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Source: Florida Entomologist, 102(1) : 249-250

Published By: Florida Entomological Society

URL: <https://doi.org/10.1653/024.102.0144>

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Lance flies (Diptera: Lonchaeidae) associated with *Acca sellowiana* (Myrtaceae) in Lages, Santa Catarina, Brazil

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Feijoa (*Acca sellowiana* [Berg] Burret) (Myrtaceae) is a small fruit tree native to the highlands of southern Brazil and northeast Uruguay (Barni et al. 2004). In its natural habitat in Brazil, this species occurs more often in woodland environs (capons) and Araucaria forests at altitudes between 900 and 1,100 masl (Lorenzini et al. 2007). The flesh of feijoa fruit is white, sweet, and aromatic with a long-lasting pineapple-like scent, and a taste reminiscent of barren strawberries (*Potentilla*) (Rosaceae) and pineapples (*Ananas comosus* [L.] Merr.) (Bromeliaceae) (Pasquariello et al. 2015). Feijoa fruit is also a source of vitamins, minerals, and secondary metabolites, with antibacterial, antioxidant, antiallergenic, and immunological properties (Weston 2010).

Because local feijoa production has been limited to regions where it naturally occurs in Brazil, fruit pests such as the South American fruit fly, *Anastrepha fraterculus* (Wiedemann) (Diptera: Tephritidae), have been reported to infest *A. sellowiana* up to 100% during the fruit ripening period (Ducroquet et al. 2000). Recently, the spotted wing drosophila, *Drosophila suzukii* (Matsumura) (Diptera: Drosophilidae), also was reported attacking feijoa fruit in Brazil (Souza et al. 2017), reinforcing the importance of frugivorous flies to the cultivation of feijoa.

Another group of frugivorous flies, the lance flies (Diptera: Lonchaeidae) are very small, glossy dipterans that have been reported to be primary invaders of commercial plant species, with some fly species considered major agricultural pests of South American fruits and vegetables (Strikis & Prado 2005; Souza-Filho et al. 2009). Although a few species of Lonchaeidae already have been reported in feijoa (Gattelli et al. 2008; Nunes et al. 2012; Gislotti et al. 2017), little information is available about this association in the state of Santa Catarina. We report here on a study to document the species of Lonchaeidae associated with fruits of *A. sellowiana* in an orchard located in Lages, Santa Catarina, Brazil.

In Feb 2018, fruits (11.6 kg, 671 fruit) were harvested from 13 feijoa trees in an experimental orchard in the Estação Experimental de Lages of the Empresa de Pesquisa Agropecuária e Extensão Rural de Santa Catarina (EPAGRI) in Lages, Santa Catarina, Brazil (27.8086°S, 50.3306°W). Harvested fruits were transported to the Laboratório de Pesquisa em Entomologia of the Centro de Ciências Agroveterinárias da Universidade do Estado de Santa Catarina. Infested fruits were individually placed into plastic pots (750 mL) containing sterile moist vermiculite, and incubated at 25 ± 2 °C, 70 ± 10% RH, and a 12:12 h (L:D) photoperiod to allow fly larvae to pupate. After 30 d, Lonchaei-

dae pupae were removed from the vermiculite and placed in a 750 mL plastic pot cage for adult emergence. At emergence, adults were collected and killed in a freezer, then stored in 70% alcohol for subsequent identification.

A total of 224 pupae was obtained, resulting in an infestation level of 0.3 puparia per fruit and 19.3 puparia per kg of fruit. From the pupae, 71 adults of Lonchaeidae emerged. Thirty-six female specimens were not identified beyond the family level, because Lonchaeidae identification is based primarily on the morphology of male terminalia. The 35 male specimens recovered from the same fruits were identified as: *Neosilba pradoi* Strikis & Lerena (N = 27), *Neosilba delvechioi* Strikis 2011 (N = 4), *Neosilba zadolicha* McAlpine & Steyskal (N = 2), *Neosilba bella* Strikis & Prado (N = 1), and *Neosilba bifida* Strikis & Prado (N = 1). *Neosilba bella* and *N. zadolicha* had been recorded already from *A. sellowiana* (Gattelli et al. 2008; Nunes et al. 2012), but this is the first report of *N. bifida*, *N. delvechioi*, and *N. pradoi* infesting fruits of feijoa. Moreover, this is the first report that *N. bella*, *N. bifida*, and *N. delvechioi* have been reported from the state of Santa Catarina.

In our study, *N. pradoi* was the predominant species obtained from fruits of *A. sellowiana*, representing 77.1% of the male adults recovered. Garcia & Norrbom (2011) reported similar results, where they sampled the fruits of 46 plant species belonging to 25 families from 6 municipalities of Santa Catarina; the next most abundant species they collected was *N. zadolicha*. In a recent survey conducted by Calvo et al. (2017), *N. pradoi* was collected from 18 cultivated and wild plant species in Uruguay.

Neosilba bella, *N. bifida*, *N. delvechioi*, and *N. zadolicha* were present in very low numbers in our study, which could suggest their occurrence as being accidental infestations of *A. sellowiana* fruit. According to Gislotti et al. (2017), this situation may suggest that immigration from other nearby host species and surrounding forest areas was occurring. The capability of fruit flies to move from adjacent native vegetation, particularly forest fragments, into orchards was previously demonstrated by Kovalski et al. (1999) and Vargas et al. (2001). Indeed, the feijoa orchard sampled in our study is surrounded by some woodland areas where other Myrtaceae species are present that may serve as reservoirs for these lonchaeid species.

It is important to state that *N. delvechioi* was described by Strikis (2011) from drawings made by Maria Cecilia Delvechio, a researcher that started the studies of *Neosilba* species in the state of São Paulo.

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She found only 1 specimen in 1978 in a peach orchard in the municipality of Monte Alegre do Sul, which is situated on the border of the state near Minas Gerais. In that region, the climate is characterized by an oceanic climate with warm summers (designated as “Cfb” according to the Köppen & Geiger classification), with a mean temperature of 18.9 °C. For more than 30 yr, surveys were carried out to try to find more males of *N. delvechioi* in several regions of the state of São Paulo, where this species was thought to be extinct. After finding it in Santa Catarina, we believe that it is a species adapted to colder climates where it may be important as a pest. In the state of Paraná, this species was once found in considerably larger numbers attacking apples (varieties ‘Fuyu’ and ‘Eva’) along with *N. zadolicha*, *N. certa*, and *N. pradoi*, the 3 last species in minor numbers.

Although studies recently have increased our knowledge on Lonchaeidae with new distribution and host records for Santa Catarina State (Garcia & Norrbom 2011; Strikis 2011), this is the first time that *Neosilba* species are reported damaging fruits of feijoa in Santa Catarina State. Considering that species of *Neosilba* can be primary invaders of commercial plant species, and that *N. pradoi* has been recorded in the region of natural occurrence of feijoa (Gattelli et al. 2008; Nunes et al. 2012; Calvo et al. 2017), our results suggest that this species has the potential to become an economically important pest in feijoa orchards.

The authors thank the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Rede Guarani/Serra Geral - FAPESC TO 2015TR10672, and the Núcleo Agroecologia e Saúde Ambiental FAPESC/CNPq TO TR2012000363 for financial support.

Summary

This study documents the species of lance flies (Diptera: Lonchaeidae) associated with fruits of feijoa (*Acca sellowiana* [Berg] Burret) (Myrtaceae), as well as their infestation level in an orchard located in Lages, Santa Catarina, Brazil. *Neosilba bifida*, *N. delvechioi*, and *N. pradoi* are reported for the first time damaging fruits of feijoa. Moreover, this is the first report of the presence of *N. bella*, *N. bifida*, and *N. delvechioi* from the state of Santa Catarina.

Key Words: feijoa; *Neosilba bifida*; *Neosilba delvechioi*; *Neosilba pradoi*; *Neosilba bella*; frugivorous flies

Sumario

Este estudo apresenta as espécies de moscas-das-frutas (Diptera: Lonchaeidae) associadas a frutos de feijoa (*Acca sellowiana* [Berg] Burret) (Myrtaceae) bem como seu nível de infestação em um pomar em Lages, Santa Catarina, Brasil. *Neosilba bifida*, *N. delvechioi*, e *N. pradoi*

são observadas pela primeira vez danificando frutos de feijoa. Além disso, esta é a primeira vez que *N. bella*, *N. bifida*, e *N. delvechioi* são registradas para o estado de Santa Catarina.

Palavras Chave: feijoa; *Neosilba bifida*; *Neosilba delvechioi*; *Neosilba pradoi*; *Neosilba bella*; moscas frugívoras

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