

## Scientific Note

# New host records for Carambola fruit fly and *Anastrepha* spp. in Brazil

Lailson N. Lemos<sup>1</sup>, Elizane V. Pantoja<sup>1</sup>, Carlos E. C. Chucre<sup>1</sup>, Guilherme A. Dalmacio<sup>1</sup>,  
Andressa P. D. Belo<sup>1</sup>, Miguel F. Souza-Filho<sup>2</sup>, Ricardo Adaime<sup>3</sup>

<sup>1</sup>Universidade Federal do Amapá, Mazagão, AP, Brazil. <sup>2</sup>Instituto Biológico, Campinas, SP, Brazil. <sup>3</sup>Embrapa Amapá, Macapá, AP, Brazil.

 Corresponding author: [ricardo.adaime@embrapa.br](mailto:ricardo.adaime@embrapa.br)

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

Received: August 21, 2024. Accepted: September 07, 2024. Published: October 02, 2024.

**Abstract.** In this work we report four new host plants of carambola fruit fly [*Bactrocera carambolae* Drew & Hancock, 1994 (Diptera: Tephritidae)] in Brazil from sampling carried out in four municipalities in the state of Amapá. We also report new host record for *Anastrepha bahiensis* Lima, 1937 and *Anastrepha striata* Schiner, 1868 (Diptera: Tephritidae) in Brazil.

**Keywords:** *Bactrocera carambolae*; fruit production; quarantine pest; Amapá; Amazon.

*Bactrocera carambolae* Drew & Hancock, 1994 (Diptera: Tephritidae), the carambola fruit fly (CFF), is an invading species in South America, reported in Suriname, French Guiana, Guyana, and Brazil (Malavasi 2015). In Brazil, it was detected officially in 1996, in the municipality of Oiapoque, state of Amapá (Silva et al. 2004). It is currently considered a quarantine pest present in Brazil, so far with records only in three states, Amapá, Pará and Roraima, under official control by the Ministry of Agriculture, Livestock, and Supply (Brasil 2018). CFF represents a highly relevant phytosanitary problem for Brazil, as its spread to areas where fruit is produced for export would cause inestimable economic, social and environmental losses (details in Garcia et al. 2024).

The Ministry of Agriculture, Livestock, and Supply created the Suppression Subprogram for the Eradication of *B. carambolae*, with the aim of eradicating the CFF in national territory, through the Normative Instructions 24 (Brasil 2015) and 28 (Brasil 2017), which establish guidelines for monitoring, control and phytosanitary education actions related to the pest. The actions are based on data from the detection and monitoring system (Garcia et al. 2024).

A natural host of fruit fly is that plant species whose fruit is found to be unmistakably infested under totally natural field conditions (Aluja & Mangan 2008). In Brazil, 31 natural host plant species (belonging to 13 botanical families) of CFF have already been identified (Adaime et al. 2023; Costa et al. 2023a, 2023b; Costa et al. 2024). Knowing the host species used for the larval development of CFF is very useful for directing agricultural control and inspection actions (Lemos et al. 2014; Jesus-Barros et al. 2015; Costa et al. 2023a). In this context, this work aimed to report new host plants for CFF in Brazil.

From March to April 2024, a sampling of fruits from plants potentially host of fruit flies was carried out in four municipalities (Ferreira Gomes, Mazagão, Porto Grande and Serra do Navio), in the state of Amapá, Brazil. The fruits were collected directly from the plants, randomly. The collected samples were packed in plastic trays (16 x 30 cm) and transported in stackable plastic boxes to the Entomology Nucleus Laboratory at the Universidade Federal do Amapá, Campus Mazagão. In the laboratory, we followed the procedures recommended by Silva et al. (2011) for grouped fruit samples. The fruits were counted, weighed and placed in plastic trays on a thin layer of moist sand. The trays were covered with organza attached by elastic alloy. The collected material was examined every three days and the puparia found were removed and transferred to transparent plastic containers containing a thin layer of moistened vermiculite. The plastic containers were covered with

organza and a vented lid, being inspected daily. The humidity in the trays and in the containers was maintained by replacing water. The fruit flies that emerged were stored in glass vials containing 70% ethanol, for later identification.

The identification of *B. carambolae* was based on Zucchi (2000). Specimens of *Anastrepha* Schiner, 1868 were identified using the illustrated identification key published by Zucchi et al. (2011). Only females were used for identification, which was performed by examination of everted aculei, using a stereomicroscope and optical microscope (40×). Other characteristics were also observed, including wing pattern, mesonotum, mediotergite, and subscutellum.

To identify the forest plant species, we collected branches containing their reproductive structures (flowers and fruits), which were later processed into herbarium specimens using the mounting and preservation techniques described by Fidalgo & Bononi (1984). The plant species were identified using identification keys and specialized literature (Lorenzi et al. 2015; Souza & Lorenzi 2019; Lorenzi 2021).

We collected 11 samples (335 fruits, 16.7 kg), from six plant species belonging to five families: Annonaceae (*Annona glabra* L. - araticum-do-brejo, one sample; *Annona muricata* L. - graviola, two samples); Fabaceae [*Andira surinamensis* (Bondt) Splitg. ex Pulle - moça, three samples]; Moraceae (*Helicostylis pedunculata* Benoist - amora-da-mata, one sample); Myrtaceae (*Eugenia uniflora* L. - pitanga, one sample) and Rutaceae (*Citrus aurantium* L. - laranja-da-terra, three samples) (Tab. 1).

Infestation by fruit flies was observed in all samples from all municipalities, from which 349 puparia were obtained (Tab. 1). We observed the emergence of specimens of *B. carambolae* (69 females +56 males), *Anastrepha bahiensis* Lima, 1937 (35 females), *Anastrepha striata* Schiner, 1868 (one female), *Anastrepha* sp. (38 males), and parasitoids *Doryctobracon areolatus* (Szépligeti, 1911) (Hymenoptera: Braconidae) (one female + eight males).

CFF specimens were obtained from all collected samples (Tab. 1). Only two of the six infested species had previously been reported as hosts of the CFF in Brazil: *E. uniflora*, already registered in the municipality of Santana (Almeida et al. 2016), and *C. aurantium*, in the municipality of Oiapoque, both in the state of Amapá (Adaime et al. 2016; Costa et al. 2023a). In turn, CFF records in *A. glabra* (Annonaceae), *A. muricata* (Annonaceae), *A. surinamensis* (Fabaceae), and *H. pedunculata* (Moraceae) are unprecedented for Brazil.

*Annona glabra* (Fig. 1A-B), native to the Americas, is a tropical plant that occurs from the southeastern United States to South

America, especially found in floodplain areas (Sinchana et al. 2024). *Annona muricata* (Fig. 2) is native to Central and South America and has been cultivated in several tropical regions of the world (Pélissier et al. 1994). *Andira surinamensis* (Fig. 3A-C) is native to tropical South America, found mainly in Brazil, Suriname, French Guiana, Venezuela and Colombia (Carvalho 2014). *Helicostylis pedunculata* (Fig. 4A-C) is native to tropical regions of South America, found especially in dry land and floodplain environments in the Amazon region (Fern 2024).

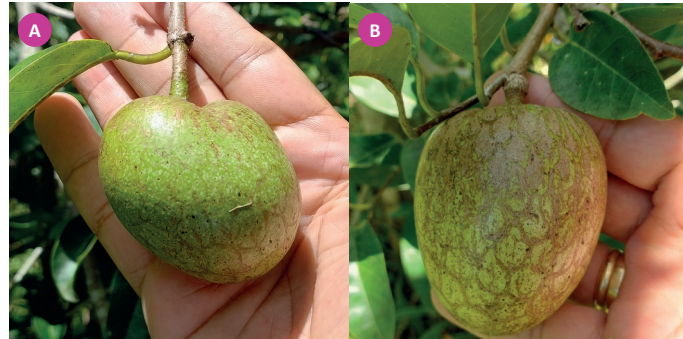


Figure 1. *Annona glabra*. A) Fruit; B) Detail of the epicarp.

The species *A. muricata* had previously been reported as a host of CFF in French Guiana (Malavasi et al. 2013; Vayssières et al. 2013), while, *E. uniflora* and *C. aurantium* were reported in both French Guiana and Suriname (van Sauer-Muller 1991; 2005; Malavasi et al. 2013; Vayssières et al. 2013). On the other hand, the records of CFF in *A. surinamensis*, *A. glabra*, and *H. pedunculata* are probably unprecedented worldwide.

CFF shared the resource with another species in only one of the eleven samples collected. This occurred in the sample of *H. pedunculata* fruits, in which *A. bahiensis* specimens predominated. In this sample, *A. striata* was also obtained. Additionally, 9 specimens of the parasitoid *D. areolatus* were also obtained from 101 puparia of

fruit flies, totaling 8.9% of parasitism (Tab. 1). In Brazil, *A. bahiensis* and *D. areolatus* have already been recorded in other species of the genus *Helicostylis* (Zucchi & Moraes 2024). The association of a given species of parasitoid with a species of fruit fly is only possible when only one species of fruit fly emerges from the sample (Zucchi 2000). Therefore, in this work it was not possible to associate *D. areolatus* with any of the species of fruit flies obtained in the sample (*A. bahiensis*, *A. striata*, and *B. carambolae*).



Figure 2. Fruit of *Annona muricata*.

Table 1. Fruit flies, host plants and associated parasitoids in Amapá State, Brazil. March and April 2024.

Dates	Municipalities	Latitude Longitude	Scientific names <sup>a</sup> Families	Fruits (n)	Mass (kg)	P <sup>b</sup> (n)	I <sup>c</sup> (P/kg)	E <sup>d</sup> (%)	Species <sup>e</sup>
March 19	Mazagão	00°05'55.1"S 51°16'55.6"W	<i>Annona glabra</i> L. Annonaceae	12	1.30	22	16.9	18.2	<i>B. carambolae</i> 3 F + 1 M
March 19	Mazagão	00°05'48.8"S 51°16'42.5"W	<i>Annona muricata</i> L. Annonaceae	1	0.41	3	7.3	100	<i>B. carambolae</i> 3 F
March 19	Mazagão	00°05'55.1"S 51°16'56.9"W	<i>Annona muricata</i> L. Annonaceae	2	1.74	5	2.9	20.0	<i>B. carambolae</i> 1 M
April 1	Mazagão	00°08'4.1"S 51°21'29.6"W	<i>Helicostylis pedunculata</i> Benoist Moraceae	115	0.75	101	134.7	84.1	<i>A. bahiensis</i> 35 F <i>A. striata</i> 1 M <i>Anastrepha</i> sp. 38 M <i>B. carambolae</i> 2 M <i>D. areolatus</i> 1 F + 8 M
April 13	Serra do Navio	00°54'05.7"N 52°00'04.6"W	<i>Andira surinamensis</i> (Bondt) Splitg. ex Pulle Fabaceae: Papilionoideae	63	3.52	78	22.1	46.1	<i>B. carambolae</i> 23 F + 13 M
April 13	Serra do Navio	00°54'12.3"N 52°00'01.3"W	<i>Eugenia uniflora</i> L. Myrtaceae	27	0.23	5	21.7	100	<i>B. carambolae</i> 1 F + 4 M
April 24	Porto Grande	00°36'41.6"N 51°25'50.2"W	<i>Citrus aurantium</i> L. Rutaceae	6	1.86	1	0.5	100	<i>B. carambolae</i> 1 F
April 24	Ferreira Gomes	00°51'17.1"N 51°10'54.6"W	<i>Citrus aurantium</i> L. Rutaceae	2	0.43	80	186.0	68.7	<i>B. carambolae</i> 30 F + 25 M
April 24	Ferreira Gomes	00°51'18.9"N 51°10'35.8"W	<i>Citrus aurantium</i> L. Rutaceae	12	2.96	18	6.1	38.9	<i>B. carambolae</i> 4 F + 3 M
April 24	Ferreira Gomes	00°51'32.1"N 51°10'44.0"W	<i>Andira surinamensis</i> (Bondt) Splitg. ex Pulle Fabaceae: Papilionoideae	34	1.59	5	3.1	100	<i>B. carambolae</i> 2 F + 3 M
April 24	Ferreira Gomes	00°51'32.8"N 51°10'43.0"W	<i>Andira surinamensis</i> (Bondt) Splitg. ex Pulle Fabaceae: Papilionoideae	61	1.91	31	16.2	19.3	<i>B. carambolae</i> 2 F + 4 M
<b>Total</b>	-	-	-	<b>335</b>	<b>16.7</b>	<b>349</b>	-	-	-

<sup>a</sup>According to WFO (2024); <sup>b</sup>P = puparia; <sup>c</sup>I = infestation; <sup>d</sup>E = emergence; <sup>e</sup>F = female, M = male.

Fruit infestation rates were quite variable. Coincidentally, the lowest (0.5 puparia/kg of fruit) and the highest (186.0 puparia/kg of fruit) indices were obtained in *C. aurantium*, both samples infested by *B. carambolae* (Tab. 1). In *H. pedunculata* fruits the infestation was considerable (134.7 puparia/kg of fruit), however, due to the infestation by *A. bahiensis*. From fruits of *H. pedunculata*, one specimen of *A. striata* was also obtained (Tab. 1). So, in this work, we make the first record of *H. pedunculata* as a host plant for *A. bahiensis* and *A. striata* in Brazil. Prior to these records, *A. bahiensis* and *A. striata* were associated with 23 and 47 plant species, respectively (Zucchi & Moraes 2024).



**Figure 3.** *Andira surinamensis*. A) Fruiting plant; B) Fruits; C) Fruit infested by *B. carambolae* larvae.



**Figure 4.** *Helicostylis pedunculata*. A) Fruits; B) Fruits in detail; C) Fruit infested by *B. carambolae* larvae.

On CFF something is now very clear: it is rapidly adapting to multiple hosts in Amapá. For example, 20 years ago, when systematic surveys of fruit flies began, there were only three host plant species reported for CFF (Silva et al. 2004). Currently, after 28 years since its first detection in Brazil, considering the species we are reporting in this work and the other records published in the period, 32 new host species of the pest were reported in Brazil, reaching 35 species (see Adaime et al. 2023;

Costa et al. 2023a; 2023b; Costa et al. 2024). Also, it is important to consider that CFF occurs both in urban areas (in residential backyards and in the urban afforestation) and in rural areas (Lemos et al. 2014; Almeida et al. 2016; Adaime et al. 2017; Belo et al. 2020; Costa et al. 2023a; 2023b). Although the current list of host plants for the pest in Amapá consists of various species (Adaime et al. 2023; Costa et al. 2023a; 2023b; Costa et al. 2024), the most frequently infested are *Averrhoa carambola*, *Psidium guajava*, *Syzygium malaccense*, and *Malpighia emarginata* (Costa et al. 2023a). This is different from what occurred two decades ago, when the pest infested almost exclusively *A. carambola*.

Given the undeniable threat that CFF represents to Brazilian fruit production (Silva et al. 2004; Malavasi 2015) and the adaptation that the pest has shown to host plants in Brazil, it is crucial to continue with fruit sampling work that, although expensive and laborious, allows obtaining valuable information for national phytosanitary defense (Lemos et al. 2014; Jesus-Barros et al. 2015; Costa et al. 2023a). Also, the results generated can be used to adopt more targeted and effective control measures (Belo et al. 2020).

### Acknowledgment

To the Ministry of Agriculture and Livestock for authorizing publication of data relating to the carambola fruit fly. To the team of the Entomology Nucleus Laboratory at the Universidade Federal do Amapá, Mazagão Campus.

### Funding Information

Universidade Federal do Amapá and Embrapa Amapá.

### Authors' Contributions

LNL: Conceptualization, Investigation, Methodology, Writing - original draft; EVP: Investigation; CECC: Investigation; GAD: Investigation; APDB: Investigation, Methodology; MFSF: Investigation, Methodology, Writing - review and editing; RA: Conceptualization, Methodology, Writing - original draft, Writing - review and editing, Supervision.

### Conflict of Interest Statement

The authors declare no competing interests.

### Referências

- Adaime, R.; Jesus-Barros, C. R.; Bariani, A.; Lima, A. L.; Cruz, K. R.; Carvalho, J. P. (2016) Novos registros de hospedeiros da mosca-da-carambola (*Bactrocera carambolae*) no estado do Amapá, Brasil. *Comunicado Técnico* 146. Macapá: Embrapa Amapá.
- Adaime, R.; Pereira, J. D. B.; Sousa, M. S. M.; Jesus, C. R.; Souza-Filho, M. F.; Zucchi, R. A. (2023) Moscas-das-frutas, suas plantas hospedeiras e parasitoides no estado do Amapá. In: Zucchi, R. A.; Malavasi, A.; Adaime, R.; Nava, D. E. (Eds.), *Moscas-das-frutas no Brasil - conhecimento básico e aplicado - Volume II*, pp. 51-68. Piracicaba: FEALQ.
- Adaime, R.; Sousa, M. S. M.; Jesus-Barros, C. R.; Deus, E. G.; Pereira, J. F.; Strikis, P. C.; Souza-Filho, M. F. (2017) Frugivorous flies (Diptera: Tephritidae, Lonchaeidae), their host plants, and associated parasitoids in the extreme north of Amapá state, Brazil. *Florida Entomologist*, 100(2): 316-324. doi: [10.1653/024.100.0229](https://doi.org/10.1653/024.100.0229)
- Almeida, R. R.; Cruz, K. R.; Sousa, M. S. M.; Costa-Neto, S. V.; Jesus-Barros, C. R.; Lima, A. L.; Adaime, R. (2016) Frugivorous flies (Diptera: Tephritidae, Lonchaeidae) associated with fruit production on Ilha de Santana, Brazilian Amazon. *Florida Entomologist*, 99(3): 426-436. doi: [10.1653/024.099.0313](https://doi.org/10.1653/024.099.0313)
- Aluja, M.; Mangan, R. L. (2008) Fruit fly (Diptera: Tephritidae) host status determination: critical conceptual, methodological, and regulatory considerations. *Annual Review of Entomology*, 53(1):

- 473-502. doi: [10.1146/annurev.ento.53.103106.093350](https://doi.org/10.1146/annurev.ento.53.103106.093350)
- Belo, A. P. D.; Silva, L. M. S. E.; Correa, J. M. G.; Ferreira, R. M. A.; Costa-Neto, S. V.; Sousa, M. S. M.; Adaime, R.; Lemos, L. N. (2020) New host plants records of *Bactrocera carambolae* Drew & Hancock and *Anastrepha* spp. (Diptera: Tephritidae) in Brazil. *Entomological Communications*, 2: ec02036. doi: [10.37486/2675-1305.ec02036](https://doi.org/10.37486/2675-1305.ec02036)
- Brasil (2015) Ministério da Agricultura, Pecuária e Abastecimento. Instrução Normativa nº 24, de 8 de setembro de 2015. Diário Oficial [da] República Federativa do Brasil, Brasília, DF, 9 set. 2015. Seção 1. [https://www.gov.br/agricultura/pt-br/assuntos/sanidade-animal-e-vegetal/sanidade-vegetal/copy\\_of\\_IN2408.09.2015PNMF.pdf](https://www.gov.br/agricultura/pt-br/assuntos/sanidade-animal-e-vegetal/sanidade-vegetal/copy_of_IN2408.09.2015PNMF.pdf). Access on: 3.vii.2024.
- Brasil (2017) Ministério da Agricultura, Pecuária e Abastecimento. Instrução Normativa nº 28, de 20 de julho de 2017. Diário Oficial [da] República Federativa do Brasil, Brasília, DF, 26 jul. 2017. Seção 1. <https://www.gov.br/agricultura/pt-br/assuntos/sanidade-animal-e-vegetal/sanidade-vegetal/arquivos-prevencao/IN282017.pdf>. Access on: 3.vii.2024.
- Brasil (2018) Ministério da Agricultura, Pecuária e Abastecimento. Instrução Normativa nº 38, de 1 de outubro de 2018. Diário Oficial [da] República Federativa do Brasil, Brasília, DF, 2 out. 2018. Seção 1. [https://www.in.gov.br/materia/-/asset\\_publisher/Kujrw0TZC2Mb/content/id/43461167/do1-2018-10-02-instrucao-normativa-n-38-de-1-de-outubro-de-2018-43461024](https://www.in.gov.br/materia/-/asset_publisher/Kujrw0TZC2Mb/content/id/43461167/do1-2018-10-02-instrucao-normativa-n-38-de-1-de-outubro-de-2018-43461024). Access on: 3.vii.2024.
- Carvalho, P. E. R. (2014) Angelim (*Andira surinamensis*). In: Carvalho, P. E. R. (Ed.), *Espécies arbóreas brasileiras*, pp. 107-113. Brasília: Embrapa. <https://www.embrapa.br/florestas/busca-de-publicacoes/-/publicacao/1140430/angelim-andira-surinamensis>
- Costa, J. V. T. A.; Sousa, M. S. M.; Jesus, C. R.; Souza-Filho, M. F.; Costa, V. A.; Silva, B. M. S.; Oliveira, J. P. M.; Adaime, R. (2023a) New Findings on Carambola Fruit Fly Hosts in South America. *Florida Entomologist*, 106(3): 161-174. doi: [10.1653/024.106.0303](https://doi.org/10.1653/024.106.0303)
- Costa, J. V. T. A.; Sousa, M. S. M.; Souza-Filho, M. F.; Adaime, R. (2023b) *Chrysophyllum cainito* L. (Sapotaceae): novo hospedeiro da mosca-da-carambola no Brasil. *Agrotropica*, 35(2,3): 161-164. doi: [10.21757/0103-3816.2023v35n2,3p161-164](https://doi.org/10.21757/0103-3816.2023v35n2,3p161-164)
- Costa, J. V. T. A.; Sousa, M. S. M.; Souza-Filho, M. F.; Lemos, L. N.; Pantoja, E. V.; Nava, D. E. Adaime, R. (2024) First record of papaya as host of carambola fruit fly in Brazil. *Entomological Communications*, 6: ec06024. doi: [10.37486/2675-1305.ec06024](https://doi.org/10.37486/2675-1305.ec06024)
- Fidalgo, O.; Bononi, V. L. R. (1984) Técnicas de coleta, preservação e herborização de material botânico. São Paulo: Instituto de Botânica.
- Garcia, F. R. M.; Adaime, R.; Jesus, C. R.; Raga, A.; Araujo, E. L.; Miranda, S. H. G.; Souza-Filho, M. F. (2024) Fruit Fly Management in Brazil: Current Status and Perspectives. In: Garcia, F. R. M. (Ed.), *Management of Fruit Flies in the Americas*, pp. 235-288. New York: Springer International Publishing.
- Jesus-Barros, C. R.; Cruz, O. M.; Adaime, R. (2015) *Byrsonima crassifolia* (Malpighiaceae): new alternate host to carambola fruit fly in Brazil. *Biota Amazônia*, 5(3): 117-118. doi: [10.18561/2179-5746/biotaamazonia.v5n3p117-11](https://doi.org/10.18561/2179-5746/biotaamazonia.v5n3p117-11)
- Lemos, L. N.; Adaime, R.; Jesus-Barros, C. R.; Deus, E. G. (2014) New Hosts of *Bactrocera carambolae* (Diptera: Tephritidae) in Brazil. *Florida Entomologist*, 97(2): 841-847. doi: [10.1653/024.097.0274](https://doi.org/10.1653/024.097.0274)
- Lorenzi, H. (2021) *Árvores brasileiras: manual de identificação e cultivo de plantas arbóreas nativas do Brasil*. vol. 3. Nova Odessa: Jardim Botânico Plantarum.
- Lorenzi, H.; Lacerda, M. T. C.; Bacher, L. B. (2015) *Frutas no Brasil: nativas e exóticas (de consumo in natura)*. São Paulo: Instituto Plantarum de Estudos da Flora.
- Malavasi, A. (2015) Mosca-da-carambola, *Bactrocera carambolae* Drew & Hancock. In: Vilela, E. F.; Zucchi, R. A. (Eds.), *Pragas introduzidas no Brasil: insetos e ácaros*, pp. 173-184. Piracicaba: FEALQ.
- Malavasi, A.; Midgarden, D.; van Sauer-Muller, A. (2013) *Manual for the control of the carambola fruit fly in South America: operations manual*. 2nd ed. Paramaribo: Carambola Fruit Fly Programme. [https://www.researchgate.net/publication/317182807\\_Manual\\_for\\_the\\_control\\_of\\_the\\_Carambola\\_fruit\\_fly\\_in\\_South\\_America](https://www.researchgate.net/publication/317182807_Manual_for_the_control_of_the_Carambola_fruit_fly_in_South_America). Access on: 3.vii.2024.
- Pélessier, Y.; Marion, C.; Kone, D.; Lamaty, G.; Menut, C.; Bessière, J. M. (1994) Volatile Components of *Annona muricata* L. *Journal of Essential Oil Research*, 6(4): 411-414. doi: [10.1080/10412905.1994.9698410](https://doi.org/10.1080/10412905.1994.9698410)
- van Sauer-Muller, A. (2005) Host plants of the carambola fruit fly, *Bactrocera carambolae* Drew & Hancock (Diptera: Tephritidae), in Suriname, South America. *Neotropical Entomology*, 34(2): 203-214. doi: [10.1590/S1519-566X2005000200008](https://doi.org/10.1590/S1519-566X2005000200008)
- van Sauer-Muller, A. (1991) An overview of the Carambola fruit fly *Bactrocera* species (Diptera: Tephritidae), found recently in Suriname. *Florida Entomology*, 74(3): 432-440. doi: [10.2307/3494837](https://doi.org/10.2307/3494837)
- Silva, R. A.; Deus, E. G.; Raga, A.; Pereira, J. D. B.; Souza-Filho, M. F.; Costa-Neto, S. V. (2011) Monitoramento de moscas-das-frutas na Amazônia: amostragem de frutos e uso de armadilhas. In: Silva, R. A.; Lemos, W. P.; Zucchi, R. A. (Eds.), *Moscas-das-frutas na Amazônia brasileira: diversidade, hospedeiros e inimigos naturais*, pp. 33-50. Macapá: Embrapa Amapá.
- Silva, R. A.; Jordão, A. L.; Sá, L. A. N.; Oliveira, M. R. V. (2004) Mosca-da-carambola: uma ameaça à fruticultura brasileira. Circular Técnica 31. Macapá: Embrapa Amapá. <https://ainfo.cnptia.embrapa.br/digital/bitstream/CPAF-AP/8417/1/Circular200431.PDF>. Access on: 28.vi.2024.
- Sinchana, R.; Mani, T. T.; Pavithra, T.; Shiju, L. (2024) A review on a miracle plant *Annona glabra* Linn. *International Journal of Pharmacognosy*, 11(3): 65-77. doi: [10.13040/ijpsr.0975-8232.ijp.11\(3\).65-77](https://doi.org/10.13040/ijpsr.0975-8232.ijp.11(3).65-77)
- Souza, V. C.; Lorenzi, H. (2019) *Botânica Sistemática: guia ilustrado para identificação das famílias de fanerógamas nativas e exóticas no Brasil, baseado em APG IV*. Nova Odessa: Jardim Botânico Plantarum.
- Fern, K. (2024) Tropical Plants Database. <https://tropical.theferns.info/viewtropical.php?id=Helicostylis+pedunculata>. Access on: 5.vii.2024.
- Vayssières, J. F.; Cayol, J. P.; Caplong, P.; Séguret, J.; Midgarden, D.; van Sauer-Muller, A.; Zucchi, R. A.; Uramoto, K.; Malavasi, A. (2013) Diversity of fruit fly (Diptera: Tephritidae) species in French Guiana: their main host plants and associated parasitoids during the period 1994-2003 and prospects for management. *Fruits*, 68(3): 219-243. doi: [10.1051/fruits/2013070](https://doi.org/10.1051/fruits/2013070)
- WFO (2024) The World Flora Online. <https://www.worldfloraonline.org>. Access on: 3.vii.2024.
- Zucchi, R. A. (2000) Taxonomia. In: Malavasi, A.; Zucchi, R. A. (Eds.), *Moscas-das-frutas de importância econômica no Brasil: conhecimento básico e aplicado*, pp. 13-24. São Paulo: Holos.
- Zucchi, R. A.; Moraes, R. C. B. (2024) Fruit flies in Brazil - Hosts and parasitoids of the Mediterranean fruit fly. <http://www.lea.esalq.usp.br/cerattis>. Access on: 11.vii.2024.
- Zucchi, R. A.; Uramoto, K.; Souza-Filho, M. F. (2011) Chave ilustrada para as espécies de *Anastrepha* da região Amazônica. In: Silva, R. A.; Lemos, W. P.; Zucchi, R. A. (Eds.), *Moscas-das-frutas na Amazônia brasileira: diversidade, hospedeiros e inimigos naturais*. pp. 71-90. Macapá: Embrapa Amapá.