among the species of *Neosilba* recorded in this work there are species considered pests (*N. glaberrima* and *N. zadolicha*), infesting plant species of economic importance such as *P. guajava*, it is recommended that denser surveys be carried out in the state of Mato Grosso.

6. REFERERENCES

- ALMEIDA, R. R.; CRUZ, K. R.; SOUSA, M. S. M.; COSTA NETO, S. V.; JESUS BARROS, C. R.; LIMA, A. L.; ADAIME, R. Frugivorous Flies (Diptera: Tephritidae, Lonchaeidae) Associated with Fruit Production on Ilha de Santana, Brazilian Amazon. **Florida Entomologist**, v. 99, p. 426-436, 2016. <https://doi.org/10.1653/024.099.0313>
- ALMEIDA, M. de; BRASIL, L.; COELHO, J. B.; UCHOA, M. A.; GISLOTTI, L. J. Diversity of fruit flies (Diptera: Tephritoidea) and their host plants in a conservation unit from midwestern Brazil. **Florida Entomologist**, v. 102, n. 3, p. 562-570, 2021. <https://doi.org/10.1653/024.102.0333>
- ADAIME, R.; SOUSA, M. S. M.; JESUS-BARROS, C. R.; DEUS, E. G.; PEREIRA, J. F.; STRIKIS, P. C.; SOUZA-FILHO, M. F. Frugivorous flies (Diptera: Tephritidae, Lonchaeidae), their host plants, and associated parasitoids in the extreme north of Amapá State, Brazil. **Florida Entomologist**, v. 100, p. 316-324, 2017. <https://doi.org/10.1653/024.100.0229>
- BATISTA, N. S.; SANTOS, J. M.; SANTOS, J. R. T.; BROGLIO, S. M. F. Moscas-frugívoras (Diptera: Tephritidae e Lonchaeidae) no Vale do Mundaú no estado de Alagoas. **Revista Verde**, v. 14, p. 512-517, 2019. <https://doi.org/10.18378/rvads.v14i4.6243>

Table 1. Species of Lonchaeidae and their host plants reported for six municipalities in the state of Mato Grosso (jul/2016 to oct/2019)
Tabela 1. Espécies de Lonchaeidae e suas plantas hospedeiras em seis Municípios do estado do Mato Grosso (jul/2016 a out/2019)

Scientific Names* - Botanical Families	Vernacular names	Species	Collection Dates	Municipalities	Coordinates
<i>Annona crassiflora</i> Mart. - Annonaceae	Marolo	<i>Neosilba glaberrima</i> (2♂)	27/11/2018	Guarantã do Norte	9°56'32.3"S 54°53'51.9"W
<i>Annona montana</i> Macfad - Annonaceae	Maromba	<i>Neosilba glaberrima</i> (6♂ + 1♀) ¹	27/11/2018	Terra Nova do Norte	10°32'20.6"S 55°06'31.6"W
<i>Annona squamosa</i> L. - Annonaceae	Pinha	Lonchaeidae sp. (1♀) ¹	11/03/2019	N. Sra. do Livramento	15°46'27.7"S 56°21'02.5"W
<i>Averrhoa carambola</i> L. - Oxalidaceae	Carambola	<i>Neosilba inesperata</i> (11♂) ¹	24/10/2019	Lucas do Rio Verde	13°03'45.2"S 55°54'24.4"W
		<i>Neosilba glaberrima</i> (8♂)	24/10/2019	Lucas do Rio Verde	13°03'45.2"S 55°54'24.4"W
<i>Caryocar brasiliense</i> A.St.-Hil. - Caryocaraceae	Pequi	Lonchaeidae sp. (8♀) ¹	13/11/2018	Sinop	11°52'21.7"S 55°35'47.7"W
<i>Cascabela thevetia</i> (L.) Lippold - Apocynaceae	Chapéu-de-Napoleão	<i>Neosilba zadolicha</i> (5♂) ¹	31/01/2017	Nova Guarita	not registered
		<i>Neosilba</i> sp. (6♀)	31/01/2017	Nova Guarita	not registered
<i>Eugenia pyriformis</i> Cambess. - Myrtaceae	Uvaia	<i>Neosilba inesperata</i> (6♂ + 4♀) ¹	03/10/2018	Sinop	11°51'35.9"S 55°27'19.0"W
<i>Eugenia uniflora</i> L. - Myrtaceae	Pitanga	<i>Neosilba inesperata</i> (1♂+2♀) ¹	24/10/2019	Lucas do Rio Verde	13°05'19.5"S 55°53'42.6"W
		<i>Neosilba inesperata</i> (1♂) ¹	31/08/2016	Sinop	11°50'21.6"S 55°29'54.5"W
		<i>Neosilba pendula</i> (1♂) ¹	31/08/2016	Sinop	11°50'21.6"S 55°29'54.5"W
<i>Ficus carica</i> L. - Moraceae	Figo	<i>Neosilba glaberrima</i> (4♂ + 1♀) ¹	24/10/2019	Lucas do Rio Verde	13°03'45.2"S 55°54'24.4"W
<i>Inga edulis</i> Mart. - Fabaceae	Ingá-de-metro	<i>Neosilba glaberrima</i> (23♂+16♀)	24/10/2019	Lucas do Rio Verde	13°04'28.1"S 55°53'59.5"W
<i>Inga laurina</i> (Sw.) Willd. - Fabaceae	Ingá sp.	<i>Neosilba glaberrima</i> (3♂ + 1♀) ¹	27/11/2018	Guarantã do Norte	9°56'32.3"S 54°53'51.9"W
<i>Malpighia emarginata</i> DC. - Malpighiaceae	Acerola	<i>Neosilba inesperata</i> (9♂) ¹	04/05/2017	Sinop	11°50'21.6"S 55°29'54.5"W
		<i>Neosilba inesperata</i> (1♂) ¹	24/10/2019	Lucas do Rio Verde	13°06'59.6"S 55°55'03.7"W
		<i>Neosilba pendula</i> (2♂)	24/10/2019	Lucas do Rio Verde	13°06'59.6"S 55°55'03.7"W
		<i>Neosilba</i> sp. (7♀)	04/05/2017	Sinop	11°50'21.6"S 55°29'54.5"W
<i>Mangifera indica</i> L. - Anacardiaceae	Manga	<i>Neosilba glaberrima</i> (2♂) ¹	24/09/2016	Sinop	11°50'21.6"S 55°29'54.5"W
		<i>Neosilba glaberrima</i> (1♂ + 3♀) ¹	11/10/2018	Sinop	11°48'09.0"S 55°27'52.1"W
		<i>Neosilba</i> sp. (1♀)	31/08/2016	Sinop	11°50'21.6"S 55°29'54.5"W
<i>Psidium cattleianum</i> Afzel. ex Sabine - Myrtaceae	Araçá	<i>Neosilba glaberrima</i> (1♂) ¹	02/09/2017	Sinop	11°51'45.8"S 55°22'46.1"W
		<i>Neosilba</i> sp. (6♀)	02/09/2017	Sinop	11°51'45.8"S 55°22'46.1"W
<i>Psidium guajava</i> L. - Myrtaceae	Goiaba	<i>Neosilba glaberrima</i> (3♂)	24/09/2016	Sinop	11°50'21.6"S 55°29'54.5"W
		<i>Neosilba glaberrima</i> (1♂)	24/10/2019	Lucas do Rio Verde	13°03'46.6"S 55°54'21.5"W
		<i>Neosilba zadolicha</i> (4♂)	24/09/2016	Sinop	11°50'21.6"S 55°29'54.5"W
		<i>Neosilba</i> sp. (9♀)	24/09/2016	Sinop	11°50'21.6"S 55°29'54.5"W
<i>Spondias purpurea</i> L. - Anacardiaceae	Siriguela	<i>Neosilba glaberrima</i> (2♂) ¹	11/10/2018	Sinop	11°51'32.5"S 55°27'19.5"W

*The scientific names are in accordance with WFO (2022) ¹ New insect-plant association in the Brazilian Amazon.

CASTILHO, A. P.; LEMOS, W. P.; STRIKIS, P. C.; SOUSA, M. S. M.; ADAIME, R. Espécies de *Neosilba* (Diptera: Lonchaeidae) registradas no polo citrícola do estado do Pará, Brasil. **Biotemas**, v. 30, p. 85-87, 2017. <https://doi.org/10.5007/2175-7925.2017v30n3p85>

CASTILHO, A. P.; SILVA, L. C.; SOUSA, M. S. M.; SANTOS, J. E. V.; LEMOS, W. P.; ADAIME, R. Novas associações de Tephritidae e Lonchaeidae (Diptera) e suas plantas hospedeiras na Amazônia Oriental. **Biotemas**, v. 32, p. 65-72, 2019. <https://doi.org/10.5007/2175-7925.2019V32N3P65>

FAO. 2019. Food and Agriculture Organization of the United Nations Statistics. (online) <http://http://www.fao.org/news/archive/news-by-date/2019/pt/>. Accessed on 16 dec. 2022).

GISLOTI, L. J. O gênero *Neosilba* McAlpine (Tephritoidea: Lonchaeidae): revisão, ocorrência e diversidade. 2014. 63p. Tese [Doutorado em Biologia] - Universidade Estadual de Campinas, Campinas, 2014.

GISLOTI, L. J.; UCHOA, M. A.; PRADO, A. New records of fruit trees as host for *Neosilba* species (Diptera, Lonchaeidae) in Southeast Brazil. **Biota Neotropica**, v. 17, n. 1, e20160213, 2017.

LOUZEIRO, L. R. F.; SOUZA-FILHO, M. F.; RAGA, A.; GISLOTI, L. J. Incidence of frugivorous flies (Tephritidae and Lonchaeidae), fruit losses and the dispersal of flies through the transportation of fresh fruit. **Journal of Asia-Pacific Entomology**, v. 24, n. 1, p. 50-60, 2021. <https://doi.org/10.1016/j.aspen.2020.11.006>

- PEREIRA, J. F.; SOUSA, M. S. M.; ADAIME, R. Lonchaeidae da Amazônia Brasileira. In: Congresso Brasileiro de Entomologia, 26.; Congresso Latino-Americano de Entomologia, 9., Maceió. Anais. Brasília, DF: Embrapa, p. 232, 2016. Available in: <<https://ainfo.cnptia.embrapa.br/digital/bitstream/item/155533/1/CPAF-AP-2016-Lonchaeidae-da-Amazonia-brasileira.pdf>>. Accessed on 15 dec. 2022.
- PEREIRA, J. F.; ADAIME, R. **Lonchaeidae from Brazilian Amazon**. 2022. Available in: <<http://lonchaeidae.cpfap.embrapa.br>>. Accessed on 15 dec. 2022).
- RAGA, A.; SOUZA-FILHO, M. F.; MACHADO, R. A.; SATO, M. E.; SILOTO, R. C. Host ranges and infestation indices of fruit flies (Tephritidae) and lance flies (Lonchaeidae) in São Paulo State, Brazil. **Florida Entomologist**, v. 94, p. 787-794, 2011. <https://doi.org/10.1653/024.094.0409>.
- RAGA, A.; SOUZA FILHO, M. F.; STRIKIS, P. C.; MONTES, S. M. N. M. Lance fly (Diptera: Lonchaeidae) host plants in the State of São Paulo, Southeast Brazil. **Entomotropica**, v. 30, p. 57-68, 2015.
- SILVA, N. M. **Levantamento e análise faunística de moscas-das-frutas (Diptera: Tephritidae) em quatro locais do estado do Amazonas**. 1993. Tese (Doutorado) - Universidade de São Paulo, Escola Superior de Agricultura "Luiz de Queiroz", Piracicaba, 1993.
- SILVA, M. E. S.; WOCHNER M. A.; SOUSA M. S. M.; BARRETO M. R.; ADAIME, R. Moscas-das-frutas (Diptera: Tephritidae), suas plantas hospedeiras e parasitoides (Hymenoptera: Braconidae) no norte do estado de Mato Grosso, Brasil. **Nativa**, v. 7, p. 513-519, 2019. <https://doi.org/10.31413/nativa.v7i5.7461>
- SOUSA, E. M.; LOUZEIRO, L. R. F.; STRIKIS, P. C.; SOUZA-FILHO, M. F.; RAGA, A. Host plants and distribution records of lance flies (Diptera: Lonchaeidae) in São Paulo State, Brazil. **EntomoBrasilis**, v. 14, p. 1-7 (e942), 2021. <https://doi.org/10.12741/ebrasilis.v14.e942>.
- STRIKIS, P. C.; DEUS, E. G.; SILVA, R. A.; PEREIRA, J. D. B.; JESUS, C. R.; MARSARO JÚNIOR, A. L. Conhecimento sobre Lonchaeidae na Amazônia brasileira. In: SILVA, R. A.; LEMOS, W. P.; ZUCCHI, R. A. (Ed.) **Moscas-das-frutas na Amazônia brasileira: diversidade, hospedeiros e inimigos naturais**. Macapá: Embrapa. Cap. 13, p. 205-215, 2011.
- VIEIRA, F. N. S.; SOUSA, E. M.; LOUZEIRO, L. R. F.; BRAGA e SILVA, S. Lonchaeidae (Diptera) species and their host plants in the Cerrado biome in the state of Piauí, Brazil. **Arquivos do Instituto Biológico**, v. 86, p. 1-5, e0242018, 2019. <https://doi.org/10.1590/1808-1657000242018>
- WORLD FLORA ONLINE - WFO - **An online flora of all known plants**. Available in: <http://www.worldfloraonline.org>. Accessed on 15 dec. 2022.

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