

## Scientific Note

# If you seek, you will find: second record of *Melanoloma viatrix* Hendel, 1911 (Diptera, Richardiidae) in pineapple in Brazil and its distribution in the country

Aprigio L. Oliveira-Filho<sup>1</sup>, Israel S. Pinto<sup>2</sup>, Hilda B. Luz<sup>1</sup>, Thiago H. R. Pádua<sup>3</sup>, Francisco Limeira-de-Oliveira<sup>4</sup>, Ricardo Adaime<sup>5</sup>, Marcoandre Savaris<sup>3</sup>, Roberto A. Zucchi<sup>3</sup>

<sup>1</sup>Instituto Federal de Educação, Ciência e Tecnologia do Pará, Itaituba, PA, Brazil. <sup>2</sup>Instituto Federal de Educação, Ciência e Tecnologia do Espírito Santo, Ibatiba, ES, Brazil. <sup>3</sup>Escola Superior de Agricultura “Luiz de Queiroz”, Piracicaba, SP, Brazil. <sup>4</sup>Universidade Estadual do Maranhão, Maranhão, Brazil. <sup>5</sup>Embrapa Amapá, Macapá, AP, Brazil.

✉ Corresponding author: [thiagopadua@usp.br](mailto:thiagopadua@usp.br)

Edited by: Daniell R. R. Fernandes<sup>1</sup>

Received: December 02, 2024. Accepted: December 12, 2024. Published: January 16, 2025.

**Abstract.** The pineapple fly, *Melanoloma viatrix* Hendel, 1911 (Diptera, Richardiidae), is a pest in pineapple plantations in several South American countries. In Brazil, pineapple damage by *M. viatrix* was first reported in a commercial plantation in the state of Amapá. We report this pest from a single pineapple sample collected in the municipality of Itaituba, state of Pará, from a plantation operated under the family farming system. As in other South American countries, pineapple is the sole known host of *M. viatrix*. Examination of specimens deposited in two Brazilian collections revealed that, in addition to the states of Amapá and Pará, *M. viatrix* also occurs in the states of Maranhão, Tocantins, and Mato Grosso. However, no host information is known for the specimens deposited in collections; therefore, *M. viatrix* is known to damage pineapple only in Amapá and Pará. Given the extensive geographical distribution of the pest, surveys of host plants and sampling in other Brazilian pineapple-producing states are needed to establish effective management strategies and prevent the spread of the pest within Brazil.

**Keywords:** Pineapple fly, *Ananás comosus*, Amazon biome, new records.

The pineapple fly, *Melanoloma viatrix* Hendel, 1911 (Diptera, Richardiidae), was originally described based on specimens collected in Songa, Bolivia; however, the species has not been reported as damaging pineapple crops in Bolivia. Approximately 55 years after the original description, *M. viatrix* was observed as a pest of pineapple in Peru in 1967 (Figueroa et al. 1970, apud Bello Amez et al. 2020). The specimens initially identified as *Melanoloma canopilosum* Hendel, 1933 were later determined to be *M. viatrix* Hendel (Arévalo-Peñaranda & Osorio-Ospina 1995; Arellano et al. 2015). Indeed, *M. canopilosum* is highly similar to *M. viatrix*, with only slight differences, such as the slightly lighter color of *M. canopilosum* (Lisiane D. Wendt, personal communication). The original description of *M. canopilosum* was based on specimens from Paraguay (Hendel 1933), without information about its host. A diagnosis for the identification of *M. viatrix*, including male and female terminalia, was presented by Adaime et al. (2024).

*Melanoloma viatrix* (Fig. 1) is the only species of the family Richardiidae with agricultural importance, as its larvae destroy pineapple pulp. The family Richardiidae is small, comprising approximately 200 species grouped in 34 genera (Pape et al. 2011; Wendt & Ale-Rocha 2014; 2015). More than 90% of the species are endemic to the Neotropical realm (Steyskal 1968), with the remainder occurring in the Nearctic realm (Steyskal 1987). The biology of richardiids remains poorly understood. The larvae are saprophytes, feeding on decomposing plant material (Perez-Gelabert & Thompson 2006; Hancock 2010); or phytophagous, developing on bracts, flowers, or inflorescences of Araceae (Hernández-Ortiz & Aguirre 2015; Wendt et al. 2018; Amancio et al. 2019), Bromeliaceae (Arévalo-Peñaranda & Osorio-Ospina 1995), and Heliconiaceae (Seifert & Seifert 1976).

The first biological data on *M. viatrix* were obtained in field and laboratory studies (Arévalo-Peñaranda & Osorio-Ospina 1995). Subsequently, Morales & López (2001) conducted research aimed

at the management and control of *M. viatrix*. Villalobos & Luque (2012) tested different diets for larvae and substrates for oviposition, determining some biological parameters. However, some of the data obtained by these authors are conflicting (Adaime et al. 2024).



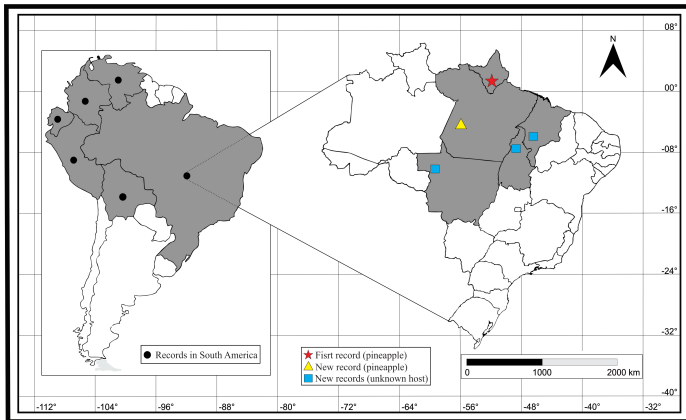
**Figure 1.** *Melanoloma viatrix* Hendel, 1911 in lateral view. A. Male; B. Female (scale = 1 mm) (Photos: M. Savaris).

Pineapple, *Ananas comosus* (L.) Merrill. (Bromeliaceae), is the sole known host of *M. viatrix*. Given that the pineapple record is relatively recent (approximately 60 years) (Figueiroa et al. 1970, apud Bello Amez et al. 2020), it is inferable that *M. viatrix* must occur in other native South American hosts. This phenomenon was observed in a reforestation area in the Eastern Antioquia region of Colombia. In this region, the reforested area was replaced by a pineapple plantation, which was severely attacked by *M. viatrix* (Arias 1992). It is likely that the pineapple fly was developing on some other local host, which was destroyed during pineapple planting. The abundance of food and the probable absence of natural enemies resulted in a severe attack on pineapple in the region.

The initial detection of *M. viatrix* in pineapple in South America was

presented at scientific events yet drew scant attention. For instance, in Peru, the first record in South America was obtained in 1967, when *M. viatrix* (as *M. canopilosum*) was detected, but was not published until three years later (Figueiroa et al. 1970, apud Bello Amez et al. 2020). In Venezuela, *M. viatrix* was initially detected in 1984 but was not recognized as a pineapple pest until 1998 (Boscán de Martínez et al. 2000). Conversely, in the Ecuadorian Amazon, it was documented as a pest approximately 25 years ago (Rogg 2000), yet it appears that no further studies of *M. viatrix* in Ecuador have been conducted.

Following the initial documentation of *M. viatrix* in Peru in 1967, this fly has been recorded in pineapple plantations in Colombia (1991), Venezuela (1998), Ecuador (2000), and Brazil (2024) (Fig. 2, Tab. 1). Nevertheless, van Dinther (1960) reported an unidentified *Melanoloma* species on pineapple crops in Suriname. Bello Amez et al. (2020) reported the occurrence of *M. viatrix* in Mexico but without providing any additional information. However, Adaime et al. (2024) determined that this record was inaccurate. The economic impact of *M. viatrix* on pineapple crops has been studied in Peru (Bello Amez et al. 1997; 2020), Colombia (Arévalo-Peñaranda & Osorio-Ospina 1995), Venezuela (Boscán de Martínez et al. 2000), and Brazil (Adaime et al. 2024).



**Figure 2.** Distribution of *Melanoloma viatrix* Hendel, 1911 in South America and Brazil (Figure: T. H. R. Pádua)

**Table 1.** Distribution of *Melanoloma viatrix* Hendel, 1911 in South America.

Country	Year	Host	First Record
Bolivia	—	unknown	Hendel (1911) (original description)
Peru	1967		Figueiroa (1970) apud Arévalo-Peñaranda & Osorio-Ospina (1995)
Colombia	1991	pineapple	Arévalo-Peñaranda & Osorio-Ospina (1995)
Venezuela	1984		Boscán de Martínez et al. (2000)
Brazil	2024		Adaime et al. (2024)

The record of *M. viatrix* on pineapple in Brazil was published only recently (Adaime et al. 2024). However, this species was already present in some Brazilian entomological collections, although in some cases it was erroneously identified. We examined specimens of *M. viatrix* housed in two collections in Brazil, namely, the Museum of Zoology, University of São Paulo (MZUSP) in São Paulo (São Paulo State), and Zoological Collection of Maranhão (CZMA), the State University of Maranhão (UEMA) in Caxias (Maranhão State). These specimens were collected at different points in time, spanning several decades (Tab. 2). Of the five specimens in the MZUSP, four were collected in Utiariti (state of Mato Grosso) and one in Araguaína (state of Tocantins). The CZMA holds six specimens collected in conservation units, namely, Chapada das Mesas (one male) and Mirador (four males, one female) (Tab. 2). The host plants of the specimens deposited in collections are unknown. This observation suggests that the exploitation of pineapple as a host for *M. viatrix* is a relatively recent phenomenon in Brazil. Ten specimens of *M. viatrix* are deposited at the collection of Department of Zoology, University of Paraná (DZUP) (Claudio J. B. Carvalho,

personal communication), which we did not examine and therefore are not considering in this study. In addition, approximately 70 specimens of *Melanoloma* are housed at the National Institute of Amazonian Research (INPA), although none has been identified to the species level (José Albertino Rafael, personal communication). Conversely, it appears that no specimens of the genus *Melanoloma* are held at the National Museum, Federal University of Rio de Janeiro (MNRJ) (Márcia Souto Couri, personal communication). Voucher specimens of *M. viatrix*, collected from pineapples in the state of Amapá (first record), are housed in the Luiz de Queiroz Museum of Entomology (MELQ) at the Luiz de Queiroz College of Agriculture (ESALQ) in Piracicaba, São Paulo State, and in the Oscar Monte Entomophagous Insect Collection of the Biological Institute (IB) in Campinas, São Paulo State (Adaime et al. 2024).

In Brazil, damage caused by larvae of *M. viatrix* was first recorded in a commercial pineapple plantation in Porto Grande, state of Amapá. The severity of this attack caused the farmers to abandon a portion of the plantation, out of concern about the potential for the pest to spread and the lack of available information regarding control measures (Adaime et al. 2024).

A recent survey of *Anastrepha* species (Diptera, Tephritidae) in the municipality of Itaituba, state of Pará, afforded the opportunity to evaluate pineapples from a commercial plantation for the possible presence of *M. viatrix*. The sampling was authorized by the National System of Biodiversity Information (SISBIO), permit number 77061-3. The pineapple plantation is managed using the family farming system and is situated in the Santa Teresinha community in the municipality of Itaituba (4°30'32.5" S; 55°54'30.8" W). It covers an area of 960 m<sup>2</sup> and comprises 2,400 pineapple plants. Four very ripe pineapples were selected for sampling. The pineapples were transported to the Biological Sciences laboratory of the Federal Institute of Education, Science and Technology of Pará (IFPA), Itaituba Campus, on March 3, 2023, and placed in a plastic container (37 cm in diameter and 13 cm in height) with sand at bottom and kept at room temperature (Fig. 3). Approximately 25 days later, five flies emerged (three males and two females), which we identified as *M. viatrix*. Voucher specimens (three males and two females) were deposited in the collection of the Luiz de Queiroz Museum of Entomology (MELQ) (ESALQENT001805-09). Consequently, based on specimens from collections (MZUSP and UEMA) and our records on pineapple, *M. viatrix* is present in three Brazilian regions, namely, Northern (Amapá, Pará, and Tocantins), Northeastern (Maranhão), and Central-West (Mato Grosso) (Fig. 2).



**Figure 3.** Pineapple sample at IFPA laboratory (Photo: A. L. Oliveira-Filho).

Our collection in the state of Pará is the second record of *M. viatrix* on pineapple in Brazil. In the recent report from Amapá, Adaime et

**Table 2.** Distribution of *Melanoloma viatrix* Hendel, 1911 in Brazil\*

State	Location	Year	Host	Identifier	Collection/Reference
<b>NORTH REGION</b>					
AP	Porto Grande	2020	pineapple	M. F. Souza Filho, M. Savaris (MS), R.A. Zucchi (RAZ)	MELQ/IB-CBE/Adaime et al. (2024)
	Mazagão	2023	pineapple		—
PA	Itaituba	2023	pineapple	MS/THRP/RAZ	MELQ/This publication
TO	Araguaína	1965	—	A. P. Prado/ MS/THRP/RAZ	MZUSP/This publication
<b>NORTHEAST REGION</b>					
MA	Mirador	2006/2013	—	MS/THRP/RAZ	UEMA/This publication
	Chapada das Mesas	2014			
<b>CENTRAL-WEST REGION</b>					
MT	Utiariti	1966	—	A. P. Prado/ MS/THRP/RAZ	MZUSP/This publication

\*State abbreviations: AP, Amapá; MA, Maranhão; MT, Mato Grosso; PA, Pará; TO, Tocantins

al. (2024) discussed the possibility that the pest also occurs in Pará. This concern is well-founded, as Pará is Brazil's largest producer of pineapples, with 350,018,000 units produced on 14,168 ha, particularly in the southeastern mesoregion of the state, which accounts for 85% of the cultivated area and 87% of the total national production (IBGE 2022).

Although the current record in Pará State, approximately 1,900 km by road from Porto Grande, Amapá (first record in Brazil), was based on an occasional collection, that is, there was no broader sampling of pineapples, the data indicate that the pineapple fly has a very wide geographical distribution in northern region.

Even though the larvae of the pineapple fly can impair the quality of the pineapple by causing irregular ripening, this symptom also increases the likelihood of detection and, consequently, destruction of the damaged pineapple by the farmers themselves. Thus, the symptoms of a pest attack can serve as a crucial element in the implementation of control measures. It is therefore essential to provide farmers with guidance on how to proceed with the destruction of damaged pineapples, in order to reduce the likelihood of pest spread. One potential strategy is cultural control, which has been recommended for the management of fruit flies (Diptera, Tephritidae) (Souza-Filho & Raga 2012). This method entails collecting symptomatic pineapples and placing them in sealed plastic or used fertilizer bags. The bags should then be left in the sun to kill the larvae. Currently, no products are registered with the Ministry of Agriculture, Livestock, and Food Supply (MAPA) for the control of *M. viatrix* in Brazil (AGROFIT 2024).

Plants in close proximity to pineapple plantations, particularly other bromeliads, should be examined to identify potential native hosts of *M. viatrix*. Knowledge of the hosts is vital for the development of effective control strategies for the pineapple fly and for preventing its spread. Additionally, a search for natural enemies that may help to reduce the pest population is essential.

Considering the above, it is imperative that the official plant health defense agencies in Brazil conduct a thorough examination of the potential presence of the pineapple fly in the primary producing regions, particularly in the states of Pará, Paraíba, Minas Gerais, Rio de Janeiro, and Tocantins. This endeavor is of paramount importance to ensure the continued viability of Brazilian pineapple production (Adaime et al. 2024). Furthermore, it is necessary to test management alternatives that have been employed in other countries where *M. viatrix* is present. These include mechanical protection of the fruits, such as the use of polyethylene sleeves with holes or PVC mesh, which has been successfully implemented in Peru (Bello Amez et al. 2020).

## Acknowledgments

We are grateful to Claudio José Barros de Carvalho (DZUP), Carlos José Einicker Lamas (MZUSP), José Albertino Rafael (INPA), and Márcia Souto Couri (MN RJ) for providing information regarding the specimens deposited in the collections of their institutions. We also thank Lisiane D. Wendt for providing information about *Melanoloma viatrix*.

## Funding Information

RAZ - Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for financial support.

## Authors' Contributions

ALOF: Conceptualization, Formal Analysis; Methodology, Investigation, Resources; Writing - review and editing. ISP: Conceptualization, Formal Analysis; Methodology, Investigation, Resources. HBL: Methodology, Investigation, Resources. THRP: Writing - review and editing. FL-de-O: Writing - review and editing. RA: Conceptualization, Formal Analysis; Writing - review and editing. MS: Conceptualization, Formal Analysis; Writing - review and editing. RAZ: Conceptualization, Formal Analysis; Writing - original draft, Writing - review and editing.

## Conflict of Interest Statement

The authors declare no competing interests.

## References

- Adaime, R.; do Nascimento Lemos, L.; Belo, A. P. D.; Souza-Filho, M. F.; Savaris, M.; Zucchi, R. A. (2024) *Melanoloma viatrix* Hendel (Diptera, Richardiidae): New pest of pineapple plantations in the North of Brazil. *Neotropical Entomology*, 53: 1002-1008. doi: [10.1007/s13744-024-01151-8](https://doi.org/10.1007/s13744-024-01151-8)
- AGROFIT (2024) Sistema de Agrotóxicos Fitossanitários do Ministério da Agricultura, Pecuária e Abastecimento (MAPA). [http://agrofit.agricultura.gov.br/agrofit\\_cons/principal\\_agrofit\\_cons](http://agrofit.agricultura.gov.br/agrofit_cons/principal_agrofit_cons). Access on: 16.viii.2024
- Amancio, G.; Hernández-Ortiz, V.; Aguirre-Jaimes, A.; Guevara, R.; Quesada, M. (2019) Feeding specialization of flies (Diptera: Richardiidae) in aroid infructescences (Araceae) of the Neotropics. *Journal of Insect Science*, 19(3): 28. doi: [10.1093/jisesa/iez065](https://doi.org/10.1093/jisesa/iez065)
- Arellano, G.; Vergara, C.; Bello, A. S. (2015) Plagas entomológicas y otros artrópodos en el cultivo de la piña (*Ananas comosus* var. *comosus* (L.) Merr., Coppens & Leal) en Chanchamayo y Satipo,

- Departamento de Junín, Perú. *Ecología Aplicada*, 14(2): 175-189. doi: [10.21704/rea.v14i1-2.94](https://doi.org/10.21704/rea.v14i1-2.94)
- Arévalo-Peñaranda, E.; Osorio-Ospina, M. A. (1995) Consideraciones generales sobre *Melanoloma viatrix* Hendel, una nueva plaga de la piña. *Revista Colombiana de Entomología*, 21(1): 1-8. doi: [10.25100/socolen.v21i1.9955](https://doi.org/10.25100/socolen.v21i1.9955)
- Arias, R. J. H. (1992) Diagnóstico sobre el cultivo de la piña en el Oriente antioqueño. *Boletín Actualidades ICA* (Colombia), 5(64): 1-8. <https://hdl.handle.net/20.500.12324/12456>
- Bello Amez, S.; Julca Otiniano, A.; Villachica León, H. (1997) Mancha de la fruta de piña tipo galerías asociada a *Melanoloma canopilosum* Hendel. Proc. 2nd. International Pineapple Symposium. *Acta Horticulturae*, 425: 493-500. doi: [10.17660/actahortic.1997.425.53](https://doi.org/10.17660/actahortic.1997.425.53)
- Bello Amez, S.; Borjas Ventura, R.; Alvarado Huamán, L.; Bello Medina, N.; Castro-Cepero, V.; Julca-Otiniano, A. (2020) La mosca de la fruta de la piña (*Melanoloma viatrix* Hendel) asociada a la mancha con galerías y experiencias de control en la selva central del Perú. *Idesia*, 38: 37-46. doi: [10.4067/S0718-34292020000400037](https://doi.org/10.4067/S0718-34292020000400037)
- Boscán de Martínez, N.; Rosales, J. C.; Godoy, F. (2000) La mosca del fruto de la piña *Melanoloma viatrix* (Diptera: Richardiidae) nuevo insecto plaga en Venezuela. *Agronomía Tropical*, 50: 135-140.
- Figueroa, R.; Wolfe, H.; Franciosi, R.; Van Oordt, E. (1970) El cultivo de la piña en el Perú. Boletín Técnico n° 75. Ministerio de Agricultura, Lima, Perú.
- Hancock, E. G. (2010) Richardiidae (Richardiid flies). In: Brown, B. V.; Borkent, A.; Cummin, J. M.; Wood, D. M.; Woodley, N. E.; Zumbado, M. A. (Eds.). *Manual of Central American Diptera*, Volume 2, pp 871-879. NRC Research Press, Ottawa.
- Hendel, F. (1911) Die Arten der Dipteren-Subfamilie Richardiina. *Deutsche Entomologische Zeitschrift*, 1911: 181-212.
- Hendel, F. (1933) Von Dr. Zühner in den Jahren 1913-1938 in Paraguay gesammelte acalyptratae Dipteren. *Revista de Entomología*, 3: 213-224.
- Hernández-Ortiz, V.; Aguirre, A. (2015) A new species of the Neotropical genus *Beebeomyia* (Diptera: Richardiidae) with observations of its biology on *Dieffenbachia oerstedi* (Araceae). *Journal of Natural History*, 49: 1877-1889. doi: [10.1080/00222933.2015.1005712](https://doi.org/10.1080/00222933.2015.1005712)
- IBGE – Instituto Brasileiro de Geografia e Estatística (2022) Produção Agrícola Municipal 2022. Available: <https://www.ibge.gov.br/estatisticas/economicas/agricultura-e-pecuaria/9117-producao-agricola-municipal-culturas-temporarias-e-permanentes.html>. Access: 23.viii.2024.
- Morales, J.; López, J. (2001) Estudios básicos para el manejo y control integrado de la mosca de la piña (*Melanoloma viatrix*). CORPOICA, Regional 7. *Boletín de Investigación*, No. 2: 1-38.
- Pape, T.; Blagoderov, V.; Mostovski, M. B. (2011) Order Diptera Linnaeus, 1758. In: Zhang, Z.-Q. (Ed.), *Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness*. *Zootaxa*, 3148: 227. doi: [10.11646/zootaxa.3703.1.3](https://doi.org/10.11646/zootaxa.3703.1.3)
- Perez-Gelabert, D. E.; Thompson, F. C. (2006) A new genus and species of Richardiidae (Diptera) from Hispaniola. *Zootaxa* 1259: 25-31. doi: [10.5281/zenodo.173157](https://doi.org/10.5281/zenodo.173157)
- Rogg, H. W. (2000) Manejo Integrado de Plagas en Cultivos de la Amazonía Ecuatoriana. Quito: Escola Superior Politécnica Ecológica Amazónica (ESPEA), IICA, ECORAE. <https://repositorio.iica.int/handle/11324/16679>. Access: 23.viii.2024.
- Seifert, R. P.; Seifert, F. H. (1976) Natural history of insects living in inflorescences of two species of *Heliconia*. *Journal of the New York Entomological Society* 84(4): 233-242. <https://www.jstor.org/stable/25009025>. Access: 23.viii.2024.
- Souza-Filho, M. F.; Raga, A. (2012) Atualidades sobre as moscas-das-frutas. *Citricultura Atual* 15(86): 16-18.
- Steyskal, G. C. (1968) Family Richardiidae. In: Papavero, N. (Ed.) *A catalogue of the Diptera of the Americas South of the United States*. São Paulo: Departamento de Zoologia, Secretaria da Agricultura
- Steyskal, G. C. (1987) Family Richardiidae. In: McAlpine, J. F.; Peterson, B. V.; Shewell, G. F.; Teskey, H. J.; Vockeroth, J. R.; Wood, D. M. (Eds.). *Manual of Nearctic Diptera*. Research Branch, Agriculture Canada, Monograph, 2: 833-837.
- van Dintner, J. B. M. (1960) Insect pests of cultivated plants in Surinam. *Bulletin of the Agricultural Experiment Station of Suriname*, 76: 1-159.
- Villalobos, A.; Luque, J. E. (2012) Aspectos biológicos de *Melanoloma viatrix* Hendel, 1911 (Diptera: Richardiidae) en condiciones de laboratorio. *Revista Agricultura Tropical* 35(5, 6): 52-67. doi: [10.25100/socolen.v35i1.9196](https://doi.org/10.25100/socolen.v35i1.9196)
- Wendt, L. D.; Ale-Rocha, R. (2014) Taxonomic revision of wasp-like richardiids, *Neoidiotypa* Osten-Sacken (Diptera, Tephritoidea, Richardiidae). *Zootaxa*, 3857: 527-550. doi: [10.11646/zootaxa.3857.4.4](https://doi.org/10.11646/zootaxa.3857.4.4)
- Wendt, L. D.; Ale-Rocha, R. (2015) Antlered richardiid flies: new species of *Richardia* (Tephritoidea: Richardiidae) with antler-like genital processes. *Entomological Science*, 18: 153-166. doi: [10.1111/ens.12122](https://doi.org/10.1111/ens.12122)
- Wendt, L. D.; Gonçalves, E. G.; Maia, A. C. D. (2018) A new species of *Beebeomyia* Curran (Diptera: Richardiidae) from Brazil, with description of immature stages and notes on their association with *Taccarum ulei* (Araceae). *Zootaxa*, 4369: 587-599. doi: [10.11646/zootaxa.4369.4.8](https://doi.org/10.11646/zootaxa.4369.4.8)