The pollination trade-off

Supplementary information

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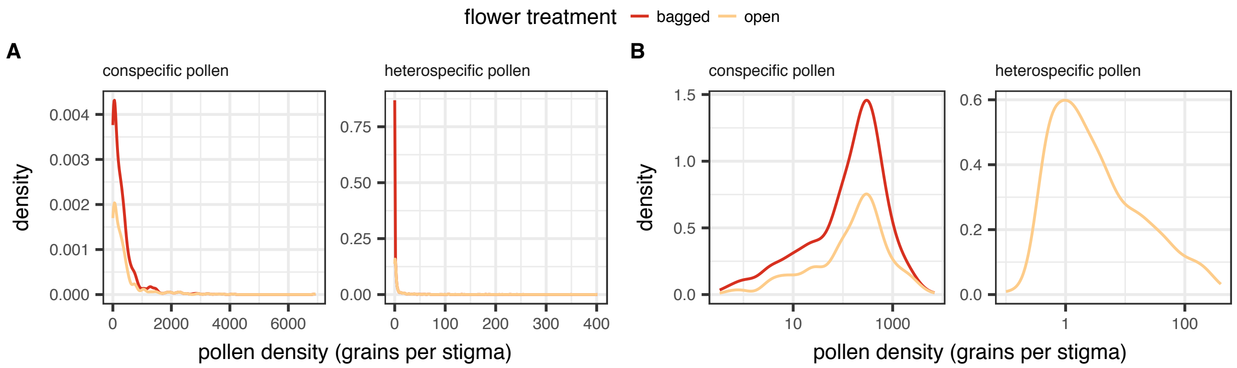

Figure S1: Distribution of stigmatic pollen density plotted in (A) a linear scale, and (B) a logarithmic scale (zero values not shown).

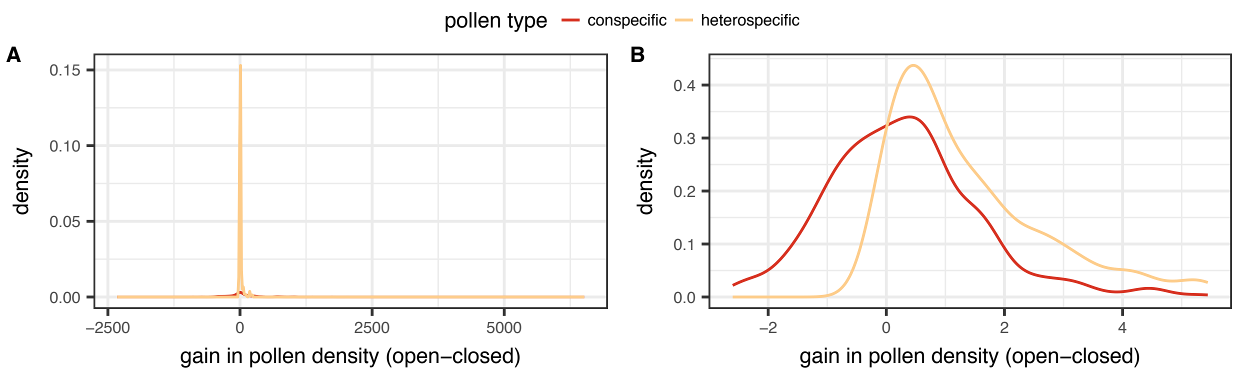

Figure S2: Distribution of the difference on stigmatic pollen density between open and closed flowers for one of the bootstrap replicates used in the model sets. When (A) using directly the gain in pollen density and (B) when pollen density is log transormed prior to calculating the gain.

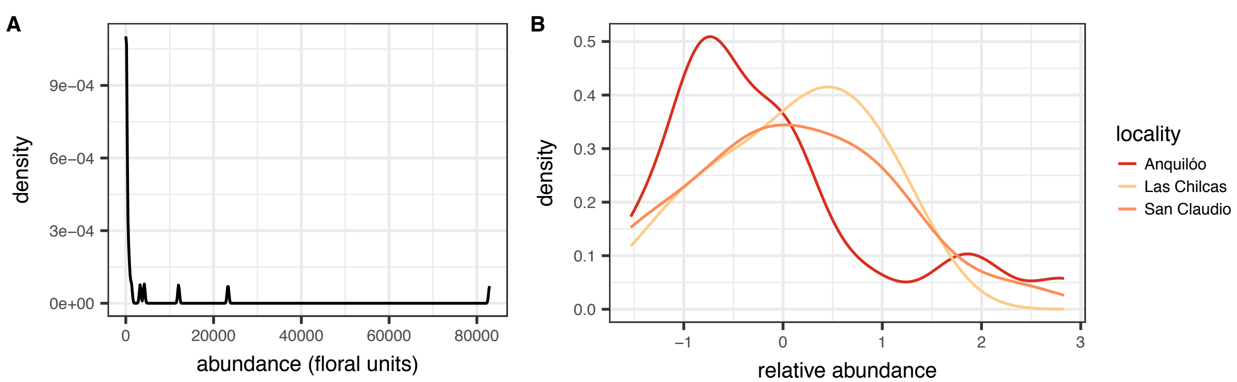

Figure S3: Distribution of plant abundance as (A) raw counts of floral units across communities, and (B) after applying a data transformation in which the counts have been

	plant species	difference	statistic	p value
1	*Aloysia gratissima*	31.67	9.00	0.04
2	*Baccharis pingraea*	3.00	156.00	0.00
3	*Carduus acanthoides*	0.00	1077.00	0.50
4	*Cirsium vulgare*	-109.77	82.00	1.00
5	*Condalia microphylla*	-8.90	20.00	0.75
6	*Cypella herbertii*	2428.25	20.00	0.02
7	*Descurania argentina*	21.50	61.00	0.06
8	*Diplotaxis tenuifolia*	198.75	217.00	0.17
9	*Dipsacus sp.*	6.72	28.50	0.01
10	*Gaillardia megapotamica*	-411.75	9.00	1.00
11	*Glandularia hookeriana*	-68.58	5.00	0.87
12	*Hirschfeldia incana*	29.50	9510.00	0.10
13	*Lycium chilense*	394.17	24.00	0.20
14	*Mentha pulegium*	1.01	34.00	0.22
15	*Nierembergia aristata*	769.75	70.00	0.00
16	*Nothoscordum euosimum*	199.42	44.00	0.02
17	*Physalis viscosa*	1074.00	15.00	0.02
18	*Prosopidastrum globosum*	3.31	20.00	0.21
19	*Senecio pulcher*	-25.00	6.00	0.71
20	*Sisyrinchium platense*	-22.25	49.00	0.69
21	*Solanum sisymbriifolium*	2195.00	3.00	0.25
22	*Sphaeralcea crispa*	5.70	15.00	0.02
23	*Stemodia lanceolata*	1261.00	25.00	0.00
24	*Thelesperma megapotamicum*	-23.33	4.00	0.65
25	*Turnera sidioides*	151.00	327.00	0.00
26	*Verbena intermedia*	87.08	367.00	0.01

Table S1: Results of testing the alternative hypothesis that the conspecific pollen density in open flowers is greater than the density in bagged flowers. Tests were performed at the species level (across communities).

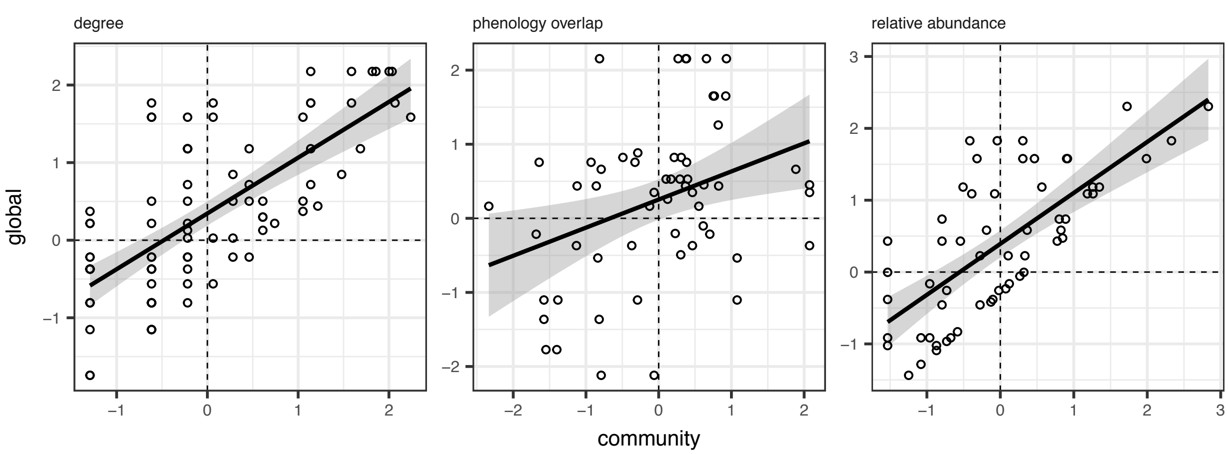

Figure S4: Relationship between the model's independent variables calculated at the community level and at the study-wide level.

	plant species	community	difference	statistic	p value
1	*Carduus acanthoides*	Anquilóo - agricultural - 2	33.00	15.00	0.02
2	*Carduus acanthoides*	San Claudio - agricultural - 1	11.50	96.00	0.25
3	*Carduus acanthoides*	San Claudio - agricultural - 2	-13.18	52.00	0.99
4	*Carduus acanthoides*	San Claudio - reserve - 1	-1.89	19.50	0.83
5	*Carduus acanthoides*	San Claudio - reserve - 2	8.75	38.50	0.12
6	*Cirsium vulgare*	Anquilóo - agricultural - 2	-38.25	12.00	0.73
7	*Cirsium vulgare*	Las Chilcas - reserve - 1	-36.75	12.00	0.73
8	*Cirsium vulgare*	San Claudio - reserve - 1	-138.83	0.00	1.00
9	*Hirschfeldia incana*	Anquilóo - agricultural - 1	100.50	263.00	0.03
10	*Hirschfeldia incana*	Anquilóo - agricultural - 2	677.00	17.00	0.02
11	*Hirschfeldia incana*	San Claudio - agricultural - 1	-176.79	165.00	0.99
12	*Hirschfeldia incana*	San Claudio - agricultural - 2	51.00	658.50	0.13
13	*Hirschfeldia incana*	San Claudio - reserve - 1	-23.25	266.00	0.69
14	*Hirschfeldia incana*	San Claudio - reserve - 2	143.00	435.50	0.02
15	*Mentha pulegium*	Las Chilcas - agricultural - 2	1.67	13.00	0.18
16	*Mentha pulegium*	Las Chilcas - reserve - 1	1.67	6.00	0.35
17	*Nierembergia aristata*	Anquilóo - agricultural - 1	721.00	1.00	0.50
18	*Nierembergia aristata*	Anquilóo - reserve - 1	846.00	9.00	0.05
19	*Nierembergia aristata*	Anquilóo - reserve - 2	881.50	18.00	0.01
20	*Nothoscordum euosimum*	Las Chilcas - agricultural - 1	305.75	18.00	0.01
21	*Nothoscordum euosimum*	Las Chilcas - agricultural - 2	38.50	5.00	0.50
22	*Sisyrinchium platense*	Las Chilcas - agricultural - 1	54.00	25.00	0.15
23	*Sisyrinchium platense*	Las Chilcas - reserve - 1	-134.00	0.00	1.00
24	*Turnera sidioides*	Anquilóo - agricultural - 1	135.25	113.00	0.00
25	*Turnera sidioides*	Anquilóo - agricultural - 2	3.00	9.00	0.04
26	*Turnera sidioides*	Anquilóo - reserve - 2	153.21	18.00	0.01
27	*Verbena intermedia*	Anquilóo - reserve - 2	35.00	13.00	0.19
28	*Verbena intermedia*	San Claudio - agricultural - 2	18.75	65.00	0.10
29	*Verbena intermedia*	San Claudio - reserve - 2	213.25	70.00	0.00

Table S2: Results of testing the alternative hypothesis that the conspecific pollen density in open flowers is greater than the density in bagged flowers. Tests were performed at the community level. Only species present in more than one community are shown.

	Df	Deviance	Resid. Df	Resid. Dev	Pr(>Chi)
NULL			649	227291.81	
species	26	73445.11	623	153846.70	0.0000
community	10	2020.22	613	151826.47	0.6614
species:community	10	1141.52	603	150684.95	0.9312

Table S3: Analysis of variance of conspecific pollen density in bagged flowers (self pollination rate). Density were modelled using a quasipoisson distribution. The model suggests that self-pollination rates are species dependent but not across.

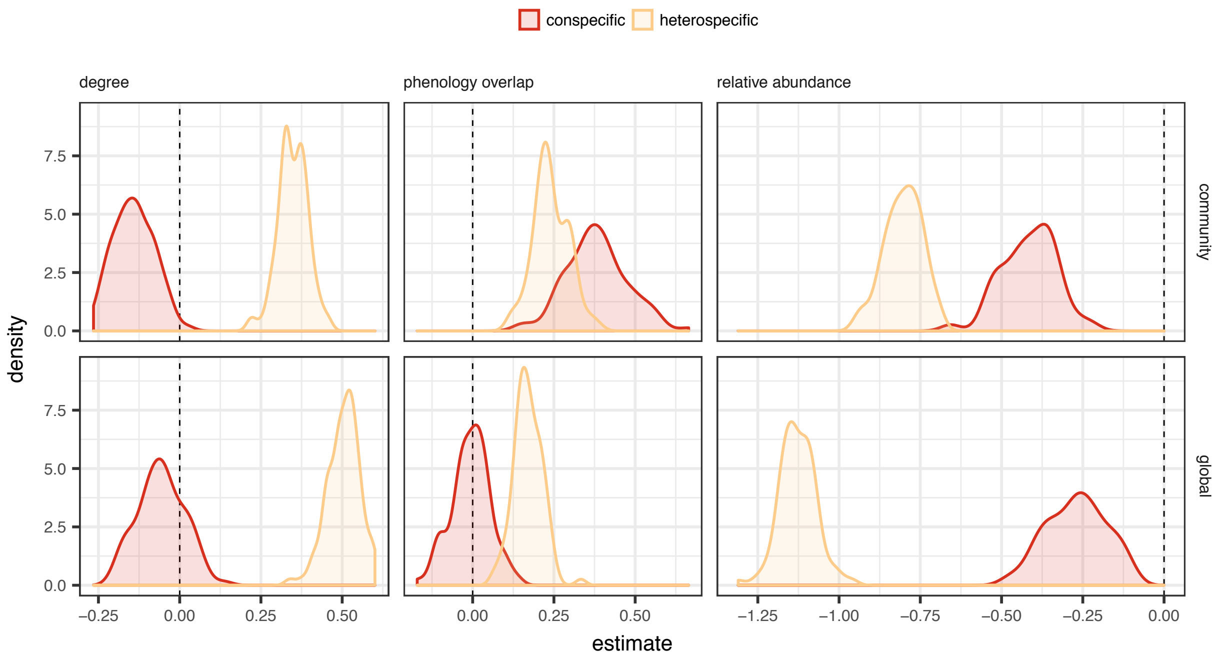

Figure S5: Model coefficients

random structure	pollen category scale	conspecific	heterospecific
1 | community / plant sp.	community	0 [0, 8.3], n = 100	7.5 [0, 20.5], n = 100
	global	0 [0, 1.2], n = 100	0 [0, 4.3], n = 100
1 | locality / land use / fragment / plant sp.	community	4 [3.9, 12.3], n = 97	11.2 [4, 24.5], n = 99
	global	4 [3.8, 5.2], n = 100	3.9 [3.5, 8.1], n = 100
1 | locality / land use / plant sp.	community	6.2 [0, 16.7], n = 100	24.8 [14.2, 35.5], n = 98
	global	13.4 [2.3, 32], n = 100	22.8 [0, 49.2], n = 100
1 | locality / plant sp.	community	10.8 [3, 25.1], n = 100	30.1 [14.6, 54.6], n = 100
	global	19.6 [6.7, 37.3], n = 100	41.7 [16.4, 82.1], n = 100
1 | plant sp.	community	10 [1.4, 26.1], n = 100	20.5 [7.3, 45.3], n = 100
	global	14.4 [0.3, 33.3], n = 100	32.5 [6.4, 75.4], n = 100
degree | community / plant sp.	community	5.1 [1.7, 13.9], n = 73	—
	global	8 [8, 8], n = 12	0 [0, 1.2], n = 12
degree | plant sp.	community	4.5 [0, 16.7], n = 99	0 [0, 4.8], n = 95
	global	18.7 [4.8, 34], n = 62	—

Table S4: Comparison of the different random structures we considered. The table shows median delta AIC values of 100 bootsrap resamples of the data. The 5th and 95th percentile are shown inside square brackets. Communities are defined by individual fragments but ignore the hierarchical arrangement of sampling sites.

	model metric	pollen type	best model set	shift estimate	p value
1	rmse	conspecific	community	-8.5E-03	2.0E-03
2	rmse	heterospecific	global	8.6E-03	1.8E-12
3	sigma	conspecific	community	-1.4E-02	1.5E-06
4	sigma	heterospecific	global	6.3E-03	2.1E-08
5	o2	conspecific	global	-1.9E-02	6.5E-11
6	o2	heterospecific	global	-6.7E-02	4.0E-18
7	r2c	conspecific	global	-1.0E-02	3.7E-04
8	r2c	heterospecific	global	-4.9E-02	4.0E-18
9	nrmse	conspecific	global	8.8E-04	6.6E-03
10	nrmse	heterospecific	global	1.6E-03	9.1E-13

Table S5: Results of two sample paired Wilcoxon signed rank test comparing different model quality metrics of the model sets using predictors computed across or within communities. Metrics are the root mean square error (rmse), the residual standard deviation (sigma), the conditional r-squared approximation as proposed by Nakagawa and Schielzeth (2013), the omega-squared value as suggested by Xu (2003), and the normalised root-mean-square error of the model sets constructed using predictors computed at the community or study level.

References

Nakagawa, S. & Schielzeth, H. (2013). A general and simple method for obtaining R2 from generalized linear mixed-effects models. *Methods in Ecology and Evolution*, 4, 133–142.

Xu, R. (2003). Measuring explained variation in linear mixed effects models. *Statistics in Medicine*, 22, 3527–3541.