

The impact of the Endangered Mauritian flying fox *Pteropus niger* on commercial fruit farms and the efficacy of mitigation

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SUPPLEMENTARY TABLE 1 Akaike's information criterion adjusted for small sample size (AICc), Δ AICc, AICc weight (wt), and number of parameters (K) of all generalized linear mixed models developed to investigate whether the number of fruits damaged in lychee *Litchi chinensis* orchards in Mauritius (Fig. 1) differs according to (1) tree size (large vs small) and (2 & 3) netting system (2: unnetted vs netted without frame vs netted with frame; 3: unnetted vs netted without frame) depending on the cause of the damage (bat, bird, rat, fungus, natural fall). For each analysis, the model that included the two-way interaction between predictors was considered to be the most parsimonious.

Analysis	Orchard	Model	K	AICc	Δ AICc	AICc wt
1	Calebasses & Constance	cause \times tree size	13	1997.90	0.00	1.00
		cause + tree size	9	2026.22	28.32	0.00
		cause	8	2034.96	37.06	0.00
		tree size	5	2427.78	429.88	0.00
		null model	4	2437.27	439.37	0.00
2	Calebasses	cause \times netting system	17	823.10	0.00	1.00
		cause	7	859.54	36.44	0.00
		cause + netting system	9	863.49	40.39	0.00
		null model	3	1170.06	346.96	0.00
		netting system	5	1172.94	349.84	0.00
3	Medine	cause \times netting system	12	1258.20	0.00	1.00
		Cause	7	1286.12	27.92	0.00
		cause + netting system	8	1287.82	29.62	0.00
		null model	3	1709.56	451.36	0.00
		netting system	4	1711.43	453.23	0.00

SUPPLEMENTARY TABLE 2 Fruit damage at four lychee orchards and a mango (*Mangifera* spp.) orchard in Mauritius (Fig. 1), caused by bats, birds, natural fall, fungus and rats. Ten large (> 6 m height) and 10 small (< 6 m height) trees were assessed in each orchard; only large trees were present at Medine, and only small trees at Belle Vue Maurel. For derivation of estimates for total fruit/tree see Methods.

Orchard (tree size and type)	Mean (\pm SD) no. of fruits damaged					Total damage (mean \pm SD)	Estimated mean no. of fruits per tree monitored (% overall damage)
	Bat	Bird	Natural fall	Fungus	Rat		
Calebasses (large lychee)	368 \pm 377	126 \pm 174	222 \pm 198	118 \pm 123	3 \pm 5	839 \pm 807	3,912 (21.4)
Calebasses (small lychee)	3 \pm 6	60 \pm 64	161 \pm 102	70 \pm 64	2 \pm 4	296 \pm 218	4,085 (7.3)
Medine (large lychee)	1,695 \pm 1,540	266 \pm 296	199 \pm 192	56 \pm 39	19 \pm 17	2,236 \pm 1,935	3,211 (69.6)
Constance (large lychee)	360 \pm 223	160 \pm 73	236 \pm 69	109 \pm 41	4 \pm 3	867 \pm 323	2,396 (36.2)
Constance (small lychee)	82 \pm 74	188 \pm 222	158 \pm 165	67 \pm 65	0	488 \pm 456	1,540 (32.1)
Belle Vue Maurel (small lychee)	28 \pm 30	27 \pm 22	19 \pm 15	8 \pm 5	2	70 \pm 56	420 (16.7)
Labourdonnais (large mango)	410 \pm 681	165 \pm 262	327 \pm 533	0	0	902 \pm 1,457	1,241 (72.7)
Labourdonnais (small mango)	2 \pm 6	266 \pm 144	130 \pm 64	0	0	398 \pm 177	527 (75.5)

SUPPLEMENTARY TABLE 3 Fruit damage at two lychee orchards (Fig. 1) where netting was employed, caused by bats, birds, natural fall, fungus and rats. Only large (> 6 m height) trees were studied. For derivation of estimates for total fruit/tree see Methods.

Orchard (netting status)	Mean (\pm SD) no. of fruits damaged					Total damage (mean \pm SD)	Estimated mean no. of fruits per tree monitored (% overall damage)
	Bat	Bird	Natural fall	Fungus	Rat		
Calebasses (unnetted; n = 10)	368 \pm 377	126 \pm 174	222 \pm 198	118 \pm 123	3 \pm 5	839 \pm 807	3,912 (21.4)
Calebasses (netted with frame; n = 3)	18 \pm 27	151 \pm 45	118 \pm 58	35 \pm 12	5	324 \pm 91	4,244 (7.6)
Calebasses (netted, no frame; n = 3),	25 \pm 14	145 \pm 41	218 \pm 115	115 \pm 55	3 \pm 1	505 \pm 211	4,064 (12.4)
Medine (unnetted; n = 10)	1,695 \pm 1,540	266 \pm 296	199 \pm 192	56 \pm 39	19 \pm 17	2,236 \pm 1,935	3,211 (69.6)
Medine (netted, no frame; n = 10)	498 \pm 381	465 \pm 326	299 \pm 220	119 \pm 85	30 \pm 18	1,411 \pm 964	4,028 (35.0)

SUPPLEMENTARY TABLE 4 Results of the post-hoc contrast tests applied to the most parsimonious generalized linear mixed model that included the two-way interaction between tree size (large vs small) and causes of fruit loss (bat, bird, natural fall, fungus, rat) for explaining the number of fruits damaged in lychee orchards (Calebasses and Constance; Fig. 1). Estimates with associated standard error (SE), Z ratio and adjusted P-value are given for each comparison of interest.

Cause	Contrast	Estimate	SE	Z ratio	P _{adj.}
Bat	Large vs small trees	2.40	0.37	6.57	***
Bird	Large vs small trees	0.41	0.36	1.14	NS
Natural fall	Large vs small trees	0.46	0.35	1.29	NS
Fungus	Large vs small trees	0.78	0.36	2.17	NS
Rat	Large vs small trees	1.25	0.47	2.65	NS
Large tree	Bat vs bird	0.94	0.25	3.76	**
	Bat vs fungus	1.10	0.25	4.37	***
	Bat vs natural fall	0.33	0.25	1.31	NS
	Bat vs rat	4.89	0.29	16.86	***
	Bird vs fungus	0.16	0.25	0.63	NS
	Bird vs natural fall	-0.62	0.25	-2.47	NS
	Bird vs rat	3.95	0.29	13.63	***
	Fungus vs natural fall	-0.78	0.25	-3.10	*
	Fungus vs rat	3.79	0.29	12.95	***
	Natural fall vs rat	4.56	0.29	15.64	***
Small tree	Bat vs bird	-1.05	0.27	-3.94	**
	Bat vs fungus	-0.52	0.28	-1.87	NS
	Bat vs natural fall	-1.62	0.28	-5.78	***
	Bat vs rat	3.73	0.39	9.48	***
	Bird vs fungus	0.53	0.26	2.01	NS
	Bird vs natural fall	-0.56	0.26	-2.15	NS
	Bird vs rat	4.79	0.38	12.57	***
	Fungus vs natural fall	-1.10	0.26	-4.29	***
	Fungus vs rat	4.26	0.37	11.43	***
	Natural fall vs rat	5.35	0.38	14.21	***

NS, P_{adj.} ≥ 0.05; *, P_{adj.} < 0.05; **, P_{adj.} < 0.01; ***, P_{adj.} < 0.001.

SUPPLEMENTARY TABLE 5 Results of the post-hoc contrast tests applied to the most parsimonious generalized linear mixed model that included the two-way interaction between netting system (unnetted vs netted without frame vs netted with frame) and causes of fruit loss (bat, bird, natural fall, fungus, rat) for explaining the number of fruits damaged at large lychee trees in Calebasses orchard (Fig. 1). Estimates with associated standard error (SE), Z ratio and adjusted P-value are given for each comparison of interest.

Cause	Contrast	Estimate	SE	Z ratio	P _{adj.}
Bat	Netted with frame vs netted, no frame	-0.54	0.76	-0.71	NS
	Netted with frame vs unnetted	-2.85	0.62	-4.62	***
	Netted, no frame vs unnetted	-2.32	0.60	-3.87	**
Bird	Netted with frame vs netted, no frame	0.06	0.73	0.09	NS
	Netted with frame vs unnetted	0.67	0.59	1.14	NS
	Netted, no frame vs unnetted	0.60	0.59	1.03	NS
Natural fall	Netted with frame vs netted, no frame	-0.63	0.73	-0.87	NS
	Netted with frame vs unnetted	-0.49	0.59	-0.83	NS
	Netted, no frame vs unnetted	0.14	0.59	0.25	NS
Fungus	Netted with frame vs netted, no frame	-1.01	0.74	-1.37	NS
	Netted with frame vs unnetted	-0.72	0.60	-1.21	NS
	Netted, no frame vs unnetted	0.28	0.59	0.48	NS
Rat	Netted with frame vs netted, no frame	0.01	0.97	0.01	NS
	Netted with frame vs unnetted	-0.17	0.77	-0.22	NS
	Netted, no frame vs unnetted	-0.18	0.77	-0.23	NS
Netted with frame	Bat vs bird	-2.38	0.48	-4.92	
	Bat vs fungus	-1.04	0.50	-2.06	
	Bat vs natural fall	-2.04	0.47	-4.36	
	Bat vs rat	2.20	0.66	3.34	
	Bird vs fungus	1.34	0.44	3.03	
	Bird vs natural fall	0.34	0.43	0.79	
	Bird vs rat	4.58	0.62	7.33	
	Fungus vs natural fall	-1.00	0.45	-2.21	

Cause	Contrast	Estimate	SE	Z ratio	P _{adj.}
	Fungus vs rat	3.24	0.64	5.06	
	Natural fall vs rat	4.24	0.63	6.77	
Netted, no frame	Bat vs bird	-1.78	0.44	-4.00	
	Bat vs fungus	-1.51	0.45	-3.35	
	Bat vs natural fall	-2.13	0.45	-4.77	
	Bat vs rat	2.75	0.64	4.32	
	Bird vs fungus	0.27	0.43	0.62	
	Bird vs natural fall	-0.35	0.43	-0.81	
	Bird vs rat	4.53	0.63	7.24	
	Fungus vs natural fall	-0.62	0.43	-1.44	
	Fungus vs rat	4.26	0.62	6.82	
	Natural fall vs rat	4.88	0.62	7.83	
Unnetted	Bat vs bird	1.14	0.24	4.69	
	Bat vs fungus	1.09	0.25	4.41	
	Bat vs natural fall	0.33	0.24	1.36	
	Bat vs rat	4.88	0.32	15.46	
	Bird vs fungus	-0.05	0.25	-0.21	
	Bird vs natural fall	-0.81	0.24	-3.36	
	Bird vs rat	3.74	0.32	11.83	
	Fungus vs natural fall	-0.76	0.24	-3.11	
	Fungus vs rat	3.80	0.32	11.89	
	Natural fall vs rat	4.55	0.32	14.22	

NS, P_{adj.} ≥ 0.05; *, P_{adj.} < 0.05; **, P_{adj.} < 0.01; ***, P_{adj.} < 0.001.

SUPPLEMENTARY TABLE 6 Results of the post-hoc contrast tests applied to the most parsimonious generalized linear mixed model that included the two-way interaction between netting system (unnetted vs netted without frame) and causes of fruit loss (bat, bird, natural fall, fungus, rat) for explaining the number of fruits damaged at large lychee trees in Medine orchard (Fig. 1). Estimate with associated standard error (SE), Z ratio and adjusted P-value are given for each comparison of interest.

Cause	Contrast	Estimate	SE	Z ratio	P _{adj.}
Bat	Netted, no frame vs unnetted	-1.09	0.38	-2.86	*
Bird	Netted, no frame vs unnetted	0.66	0.38	1.73	NS
Natural fall	Netted, no frame vs unnetted	0.46	0.38	1.22	NS
Fungus	Netted, no frame vs unnetted	0.76	0.38	1.99	NS
Rat	Netted, no frame vs unnetted	0.42	0.39	1.08	NS
Netted, no frame	Bat vs bird	0.11	0.23	0.49	NS
	Bat vs fungus	1.39	0.24	5.83	***
	Bat vs natural fall	0.52	0.23	2.20	NS
	Bat vs rat	2.73	0.24	11.24	***
	Bird vs fungus	1.27	0.24	5.41	***
	Bird vs natural fall	0.40	0.23	1.72	NS
	Bird vs rat	2.62	0.24	10.81	***
	Fungus vs natural fall	-0.87	0.24	-3.69	**
	Fungus vs rat	1.34	0.24	5.48	***
	Natural fall vs rat	2.21	0.24	9.11	***
Unnetted	Bat vs bird	1.86	0.23	8.18	***
	Bat vs fungus	3.24	0.23	13.90	***
	Bat vs natural fall	2.06	0.23	9.08	***
	Bat vs rat	4.24	0.25	17.04	***
	Bird vs fungus	1.38	0.23	5.99	***
	Bird vs natural fall	0.21	0.22	0.92	NS
	Bird vs rat	2.38	0.25	9.72	***
	Fungus vs natural fall	-1.17	0.23	-5.09	***
	Fungus vs rat	1.00	0.25	4.08	***
	Natural fall vs rat	2.18	0.24	8.95	***

NS, P_{adj.} ≥ 0.05; *, P_{adj.} < 0.05; **, P_{adj.} < 0.01; ***, P_{adj.} < 0.001.