WILD HOSTS OF FRUGIVOROUS DIPTERANS (TEPHRITIDAE AND LONCHAEIDAE) AND ASSOCIATED PARASITOIDS IN THE BRAZILIAN AMAZON

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In the past decade, the importance of the various studies on frugivorous dipterans (Tephritidae and Lonchaeidae) in the Brazilian Amazon has been recognized, especially those focused on diversity, geographic distribution, and host identification. This work aimed to identify wild plant species that are hosts of frugivorous dipterans in Amapá State, which lies in the extreme northeast of the Brazilian Amazon.

From Sep 2010 and Apr 2011, wild fruits were collected in 14 of the 16 municipalities of Amapá (Fig. 1), taking into contemplation the 3 main plant formations in the state, i.e., dryland forest, floodplain forest, and Brazilian savannah (cerrado). The region is located between the latitudes N 03° 50' and S 00° 34' and longitudes W 52° 09' and W 50° 48'. The samples were collected at random from plants that bore an abundant quantity of maturing or mature fruits. Such fruits were picked off the plant or collected from those recently fallen onto the ground. The collected samples were processed as grouped fruits, and adult insects were obtained according to the method of Silva et al. (2011a).

A total of 2,097 fruits were collected (42.0 kg), from 12 plant species native to the Amazon region, in 8 plant families (Table 1). Eight species of Tephritidae were obtained: *Anastrepha antunesi* Lima, *Anastrepha coronilli* Carrejo & González, *Anastrepha distincta* Greene, *Anastrepha leptozona* Hendel, *Anastrepha obliqua* (Macquart), *Anastrepha parishi* Stone, *Anastrepha striata* Schiner, and *Anastrepha fraterculus* (Wiedemann). Likewise 4 species of Lonchaeidae were obtained: *Neosilba bella* Strikis & Prado, *Neosilba glaberrima* (Wiedemann), *Neosilba pseudozadolicha* Strikis, and *Neosilba zadolicha* McAlpine & Steyskal. The *Anastrepha* and *Neosilba* species collected in this work had already been reported in the state of Amapá (Silva et al. 2011b; Strikis et al. 2011).

Simaba guianensis Aubl. (Sapindales: Simaroubaceae) is reported for the first time as a host of Tephritidae. In only one sample (41 fruits, 254g) a total of 15 puparia were obtained, from which emerged adults of *A. fraterculus* and *A. parishi* (Table 1). In the state of Amapá, *A. fraterculus* and *A. parishi* had already been reported in 5 and 3 hosts, respectively (Silva et al. 2011b; Jesus-Barros et al. 2012). New hosts are reported for the lonchaeids *N. bella*, *N. pseudozadolicha,* and *N. zadolicha* (Table 1).

Six species of parasitoids were collected, all of them previously reported in the region (Table 1). However, *Doryctobracon crawfordi* (Viereck) was associated for the first time with *A. coronilli* in fruits of *Bellucia grossularioides* L.; and *Doryctobracon areolatus* (Szépligeti) was associated for the first time with *A. distincta* in fruits of *Inga laurina* (Sw.) Willd. *Opius bellus* Gahan specimens were obtained from a *Gustavia augusta* L. sample (from Laranjal do Jari), but no dipterans emerged from the fruits. Therefore it is not possible to determine whether the species is associated with Tephritidae and/or Lonchaeidae. Our results indicate that the wild host plants *Spondias mombin* L. and *B. grossularioides* play an important role as reservoirs of native parasitoids. Similar results were obtained in other studies in the Brazilian Amazon (Costa et al. 2009; Ronchi-Teles et al. 2011; Dutra et al. 2013) and other forested areas (López et al. 1999; Aluja et al. 2003).

An undentified species of *Richardia* (Tephritoidea: Richardiidae), reported in *S. mombin*, *G. augusta*, and *Pouteria caimito* Radlk., has also often been observed in fruits of Arecaceae [*Attalea excelsa* Mart., *Astrocaryum murumuru* Mart.

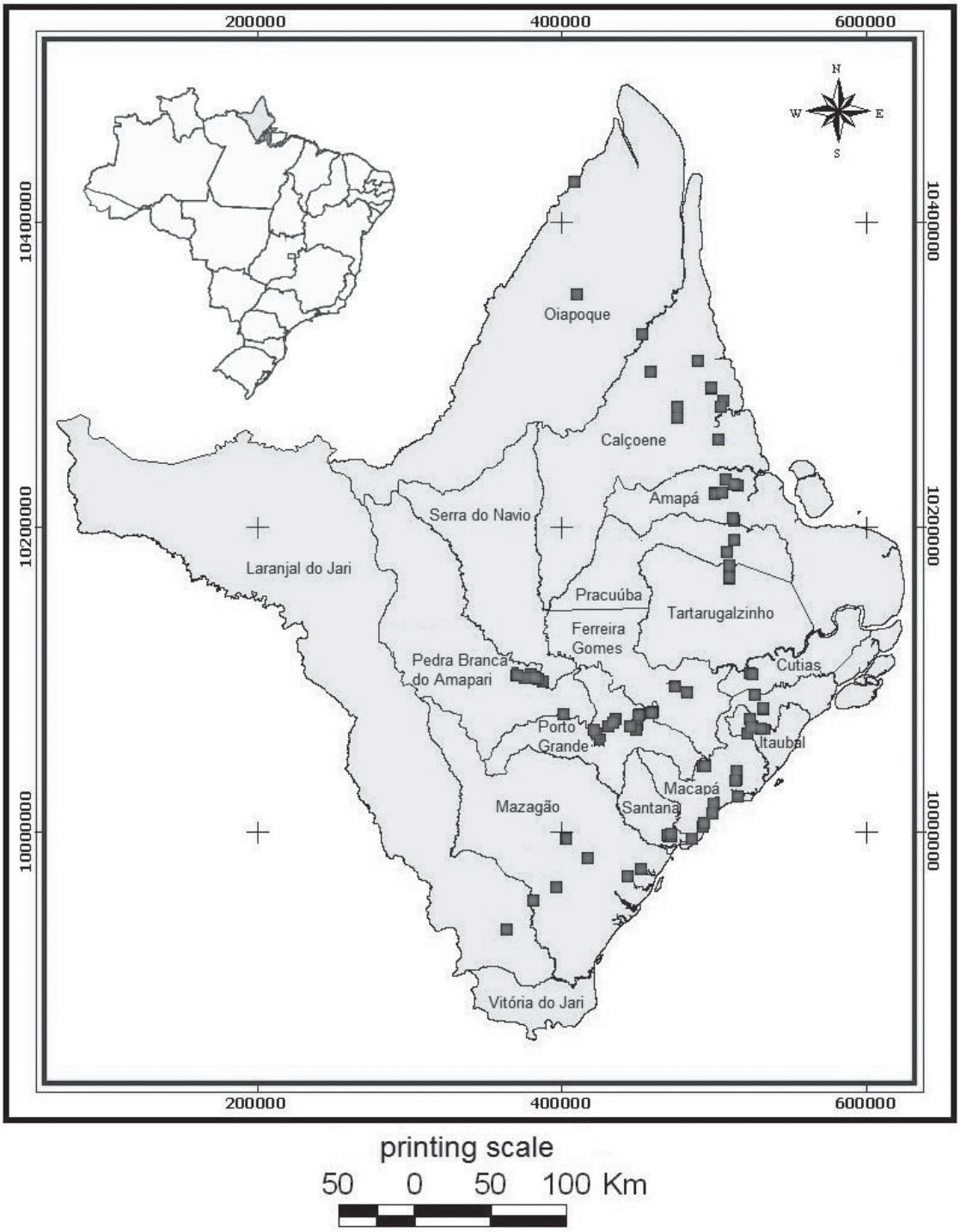

Fig. 1. Map of the state of Amapá, specifying the collection sites (dark squares) of fruits of wild hosts of frugivorous dipterans (Tephritidae and Lonchaeidae) and associated parasitoids. The collections were completed from September 2010 to April 2011.

TABLE 1. HOSTS OF *ANASTREPHA* AND *NEOSILBA* AND ASSOCIATED PARASITOIDS IN MUNICIPALITIES OF AMAPÁ STATE. SEP 2010 TO APR 2011.

Families/species/municipalities	C/I:	Fruits (*n*)	Mass (g)	Puparia (n)	Infestation (Puparia/kg)	Tephritidae (*Anastrepha*)	PP%	Parasitoid	Lonchaeidae (*Neosilba*)	Richardiidae
Anacardiaceae										
Spondias mombin L.										
Macapá	4/4	267	2,304	149	64.7	Ao (6), Aa (8), 36♂	46.97	Da (27), Ob (43)	0	0
Porto Grande	4/4	216	3,197	157	49.1	Ao (56), Aa (10), 28♂	3.18	Ob (5)	0	0
Pracuúba	1/1	100	821	287	349.6	Ao (91), 154♂	1.74	Aan (5)	0	0
Serra do Navio	1/1	48	831	320	385.1	Ao (50), 115♂	5	Ua (4), Ob (10), Ape (2)	0	*Richardia* sp. (1)
Tartarugalzinho	1/1	70	1,049	102	97.2	Ao (23), 78♂	0	0	0	0
Chrysobalanaceae										
♦*Chrysobalanus icaco* L.										
Porto Grande	9/3	366	1,795	26	14.5	Af (4), 7♂	3.84	Aan (1)	Nb (1), 2♂	0
Fabaceae										
◘*Inga edulis* Mart.										
Amapá	4/3	28	4,829	93	19.3	Ad (14)	0	0	Nz (1), Ng (22), 28♂	0
Porto Grande	12/8	99	11,652	490	42.0	Ad (148), 71♂	0	0	Ng (35), Nz (11), Np (1), 39♂	0
Serra do Navio	1/1	4	937	165	176.1	Ad (20), 3♂	0	0	Ng (47), Nz (1), 55♂	0
Inga laurina (Sw.) Willd.										
Santana	1/1	20	161	23	142.9	Ad (15), 5♂	4.34	■Da (1)	0	0
Inga sp.										
Itaubal	1/1	18	388	9	23.2	Ad (2), 1♂	0	0	Ng (1), Np (1), 2♂	0
Lecythidaceae										
♦▲*Gustavia augusta* L.										
Amapá	2/2	20	1,469	48	32.7	0	0	0	Nb (1), 1♂	*Richardia* sp. (27)
Macapá	1/1	4	292	2	6.8	0	0	0	Nz (2)	0
Laranjal do Jari	1/1	11	191	8	41.9	0	50	Ob (4)	0	0

C: samples collected; I: samples infested; PP%: percentage of parasitism; Ao: *Anastrepha obliqua*; Aa: *Anastrepha antunesi*; Af: *Anastrepha fraterculus*; Ad: *Anastrepha distincta*; Ac: *Anastrepha coronilli*; As: *Anastrepha striata*; Al: *Anastrepha leptozona*; Ap: *Anastrepha parishi*; Da: *Doryctobracon areolatus*; Dc: *Doryctobracon crawfordi*; Ape: *Aganaspis pelleranoi*; Ob: *Opius bellus*; Aan: *Asobara anastrephae*; Ua: *Utetes anastrephae*; Nb: *Neosilba bella*; Nz: *Neosilba zadolicha*; Ng: *Neosilba glaberrima*; Np: *Neosilba pseudozadolicha*, • new host of Tephritidae; ◘ new host of *N. pseudozadolicha*; ♦ new host of *N. bella*; ▲ new host of *N. zadolicha*; ■ new *Anastrepha* parasitoid association.

TABLE 1. (CONTINUED) HOSTS OF *ANASTREPHA* AND *NEOSILBA* AND ASSOCIATED PARASITOIDS IN MUNICIPALITIES OF AMAPÁ STATE. SEP 2010 TO APR 2011.

Families/species/municipalities	C/I:	Fruits (*n*)	Mass (g)	Puparia (n)	Infestation (Puparia/kg)	Tephritidae (*Anastrepha*)	PP%	Parasitoid	Lonchaeidae (*Neosilba*)	Richardiidae
Melastomataceae										
Bellucia grossularioides L.										
Amapá	2/2	41	501	16	31.9	Ac (5), 7♂	12.5	Da (2)	0	0
Calçoene	2/2	38	369	14	37.9	Ac (6), 5♂	0	0	0	0
Ferreira Gomes	2/2	93	792	175	220.9	Ac (22), 27♂	28	Da (43), Ape (6)	0	0
Mazagão	2/2	69	469	114	243.0	Ac (24), 30♂	15.78	Da (18)	1♂	0
Pedra Branca	2/2	13	572	18	31.5	Ac (3), 5♂	5.55	Da (1)	0	0
Porto Grande	7/6	205	1,997	398	199.3	Ac (73), 109♂	12.56	Da (36), Ape (12), ■Dc (2)	0	0
Santana	1/1	7	51	2	39.2	Ac (1), 1♂	0	0	0	0
Serra do Navio	2/2	110	1,197	202	168.7	Ac (43), 44♂	11.38	Da (22), Ape (1)	0	0
Bellucia imperialis Saldanha & Cogn.										
Calçoene	1/1	63	714	25	35.0	Ac (5), 11♂	0	0	0	0
Myrtaceae										
Eugenia stipitata Mc Vaugh										
Macapá	1/1	10	1,404	13	9.3	As (4), 5 ♂	0	0	0	0
Sapotaceae										
▲*Pouteria caimito* Radlk.										
Porto Grande	2/2	57	2,955	1,051	355.7	Al (273), 337♂	5.7	Da (60)	Ng (19), Nz (16), 35♂	*Richardia* sp. (10)
Santana	2/2	15	686	404	588.9	Al (141), 223♂	0	0	0	0
◆*Manilkara huberi* (Ducke)										
Mazagão	1/1	64	146	7	47.9	0	0	0	Nb (1), 2♂	0
Simaroubaceae										
•*Simaba guianensis* Aubl.										
Calçoene	1/1	41	254	15	59.0	Af (4), Ap (1), 9♂	0	0	0	0

C: samples collected; I: samples infested; PP%: percentage of parasitism; Ao: *Anastrepha obliqua*; Aa: *Anastrepha antunesi*; Af: *Anastrepha fraterculus*; Ad: *Anastrepha distincta*; Ac: *Anastrepha coronilli*; As: *Anastrepha striata*; Al: *Anastrepha leptozona*; Ap: *Anastrepha parishi*; Da: *Doryctobracon areolatus*; Dc: *Doryctobracon crawfordi*; Ape: *Aganaspis pelleranoi*; Ob: *Opius bellus*; Aan: *Asobara anastrephae*; Ua: *Utetes anastrephae*; Nb: *Neosilba bella*; Nz: *Neosilba zadolicha*; Ng: *Neosilba glaberrima*; Np: *Neosilba pseudozadolicha*, • new host of Tephritidae; ◘ new host of *N. pseudozadolicha*; ◆ new host of *N. bella*; ▲ new host of *N. zadolicha*; ■ new *Anastrepha* parasitoid association.

and *Maximiliana maripa* (Aublet) Drude] during work conducted by our research group in the same region. Further research will be conducted to pursue a better understanding of the biology and ecology of this species.

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Summary

We report for the first time *Simaba guianensis* Aubl. (Sapindales: Simaroubaceae) as a host of Tephritidae, i.e., *Anastrepha fraterculus* and *Anastrepha parishi*. Also we report new hosts for species of *Neosilba*. Finally we report new associations between parasitoid hymenopterans and *Anastrepha* species.

Key Words: *Anastrepha*, *Doryctobracon, Neosilba*, *Opius bellus, Richardia* sp., *Simaba guianensis*

Resumo

Simaba guianensis Aubl. (Sapindales: Simaroubaceae) é registrada pela primeira vez como hospedeiro de Tephritidae, i.e., *Anastrepha fraterculus* e *Anastrepha parishi*. Foram registrados novos hospedeiros para espécies de *Neosilba*. Adicionalmente, novas associações de himenópteros parasitoides e espécies de *Anastrepha* também são registradas.

Palavras Chave: *Anastrepha*, *Doryctobracon, Neosilba*, *Opius bellus, Richardia* sp., *Simaba guianensis*

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