

## Supporting information:

# Recipient and donor characteristics govern hierarchical structure in a heterospecific pollen competition network of co-flowering plants

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The following Supporting Information is available for this article:

**Table S1.** Species names, common names, varieties and sources of the different seeds.

**Table S2.** Numerical values of all the traits measured for each species.

**Table S3.** Seed set in percentage for hand cross-pollination, hand self-pollination, natural selfing and apomixis for all species.

**Table S4.** Species x species matrix with the significance of effect “yes” or “no” of the different donors on the seed set of the different recipient species.

**Table S5.** Estimates, standard error, t-value and P-value of the effect of the different 9 donors on each recipient species.

**Table S6.** Number of seeds produced with 100% foreign pollen treatments for the different recipient species.

**Table S7.** Phylogenetic signal and significance for all the different traits

**Table S8.** Procrustes analysis results.

**Figure S1.** Correlation matrix for all the different traits.

**Figure S2.** Total amount of pollen found for the different treatments.

**Figure S3.** Pollen ratios for the different recipient species.

**Figure S4.** Pollen ratios for the different recipient species by family.

**Figure S5.** Unipartite bidirectional network with asymmetrical effect

**Figure S6.** Statistical comparison of pollen ratios by family as pollen donor and recipient.

**Figure S7.** Violin plot of the reproductive biology of the species.

**Figure S8.** Grouped effect sizes by family for each recipient species.

# TABLE S1

Species	Common_names	Variety	Source
Brassica oleracea	Wild cabbage	Capitata	<a href="https://www.mrfothergills.com.au/">https://www.mrfothergills.com.au/</a>
Brassica rapa	Pak choi	Chinensis	<a href="https://www.mrfothergills.com.au/">https://www.mrfothergills.com.au/</a>
Eruca sativa	Rocket		<a href="https://www.mrfothergills.com.au/">https://www.mrfothergills.com.au/</a>
Sinapis alba	White mustard		<a href="https://www.mrfothergills.com.au/">https://www.mrfothergills.com.au/</a>
Ipomoea aquatica	Water spinach		<a href="https://www.theseedcollection.com.au/">https://www.theseedcollection.com.au/</a>
Ipomoea purpurea	Morning glory		<a href="http://www.shaman-australis.com.au">http://www.shaman-australis.com.au</a>
Capsicum annuum	Capsicum	California Wonder	<a href="https://www.edenseeds.com.au">https://www.edenseeds.com.au</a>
Petunia integrifolia	Petunia		<a href="https://www.dianeseeds.com/">https://www.dianeseeds.com/</a>
Solanum lycopersicum	Tomato	Tommy Toe	<a href="https://www.mrfothergills.com.au/">https://www.mrfothergills.com.au/</a>
Solanum melongena	Eggplant	Little Fingers	<a href="https://www.4seasonsseeds.com.au/">https://www.4seasonsseeds.com.au/</a>

TABLE S2

Species	Pollen size $\mu\text{m}$	Pollen grains per anther	Ovule number	Pollen:ovule ratio	Stigma area $\mu\text{m}^2$	Stigma length (mm)	Stigma width (mm)	Style length (mm)	Style width (mm)	Ovary length (mm)	Ovary width (mm)	Selfing rate	SI index
Brassica oleracea	27.72	42033	29	8696.48	0.62	0.53	0.88	2.32	0.65	5.93	1.11	0.0	0.00
Brassica rapa	25.35	7133	26	1646.08	0.36	0.37	0.73	1.08	0.52	3.53	0.88	0.0	0.00
Capsicum annuum	32.46	30761	241	765.83	1.06	0.72	1.18	3.24	1.06	3.15	5.80	0.8	0.64
Eruca versicaria	24.95	22151	24	5537.75	0.35	0.73	0.67	6.60	0.73	4.42	0.94	0.1	0.02
Ipomoea aquatica	70.10	858	4	1072.50	3.26	1.43	2.25	19.44	0.45	2.38	1.42	0.6	0.75
Ipomoea purpurea	97.59	654	6	545.00	2.27	1.24	1.88	28.23	0.58	1.06	1.57	1.0	2.74
Petunia integrifolia	24.74	34657	220	787.66	1.17	0.80	1.32	14.65	0.45	3.13	1.77	0.9	0.26
Sinapis alba	33.59	3507	6	3507.00	0.55	0.63	0.91	3.62	0.77	1.98	1.07	0.7	1.12
Solanum lycopersicum	22.00	28915	92	1885.76	0.09	0.19	0.35	6.47	0.31	1.16	1.13	0.7	0.48
Solanum melongena	25.18	166989	1010	992.01	1.14	0.96	1.33	11.33	0.94	4.02	3.55	1.0	1.45

TABLE S3

Species	Hand cross-pollination	Hand self-pollination	Spontaneous selfing	Apomixis
Brassica oleracea	32.07	0.00	0.00	0
Brassica rapa	44.97	0.00	0.00	0
Capsicum annuum	80.00	56.47	19.34	0
Eruca sativa	23.75	0.42	0.00	0
Ipomoea aquatica	40.00	30.00	20.00	0
Ipomoea purpurea	31.67	86.67	31.67	0
Petunia integrifolia	80.16	24.77	0.00	0
Sinapis alba	41.67	48.33	5.00	15
Solanum lycopersium	85.65	41.20	68.48	0
Solanum melongena	60.48	74.87	21.56	0

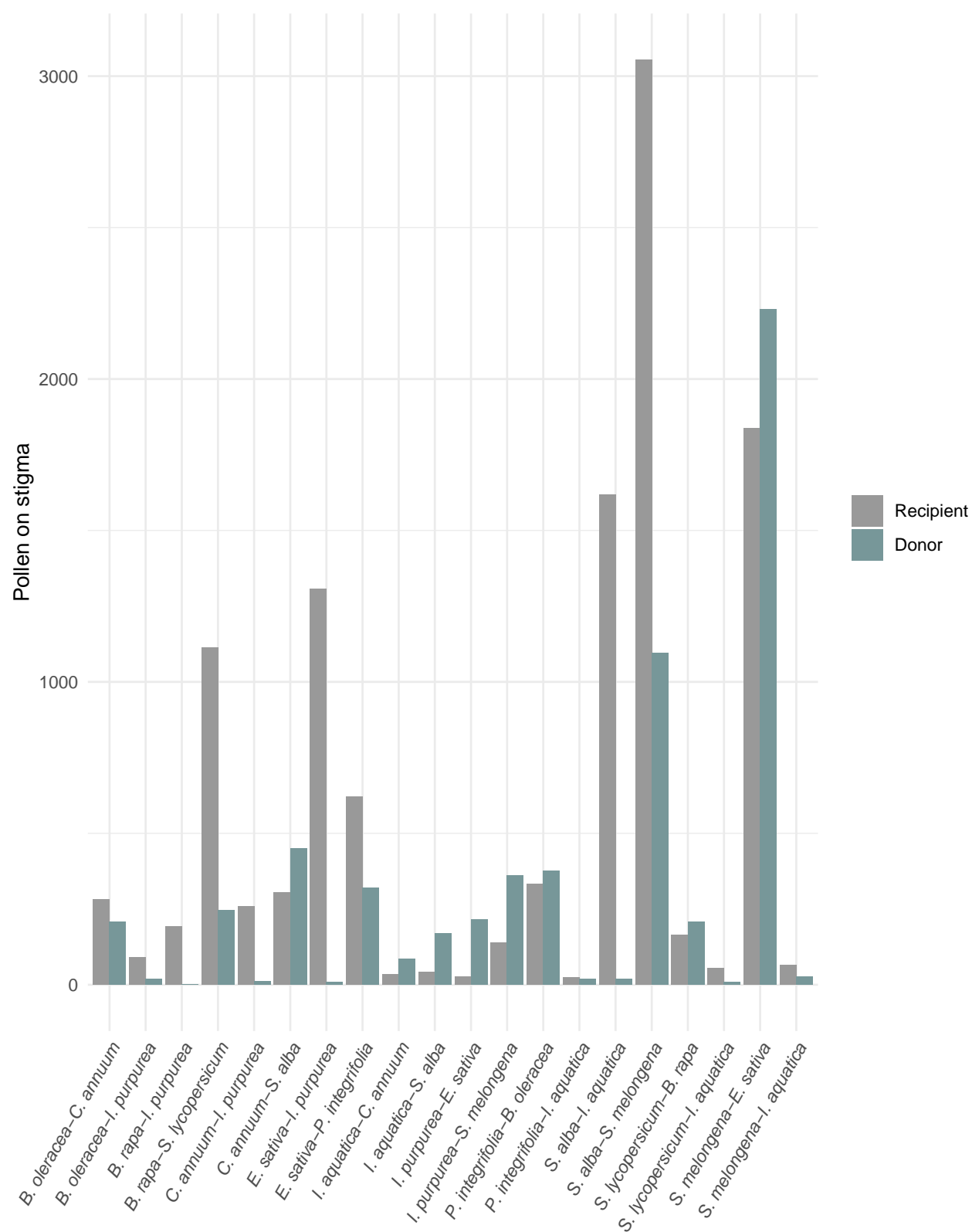
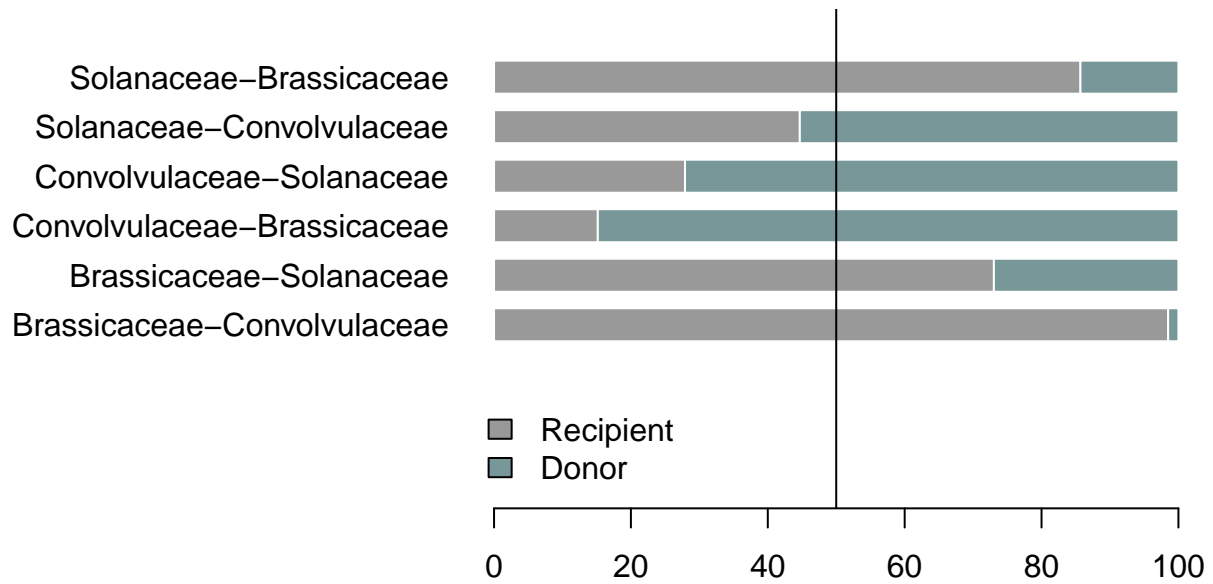
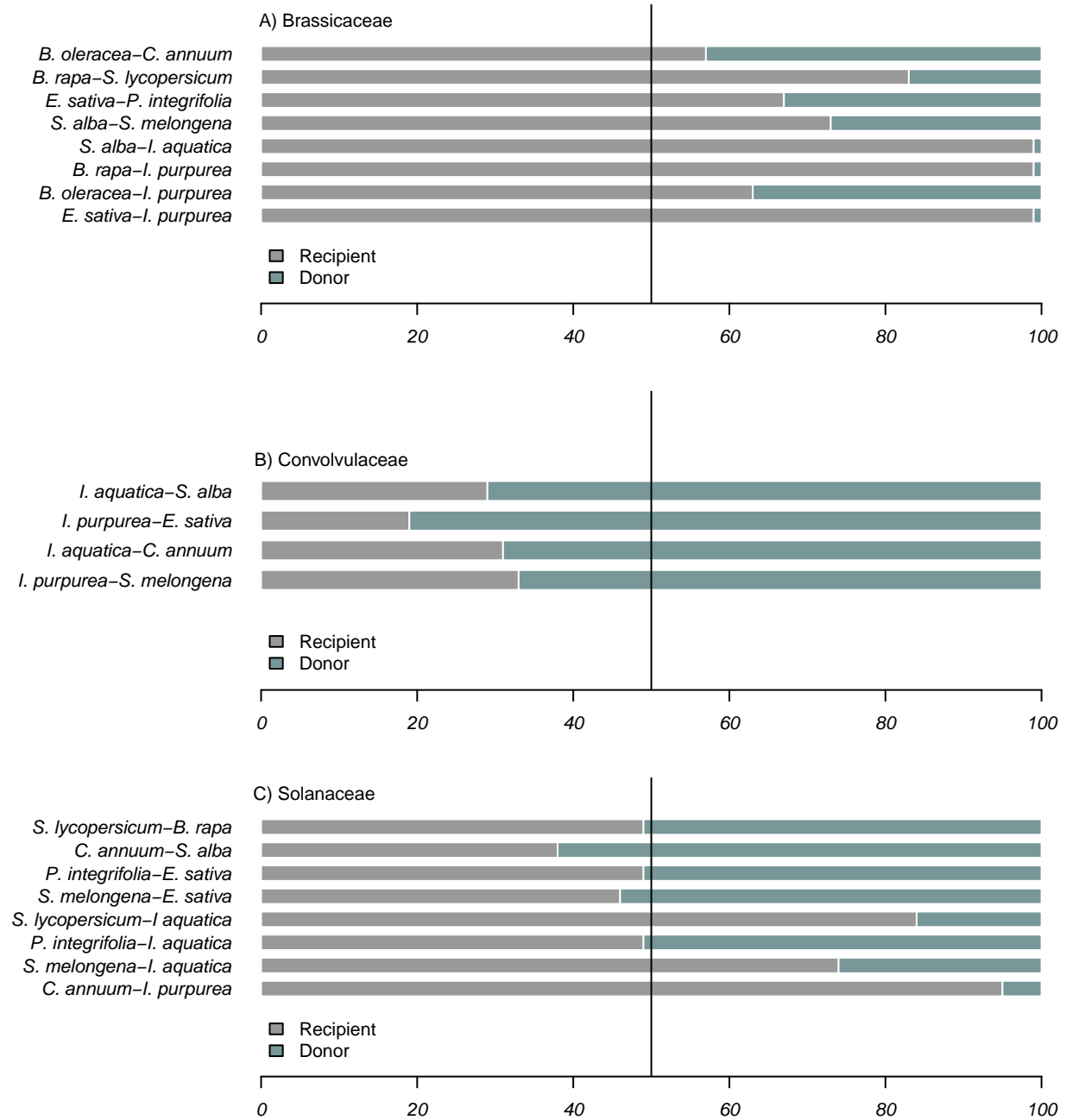


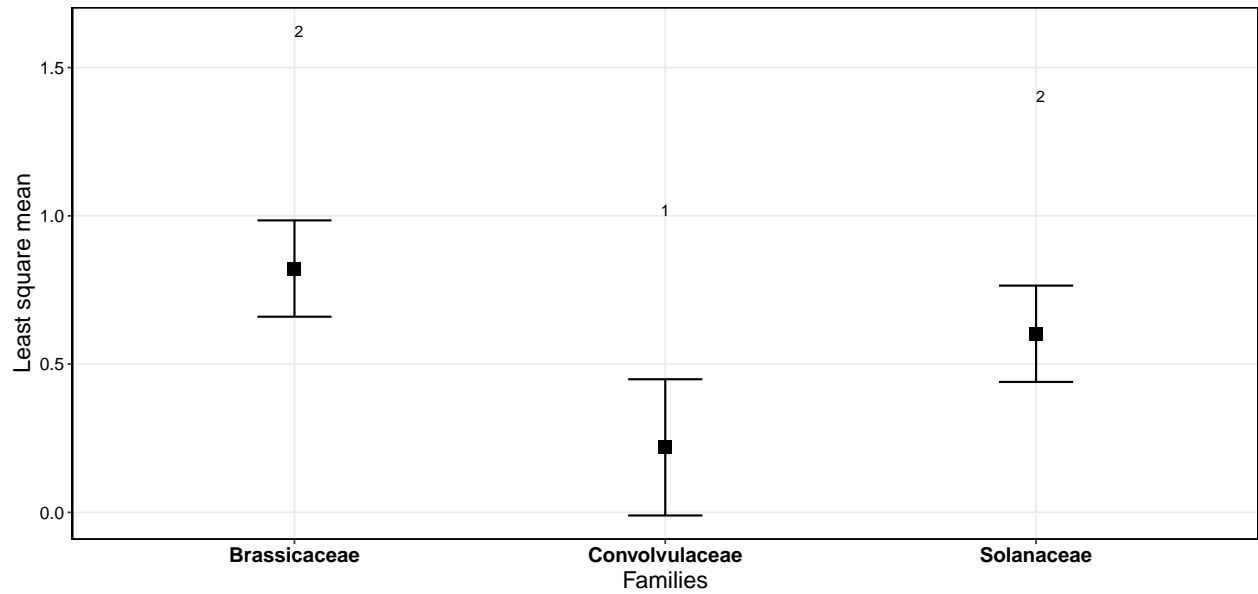
Fig S1



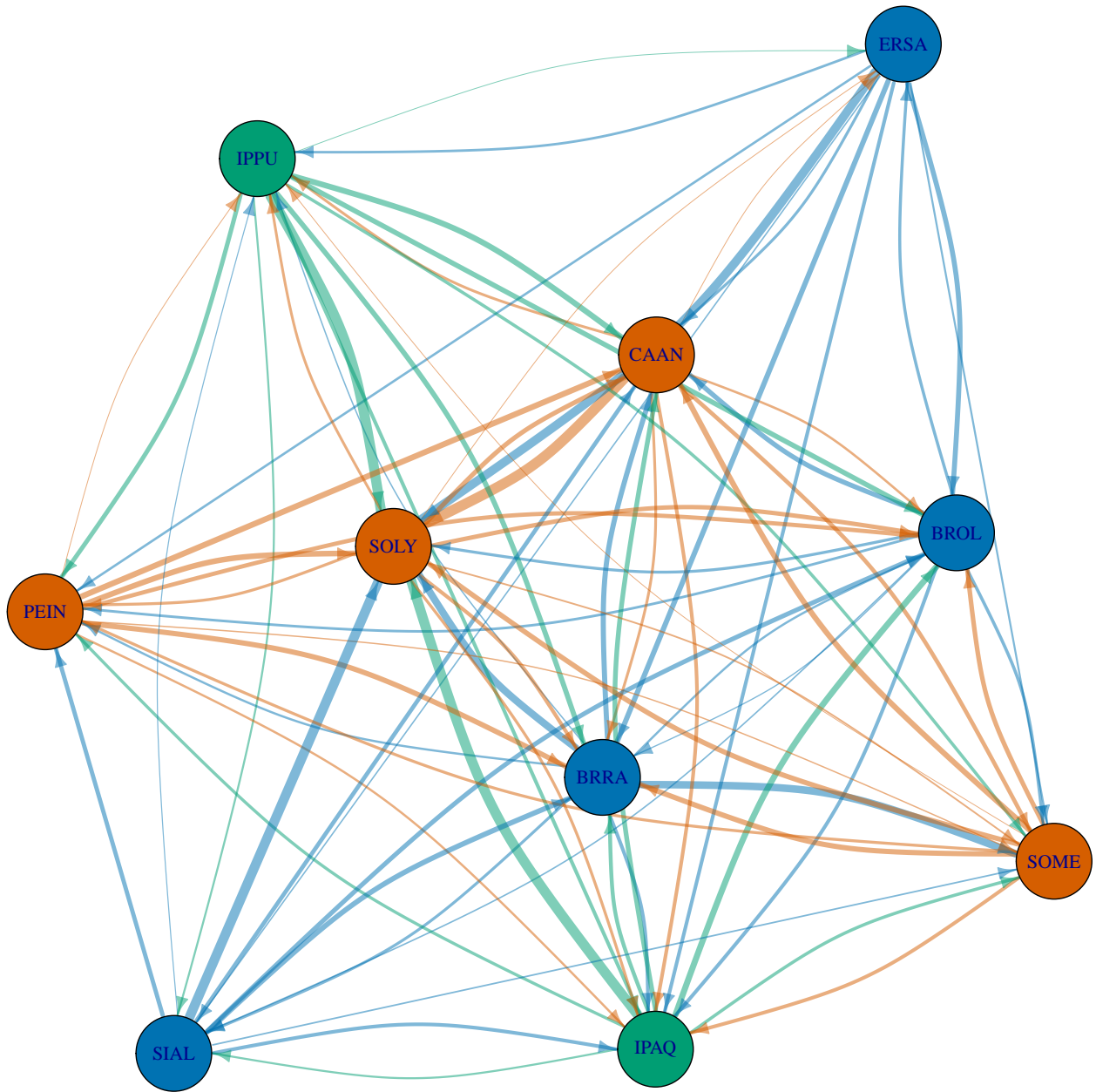
**Fig S3** Average proportion of heterospecific pollen per family for the different 20 treatments counted. On the label of the y-axis, the first family is the pollen recipient family, and the second, the pollen donor family. These pollen ratios are the number of heterospecific pollen grains divided by the total pollen grains per stigma (conspecific and heterospecific pollen) and then averaged by family (N=20). The vertical bar on intercept 50, represents equal proportions of both recipient (grey) and donor (light blue) pollen.



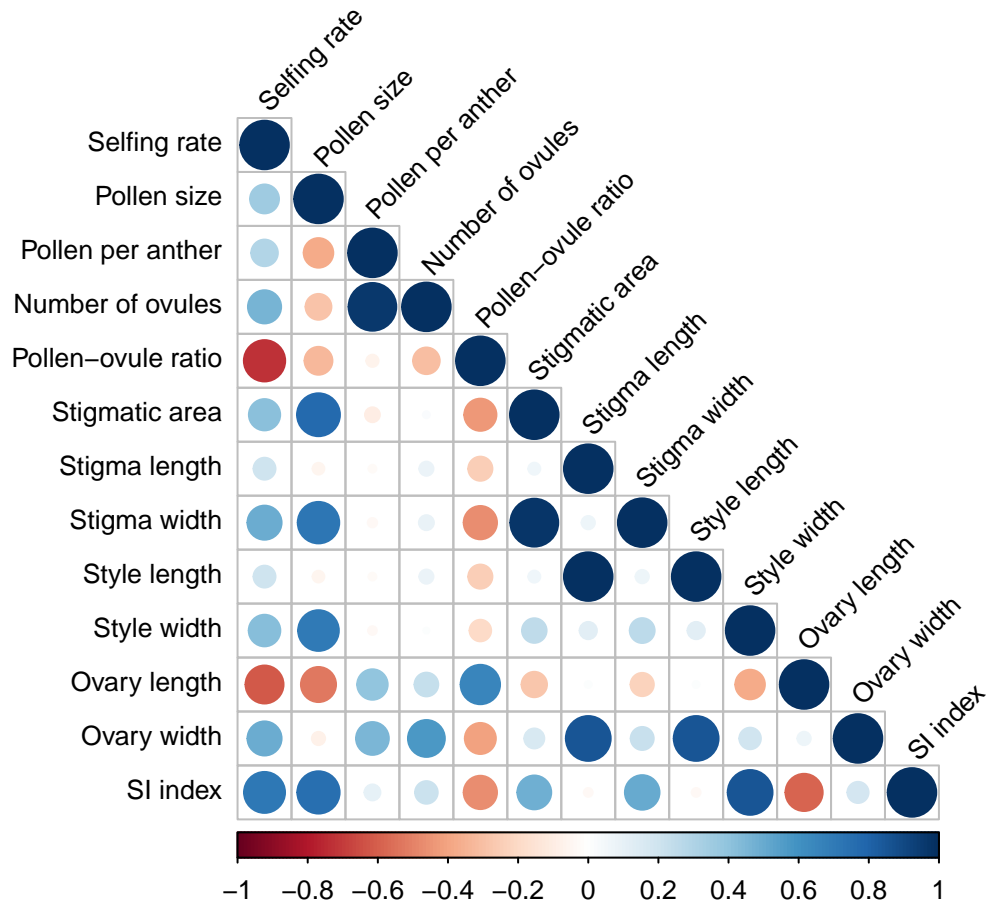




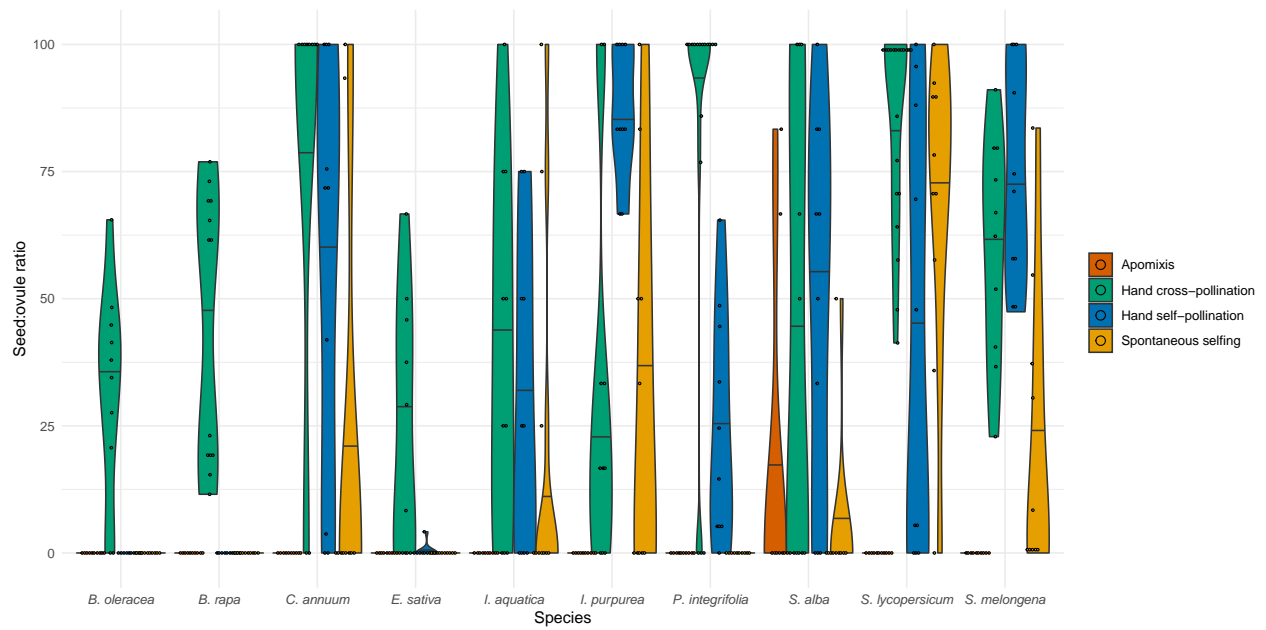
**Fig. S4** Pollen ratios comparisons between the different pollen recipient families where the boxes represent least square means, the error bars, confidence intervals 95%, and sharing numbers indicate no significant differences between groups (Tukey adjusted comparisons). These pollen ratios are the total number of heterospecific pollen grains divided by the total quantity of pollen (conspecific pollen + heterospecific pollen), and then compared by family (N=20).



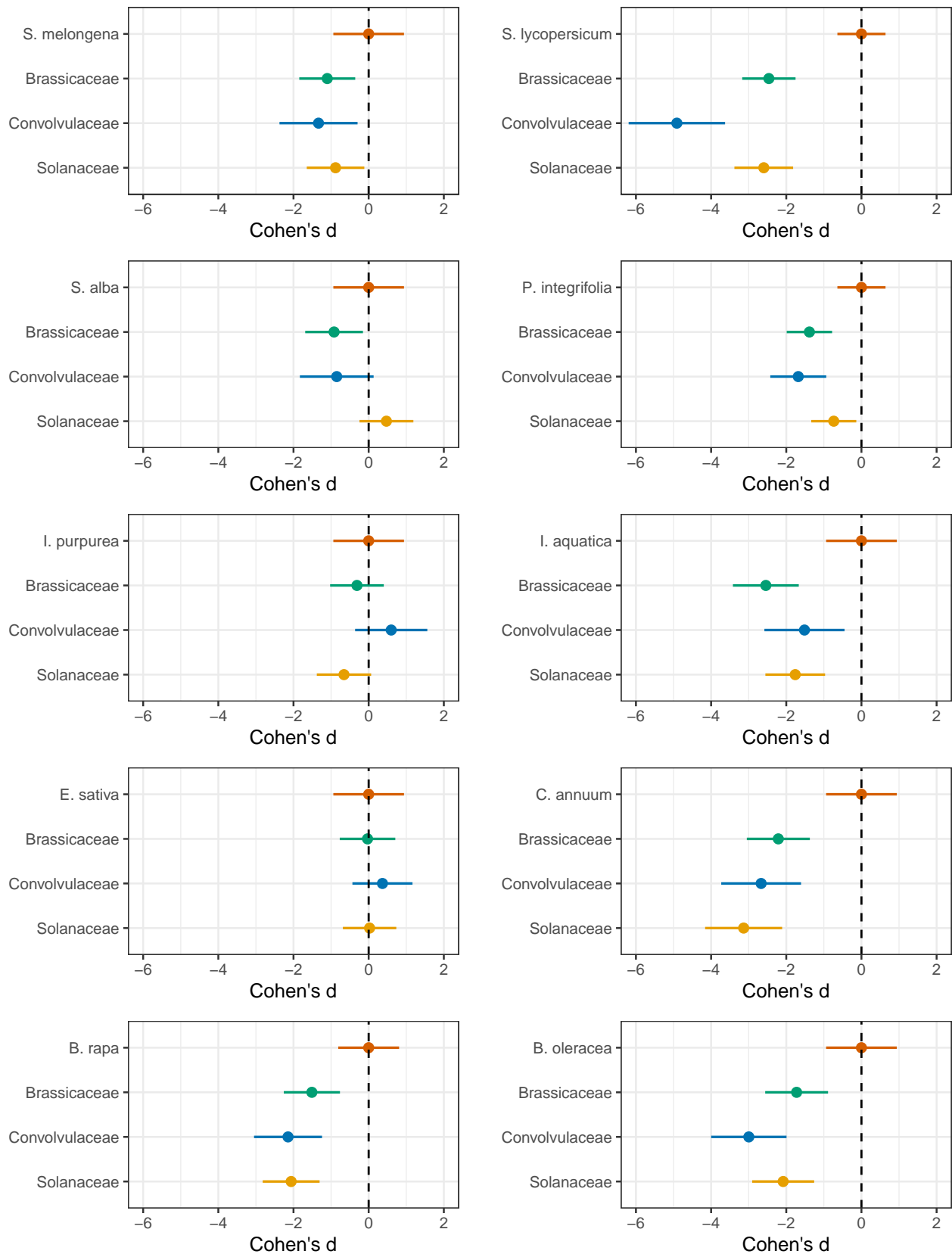
**Fig. S5** Unipartite bidirectional network with asymmetrical effect. The lines with the arrow heads connect the impact of foreign pollen (effect size) of each pollen donor species on each recipient species. All the arrow heads point to the recipient species of the reciprocal interaction. Lines of species that did not have a negative impact are not represented. The different nodes and the donor species appear coloured by family: Solanaceae (orange), Brassicaceae (blue) and Convolvulaceae (green). The intensity of the effect is represented by the line's size where a larger effect size corresponds to a thicker line and a thinner line to a smaller effect size. Species code: BROL: *Brassica oleracea*, BRRA: *Brassica rapa*, ERSA: *Eruca sativa*, SIAL: *Sinapis alba*, IPAQ: *Ipomoea aquatica*, IPPU: *Ipomoea purpurea*, CAAN: *Capsicum annuum*, PEIN: *Petunia integrifolia*, SOLY: *Solanum lycopersicum*, SOME: *Solanum melongena*.



**Fig S6** Graphical representation of the correlation matrix of the different reproductive traits considered in the experiment. Positive correlations are displayed in blue and negative in red. The intensity, size and colour of the circles are proportional to the correlation coefficient from Pearson's  $r$ .



**Fig. S7** Violin plot of the proportion of seeds covered to ovule (%) for all species with four different hand-pollination treatments (apomixis, hand cross pollination, hand self pollination and spontaneous selfing). The coloured dots, represent the different values of seed set for each treatment.



**Fig. S8** Effect sizes (95% confidence intervals) of the different families on each focal species (recipient) and a hand cross-pollination treatment (control). For each species the control treatment appears in yellow and the grouped effect per family in blue for Brassicaceae, green for Convolvulaceae and orange for Solanaceae.