

SUPPLEMENTARY MATERIAL (TABLES AND FIGURES)

TABLES

Table 1. Collection sites**, geographic coordinates, altitude, species of the AF complex, host fruits and data source

Collection sites	Geographic coordinates		Altitude	Species (Host fruits)	Source of data
A. Inland Plateau					
Hidrolândia, GO	-17,0478	-49,2264	786	SP1 (Guava, Acerola)	ULC
Morrinhos, GO	-17,7303	-49,0925	753	SP1 (Guava)	ULC
Prata, MG	-19,3033	-48,9144	678	SP1 (Guava)	ULC
Sete Lagoas, MG	-19,4658	-44,2469	769	SP1 (Guava)	XI
Uberaba, MG	-19,7478	-47,9319	773	SP1 (Guava)	ULC
Delta, MG	-19,9769	-47,7708	511	SP1 (Guava)	ULC
Mirassol, SP	-20,8281	-49,5011	537	SP1 (Guava)	VI
Cajobi, SP	-20,8342	-48,7747	576	SP1 (Guava)	ULC
Tabapuã, SP	-20,9639	-49,0319	512	SP1 (Guava)	ULC
Embaúba, SP	-20,9828	-48,8358	533	SP1 (Guava)	ULC
Brodowski, SP	-20,9908	-47,6589	843	SP1, SP3(Guava)	ULC
Lins, SP	-21,0100	-49,6361	484	SP1 (Guava)	ULC
Jaboticabal, SP	-21,2550	-48,3206	596	SP1 (Guava)	ULC
Guaíba, SP	-21,3544	-48,2261	618	SP1 (Guava)	ULC
Araraquara, SP	-21,7880	-48,1716	675	SP1 (Guava)	VI
Além Paraíba, RJ	-21,8753	-42,6775	157	SP1 (Guava)	ULC
Guarantã, SP	-21,8897	-49,5886	515	SP1 (Guava)	ULC
São Carlos, SP	-21,9333	-47,8944	769	SP1 (Guava)	ULC
Bem Posta, RJ	-22,0759	-43,0519	306	SP1, SP3 (Jambo amarelo)	ULC
Olavo de Carvalho, SP	-22,0889	-49,2217	460	SP1 (Guava)	ULC
Garça, SP	-22,1986	-49,6514	665	SP1 (Guava)	ULC
Bauru, SP	-22,2983	-49,1775	518	SP1 (Guava)	ULC
Duartina, SP	-22,4111	-49,4008	515	SP1 (Guava)	ULC
Volta Redonda, RJ	-22,5050	-44,0675	400	SP1 (Guava)	ULC
Serra Negra, SP	-22,6119	-46,7008	966	SP1 (Guava), SP2 (Orange)	ULC
Monte Alegre Sul, SP	-22,6819	-46,6808	774	SP1 (Guava, Peach," Umê","Uvaia")	V
Campos do Jordão, SP	-22,7394	-45,5914	1615	SP1 (Raspbery, "Pitanga")	IV,ULC
S. Bento Sapucaí, SP	-22,7733	-45,6978	1003	SP1 (Guava,Loquat)	ULC
Guaratinguetá, SP	-22,7883	-45,1569	563	SP1, SP3 (Guava)	ULC
S. Antonio Pinhal, SP	-22,8419	-45,2508	531	SP1 (Guava)	ULC
Piracicaba, SP	-22,9351	-47,6315	571	SP1/SP3 (Guava)	ULC
Taubaté, SP	-23,0708	-45,5533	599	SP2 (Orange)	VI
Indaiatuba, SP	-23,0900	-47,2178	608	SP2 (Orange)	ULC
Caçapava, SP	-23,1008	-45,7069	565	SP2 (Orange)	ULC
Jacareí, SP	-23,2972	-46,0278	628	SP1, SP3 (Guava)	VI
Jambeiro, SP	-23,3094	-45,7172	697	SP1, SP3 (Guava), SP2 (Orange)	VI, ULC
Tremembé, SP	-23,3106	-45,7697	667	SP2 (Orange)	ULC
Carvalho Pinto, SP	-23,3614	-45,9028	673	SP1 (Guava)	ULC
Santa Branca, SP	-23,3617	-45,9025	673	SP1, SP3 (Guava)	ULC
Paraibuna, SP	-23,3642	-45,6964	667	SP2 (Orange), SP3 (Guava)	ULC
Itaquera, SP	-23,5122	-46,6708	728	SP1 (Guava)	ULC
Salesópolis, SP	-23,5275	-45,8203	822	SP1, SP3 (Guava), SP2 (Orange)	VI, ULC
Paraibuna, SP	-23,5536	-45,6347	794	SP1, SP3 (Guava)	ULC
Ibiúna, SP	-23,7128	-47,1608	913	SP1 (Guava), SP2 (Orange)	ULC
Sengés, PR	-24,1267	-49,5106	718	SP1 (Guava)	VI
Pedro de Toledo, SP	-24,2833	-47,2487	205	SP1, SP3 (Guava)	ULC
Itararé, PR	-24,2702	-49,3313	1008	SP1 (Guava)	VI
Jaguaraíva, PR	-24,2706	-49,7339	884	SP1 (Guava)	ULC
Guarapuava, PR	-25,3804	-51,4431	994	SP1 (Guava)	ULC
Imbituva, PR	-25,2503	-50,5883	803	SP1 (Guava)	VI
Graciosa, PR	-25,3867	-48,8689	160	SP3 (Guava)	ULC

Irati, PR	-25,4716	-50,6533	837	SP1 (Guava)	VI
S. José Pinhais, SP	-25,5467	-49,2050	907	SP1 (Loquat)	ULC
Mafras, SC	-26,1214	-49,7809	814	SP1 (Loquat)	ULC
Guaramirim, SC	-26,4718	-49,2507	253	SP1 (Guava)	VI
Caçador, SC	-26,7217	-50,0508	729	SP1 ("Gabioba")	XIII
Lages, SC	-27,7800	-50,2108	929	SP1, SP3 ("Araçá")	ULC
São Joaquim, SC	-28,2810	-49,9102	1388	SP1 ("Gabioba")	II, XII
Lauro Miller, SC	-28,3722	-49,3417	154	SP1, SP3 (Guava), SP2 (Orange)	ULC
Vacaria, RS	-28,4502	-50,9805	909	SP1 (Guava), SP3 ("Feijoa")	,II, X, XIII
Bento Gonçalves, RS	-29,1716	-51,5014	651	SP1 (Guava,"Araçá", "Feijoa")	II, III,XIV

B. Coastal Plains

Natal, RN	-5,7950	-35,2089	35	SP2 (Guava)	XI
Parnamirim, RN	-5,9158	-35,2628	55	SP3 (Guava)	I,VIII
Cruz das Almas, BA	-12,8089	-39,1656	203	SP2 (Guava)	XI
Una,BA	-15,2933	-39,0753	24	SP3 (Guava)	IV
Angra dos Reis, RJ	-23,0069	-44,3178	111	SP3 (Guava)	ULC
Picinguaba, SP	-23,3575	-44,8611	39	SP2 (Tropical almond)	ULC
Perequê-Mirim, SP	-23,4881	-45,1033	12	SP2 (Tropical almond), SP3 (Guava)	ULC
Caraguatatuba, SP	-23,6092	-45,4264	17	SP2 (Orange),SP2,SP3 (Tropical Almond, Guava)	ULC
Boiçucanga, SP	-23,7850	-45,6239	31	SP2, SP3 (Tropical almond, Guava)	ULC
Bertioga, SP	-23,8502	-46,1317	9	SP2, SP3 (Tropical almond)	ULC
Bertioga, SP	-23,8502	-46,1317	9	SP2, SP3 (Tropical almond)	ULC
Santos. SP	-23,9369	-46,3283	41	SP3 (Tropical almond)	ULC
Itanhaem, SP	-24,1722	-46,7811	5	SP2, SP3 (Tropical almond)	VI
Peruibe. SP	-24,3225	-46,9817	15	SP2, SP3 (Tropical almond)	ULC
Ilha Comprida, SP	-24,7567	-47,6019	7	SP2, SP3 (Tropical almond)	ULC
Garuva, SC	-25,0250	-48,8531	34	SP2, SP3 (Loquat)	ULC
Paranaguá, PR	-25,3132	-48,3032	10	SP2, SP3 (Tropical almond)	ULC
Caiobá, SC	-25,8206	-48,5318	25	SP2, SP3 (Tropical almond)	VI
Guaratuba, SC	-25,8867	-48,5772	7	SP2, SP3 (Guava)	VI
Porto Belo, SC	-27,1608	-48,5586	32	SP2, SP3 (Guava)	ULC
São José, SC	-27,4356	-48,5900	25	SP2(Loquat)	ULC
Palhoça, SC	-27,8306	-48,6309	6	SP2 (Orange)	ULC
Esplanada, SC	-28,7017	-49,1867	31	SP2 (Orange)	ULC
Pelotas, RS	-31,7713	-52,3507	5	SP1 ("Araçá", "Araçá (sic))	II, X

(Host fruits*), Acerola, *Malpighia emarginata* DC.; Araçá, *Psidium cattleianum* Sabine; Araçá (sic), *Eugenia stipitata* McVaugh; Feijoa, *Acca sellowiana* Berg.; Gabioba, *Campomanesia xanthocarpa* L.; Guava, *Psidium guajava* L.; Jambo, *Syzygium jambos* (L.) Alston; Loquat, *Eryobotrica japonica* L.; Orange, *Citrus sinensis* L.; Papaya, *Carica papaya* L.; Peach, *Prunus persica* L.; Pitanga, *Eugenia uniflora* L.; Raspberry, *Rubus idaeus* L.; Tropical almond, *Terminalia catappa* L.; Umê, *Prunus mume* Siebold & Zucc.; Uvaia, *Eugenia pyriformis* Cambess

(Source of data)* I, Devescovi et al., 2014; II, Dias et al., 2015; III, Hernández-Ortiz et al., 2012; IV, Manni et al., 2015; V, Perre, 2017; VI, Prezotto et al., 2017; VII, Prezotto et al., 2019; VIII, Roriz et al., 2017; IX, Rull et al., 2012; X, Rull et al., 2013; XI, Selivon et al., 2005; XII, Vaničková et al., 2015; XIII, Selivon, 1996; XIV, Kovalesky et al. 1999; ULC, unpublished laboratory collection.

(**) Localities were included as "Inland" according to their location in the relief's geomorphological units, Rolling Plains, Plateau, Mountain/Ridges (<http://www.intechopen.com/books/soil-erosion-studies/natural-potential-for-erosion-for-brazilian-territory>)

Table 2. Principal componentes' loadings of selected bioclimatic and geographic variables

	RC2	RC1	RC3
Bio2	0.178	0.882	0.372
Bio7	-0.326	0.903	0.109
Bio12	-0.127		-0.901
Bio15	0.824	0.284	0.276
lon	0.759	-0.425	-0.204
lat	0.926	-0.137	
altitud		0.401	0.686
SS loadings	2.269	2.042	1.558
Proportion Var	0.324	0.292	0.223
Cumulative Var	0.324	0.616	0.838

Table 3. Chromosome length of the three Brazilian species of the AF complex

Chromosome	Means (sd)			ANOVA		
	A.sp.1	A.sp.2	A.sp.3	d.f.	F	p
II	10.4 (0.3)	10.5 (0.4)	10.3 (0.5)	2, 72	2.565	0.084 ns
III	8.6 (0.4)	8.5 (0.2)	8.4 (0.2)	2, 72	0.626	0.538 ns
IV	8.2 (0.3)	7.9 (0.3)	8.0 (0.4)	2, 72	1.755	0.181 ns
V	7.6 (0.3)	7.5 (0.2)	7.8 (0.3)	2, 72	1.937	0.152 ns
VI	6.9 (0.2)	6.8 (0.2)	6.8 (0.2)	2, 72	2.361	0.102 ns
X	7.2 (0.4) a	10.0 (0.6) b	8.2 (0.5) c	2, 72	120.79	< 0.001**
Y	3.8 (0.5) a	7.6 (0.5) b	4.6 (0.4) c	2, 72	213.51	< 0.001**

Distinct letters (Tukey test) indicate significant differences for chromosome X and Y

Table 4. ITS1 polymorphism in species of the *fraterculus* complex in Brasil

Species	N	Sq	S	Hap	Hd	π	K
A. sp.1	60	18	10	5	0.751 $\pm$ 0.031	0.0049 $\pm$ 0.0002	2.523
A. sp.2	40	10	2	3	0.645 $\pm$ 0.023	0.0014 $\pm$ 0.0003	0.733
A. sp.3	40	8	2	2	0.250 $\pm$ 0.000	0.001 $\pm$ 0.0003	0.500

N, Number of individuals; Sq, number of sequences; S, number of polymorphic sites; Hap, number of sequence types; Hd, diversity of sequence types; π , nucleotide diversity; K, mean number of nucleotide diversity

Table 5. Mean time (min) of engaged mating pairs

Species	Hours	min (sd)
A. sp.1	6 to 9	80.3 (40.7)*
A. sp.2	6 to 10	46.2 (28.5)
A. sp.3	10 to 18	47.3 (24.7)
Hybrid 13	6 to 9	43.5 (24.1)
	9 to 14	44.5 (20.7)
Hybrid 31	6 to 9	41.0 (33.4)
	9 to 14	33.5 (21.1)

(Friedeman, (N= 41, df = 2) = 6.0, $p < 0.049$)

Table 6. Comparisons of the Brazilian species of the AF complex separated by sex

FEMALES	Hotteling-Lawley	F approx.	p
A. sp.1 vs A. sp.2	8.4741	(2, 68) 288.12	< 0.001 ***
A. sp.1 vs A. sp.3	4.7642	(2, 53) 126.25	< 0.001 ***
A. sp.2 vs A. sp.3	15.343	(2, 54) 414.26	< 0.001 ***
MALES			
A. sp.1 vs A. sp.2	2.7634	(2, 64) 88.43	< 0.001 ***
A. sp.1 vs A. sp.3	4.1006	(2, 58) 118.92	< 0.001 ***
A. sp.2 vs A. sp.3	8.8275	(2, 57) 251.58	< 0.001 ***

FIGURES

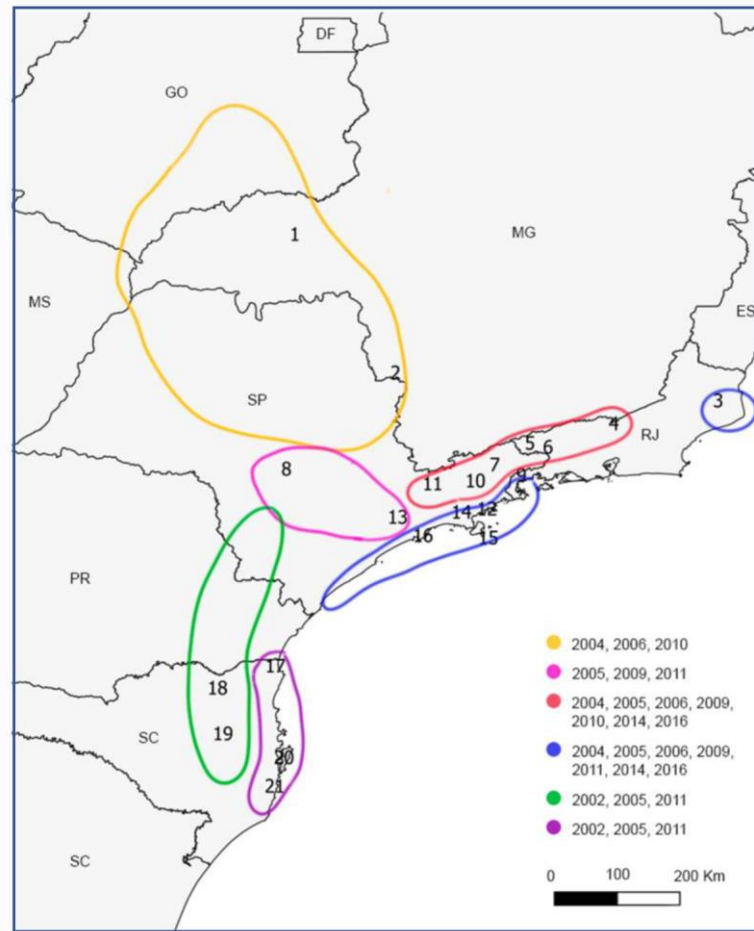


Figure 1. Regions, sites and years of collection of AF complex. The lines represent the areas of collection (Supplementary Table S1) and the numbers the collecting sites shown in Table 1 (1 Ube, 2 Gux, 3 Cgo, 4 Tri, 5 Res, 6 Bma, 7 Lor, 8 Bot, 9 Par, 10 Slp, 11 Isa, 12 Uba, 13 Spa, 14 Sse, 15 Ibe, 16 Gja, 17 Ipo, 18 Rne, 19 Lon, 20 Flo, 21 Gba).

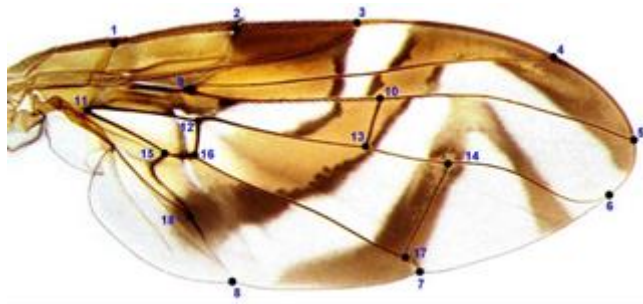


Figure 2. Right wing of a female of the AF complex. The 18 points employed in the geometric morphometry are shown: (1) junction of the humeral and costal veins; 2) subcostal break along costal vein; 3) apex of vein R_1 ; 4) apex of vein R_{2+3} ; 5) apex of vein R_{4+5} ; 6) apex of vein M; 7) apex of vein CuA_1 on posterior margin; 8) apex of vein CuA_2 on posterior margin; 9) basal bifurcation of R_{2+3} and R_{4+5} ; 10) junction of R_{4+5} and cross-vein r-m; 11) basal angle of cell bm; 12) junction of M and cross-vein dm-bm; 13) junction of M and cross-vein r-m; 14) junction of M and cross-vein dm-cu; 15) junction of CuA_1 and Cu_2 ; 16) junction of CuA_1 and cross-vein bm-cu; 17) junction of CuA_1 and dm-cu; 18) junction of A and Cu_2 (= apex of cell bcu).

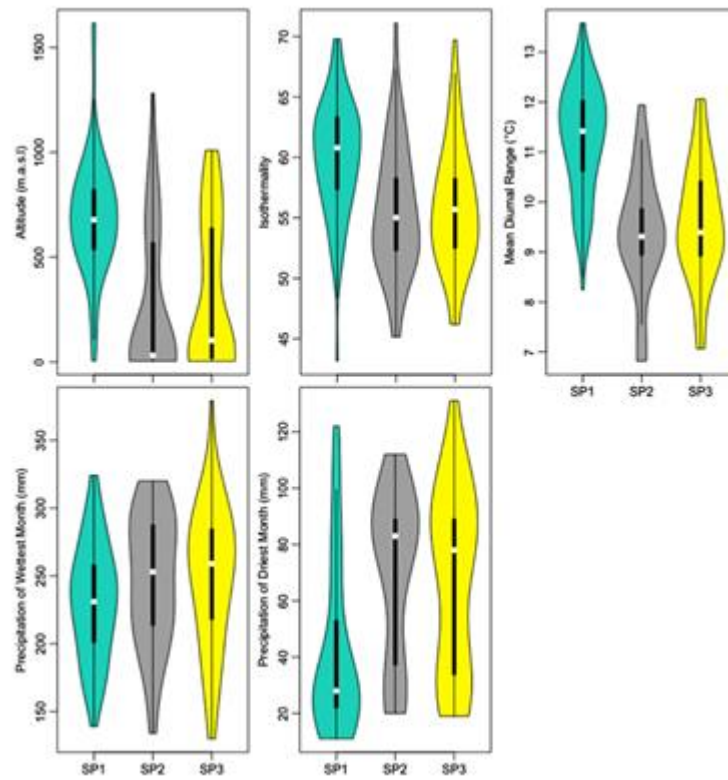


Figure 3. Climatic and geographic parameters found to vary the most among three species of *Anastrepha* flies.