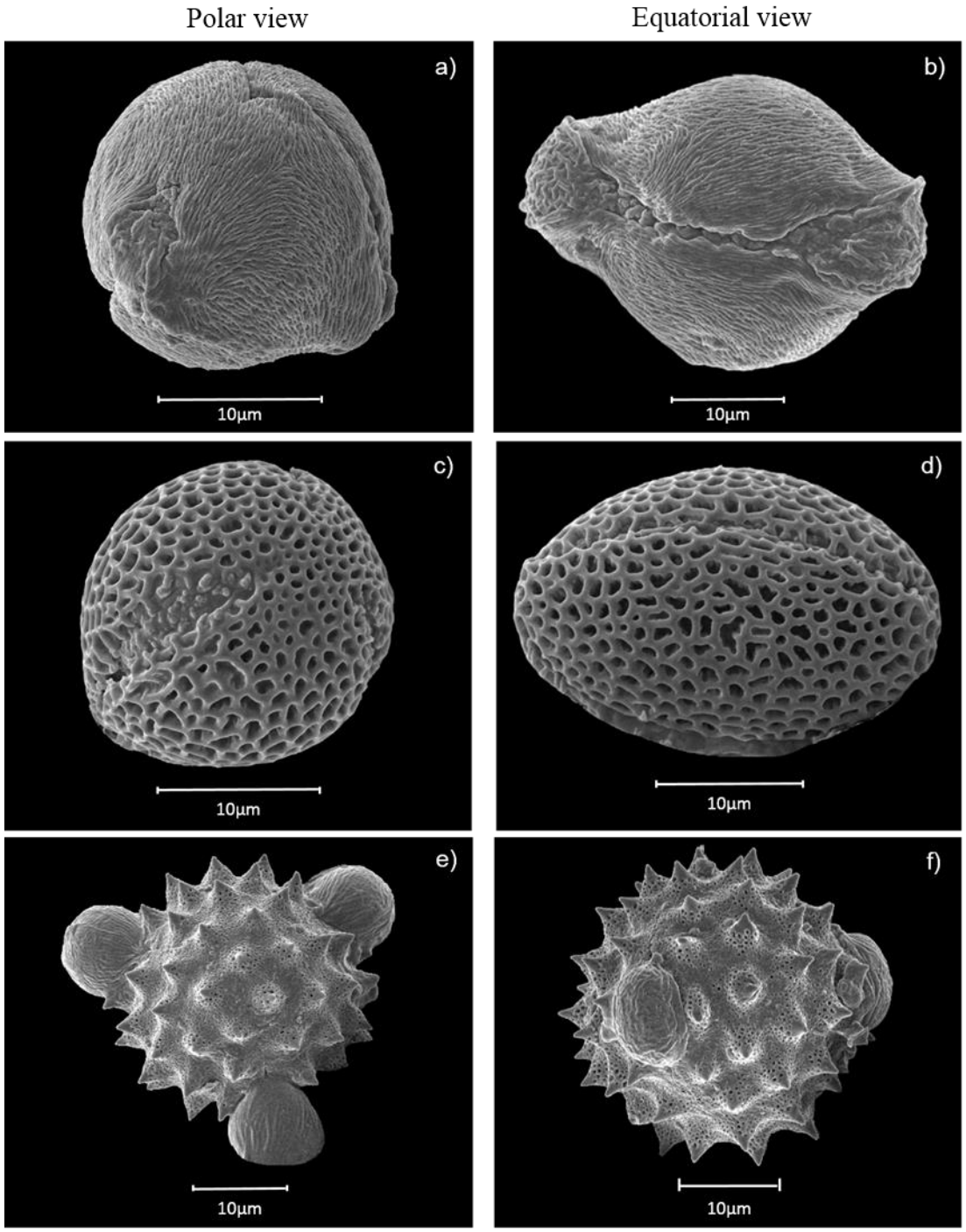
Figure S1- Palynological identification of the pollen pellet morphospecies (PPMs). a-b) *Pyracantha coccinea* (Rosales: Rosaceae); c-d) *Capsella bursa-pastoris* (Brassicales: Brassicaceae); e-f) *Carduus thoermeri* (Asterales: Asteraceae); g-h) *Hypochaeris radicata* (Asterales: Asteraceae); i-j) *Diplotaxis tenuifolia* (Brassicales: Brassicaceae); k-l) *Salix humboldtiana* (Malpighiales: Salicaceae).



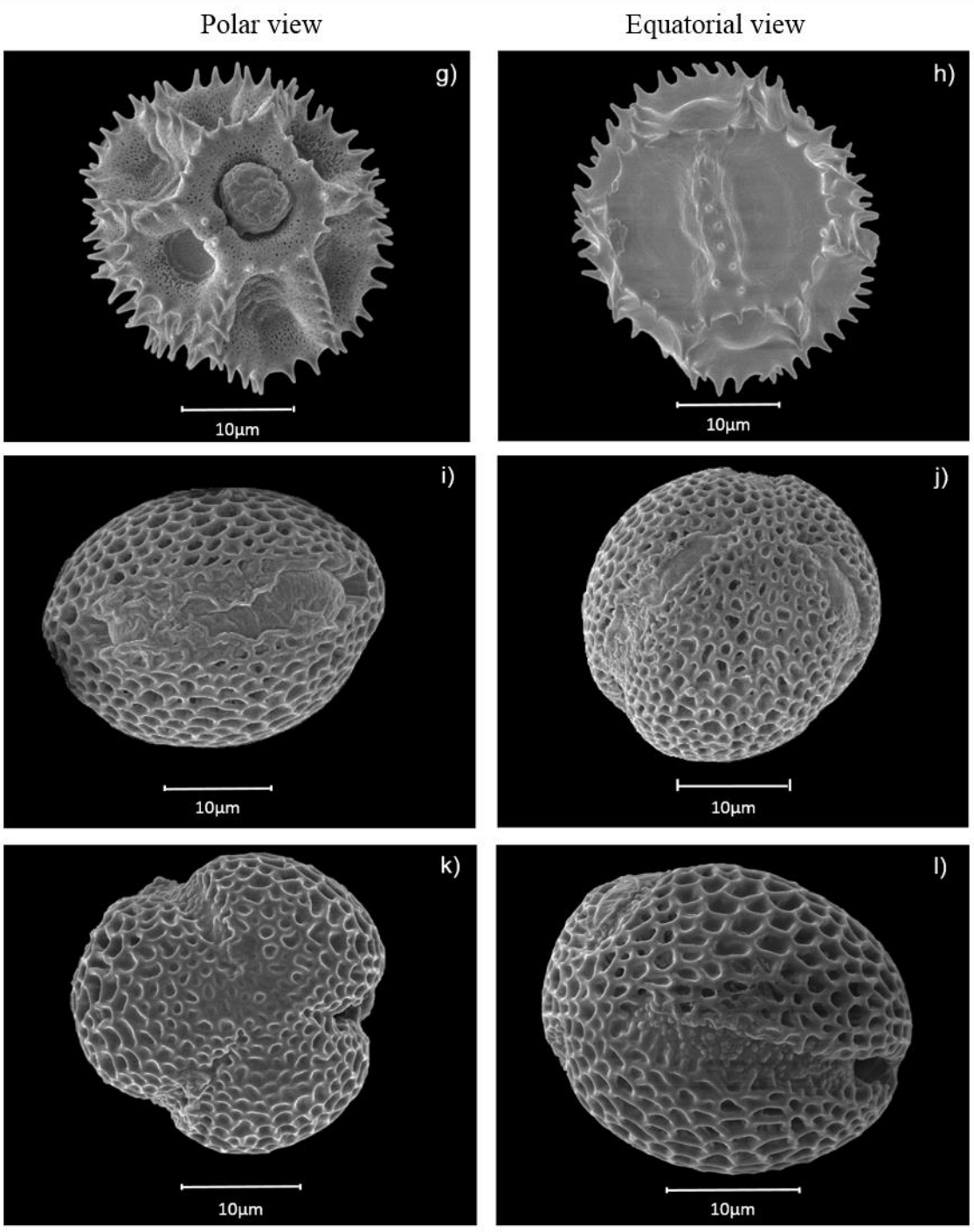


Figure S2. Detailed process of one conditioning and control stage - CS (Conditioned Stimulus); US (Unconditioned Stimulus).

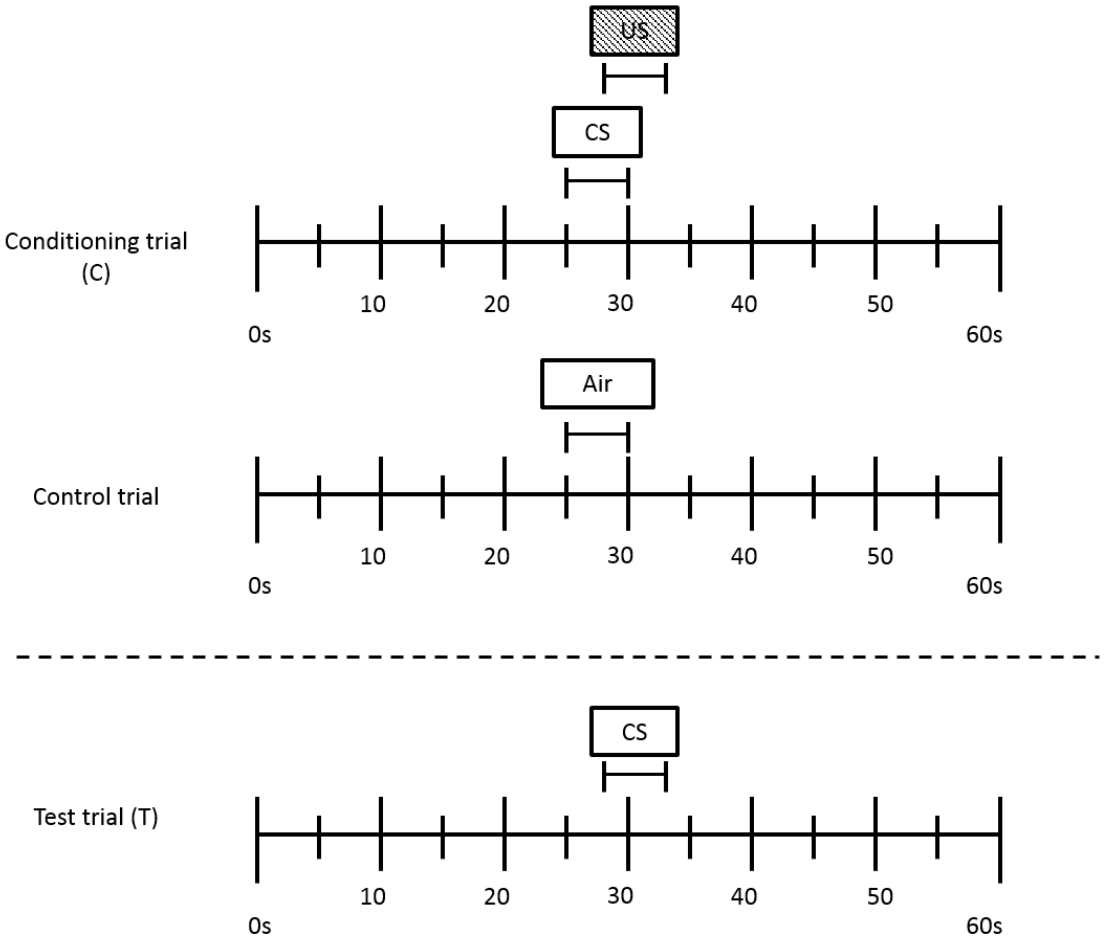


Figure S3. Repartition among the pollen conditioned classes of the bees excluded (*n*=13) of the statistics due to their positive PER at the first trial.

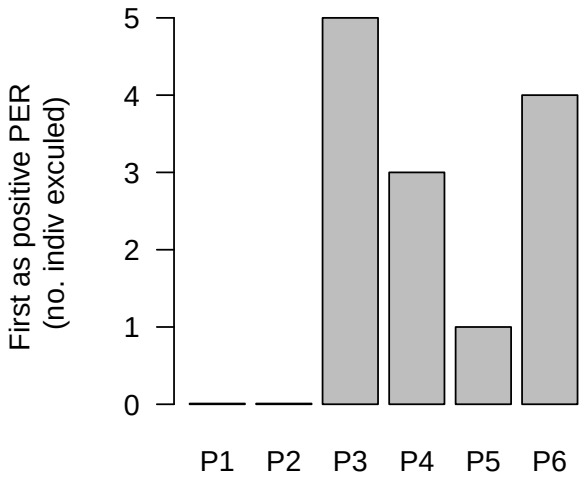


Figure S4. Colinearity test between explanatory variables fitted using the *chart.Correlation* function of the *Performance Analytics* R-package. Values represent Pearson correlation coefficient. Red lines fit a polynomial surface determined by one or more numerical predictors, using local fitting. There is no significant correlations between explanatory variables meaning a control if the colinearity test.

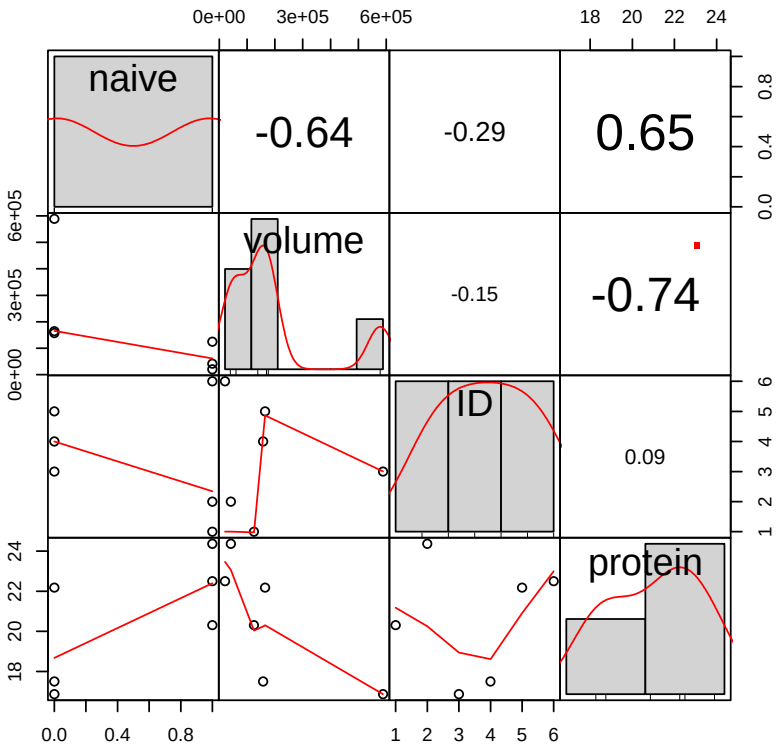


Table S1. Pollens and plants characteristics.

Pollen	Scientific name	Pollen description	Polar axis (P) and Equatorial diameter (E) (µm)	Color	Maximum flowering	Habit	%Protein content (6.25*Nitrogen amount)
1	*Pyracantha coccinea* (Rosales: Rosaceae)	Monad with three colporus, isopolar and radial symmetry. In polar view is circular while in equatorial view is elliptical. Streaked surface, short striae in irregular arrangement.	P=36-41 E=30-32	Pale yellow	Nov-Dec.	Exotic perennial tree	20.31
2	*Capsella bursa-pastoris* (Brassicales: Brassicaceae)	Monad, with three colpus with granular membrane, isopolar and radially symmetric. In polar view is circular and lobulated while in equatorial vision is circular or elliptical. The surface is reticulated.	P=14-39 E=13-30	Strong yellow	Nov-Dec	Exotic herb	24.37
3	*Carduus thoermeri* (Asterales: Asteraceae)	Monad, large size, spherical or slightly ellipsoidal. Tricolporate. Spines from 5 to 7 µm high, broad base. The entire surface with small perforations.	P=43-52 E=49-55	Dark purple	Nov-March	Exotic herb	16.87
4	*Hypochaeris radicata* (Asterales: Asteraceae)	Monad, tricolporate and echinate. The shape of pollen in polar and equatorial view is circular with hexagonal ambit.	P=27-32 E=30-37	Strong orange	Nov-Feb	Exotic herb	17.5
5	*Diplotaxis tenuifolia* (Brassicales: Brassicaceae)	Monad, radial symmetry. Tricolpates. In polar view are circular while in equatorial view are circular or elliptical. Reticular surface, long colpi, wide grooves without continuous margins formed by the meshes of the reticulum	P=35-42 E=32-36	Yellow	Jan-Feb	Exotic herb	22.18
6	*Salix humboldtiana* (Malpighiales: Salicaceae)	Monad, in polar view is circular or mildly triangular, while is circular in equatorial view. Reticulated surface. Tricolpates, long colpi with granular membrane.	P=18-22 E=15-19	Yellow	Sep-Nov	Native deciduous tree	22.5

Table S2. Values of statistical parameters obtained when analyzing the % PER in Conditioning 3 (C3) by mean of a GLM.

	Estimate	Std. Error	*Z* value	*P* value
P2-P1	-16.774	1190.865	-0.014	0.997
P3-P1	-17.074	1190.865	-0.014	0.997
P4-P1	-17.413	1190.865	-0.015	0.996
P5-P1	-17.585	1190.865	-0.015	0.996
P6-P1	-16.001	1190.865	-0.013	0.996
P3-P2	-0.300	0.607	-0.494	0.995
P4-P2	-0.639	0.553	-1.154	0.825
P5-P2	-0.810	0.621	-1.305	0.738
P6-P2	0.773	0.878	0.880	0.937
P4-P3	-0.339	0.457	-0.741	0.970
P5-P3	-0.510	0.537	-0.950	0.915
P6-P3	1.073	0.821	1.307	0.737
P5-P4	-0.171	0.475	-0.362	0.999
P6-P4	1.412	0.782	1.806	0.402
P6-P5	1.584	0.831	1.905	0.342

Table S3. Values of statistical parameters obtained when analyzing the % PER during the Test by mean of a GLM.

	Estimate	Std. Error	*Z* value	*P* value
P2-P1	0.002	0.288	0.008	0.996
P3-P1	-0.402	0.274	-1.468	0.682
P4-P1	-0.038	0.258	-0.148	0.992
P5-P1	-0.550	0.290	-1.897	0.400
P6-P1	-0.563	0.297	-1.895	0.401
P3-P2	-0.404	0.253	-1.597	0.597
P4-P2	-0.040	0.235	-0.171	0.991
P5-P2	-0.552	0.271	-2.037	0.318
P6-P2	-0.565	0.279	-2.025	0.324
P4-P3	0.364	0.212	1.713	0.519
P5-P3	-0.148	0.255	-0.580	0.992
P6-P3	-0.161	0.264	-0.609	0.990
P5-P4	-0.512	0.239	-2.138	0.264
P6-P4	-0.525	0.249	-2.102	0.283
P6-P5	-0.012	0.280	-0.045	0.995

Table S4- Proportion of PER success for the perception matrix. With parentheses the total n values for each combination

		Test pollens					
		P1	P2	P3	P4	P5	P6
Conditioned pollens	P1	0.66 (n=21)	0.47 (n=21)	0.57 (n=21)	0.42 (n=21)	0.29 (n=17)	0.29 (n=17)
	P2	0.73 (n=19)	0.52 (n=19)	0.42 (n=19)	0.42 (n=19)	0.40 (n=25)	0.52 (n=25)
	P3	0.5 (n=28)	0.46 (n=28)	0.64 (n=37)	0.42 (n=28)	0.21 (n=19)	0.21 (n=19)
	P4	0.67 (n=37)	0.40 (n=40)	0.43 (n=39)	0.69 (n=39)	0.38 (n=26)	0.38 (n=29)
	P5	0.37 (n=16)	0.43 (n=16)	0.47 (n=19)	0.12 (n=16)	0.63 (n=22)	0.48 (n=23)
	P6	0.33 (n=18)	0.33 (n=18)	0.36 (n=19)	0.31 (n=19)	0.38 (n=21)	0.52 (n=25)

Table S5. Matrix of simplification listing the 56 scenarios of renamed pollen identity. The first scenario (sc1) represents the original affiliation of the pollen identity (i.e. the six pollen types are differentiated), and the other scenarios are simplified. The simplification means a restriction of the number of pollen identities (i.e. <6). The scenarios from sc2 to sc16 include five renamed pollen identities (A, B, C, D and E) with all the combination of identity allocation. The scenarios from sc17 to sc35 include four renamed pollen identities (A, B, C and D) with all the combination of identity allocation. The scenarios from sc36 to sc49 include three renamed pollen identities (A, B and C) with all the combination of identity allocation. The scenarios from sc50 to sc56 include two renamed pollen identities (A and B) with all the combination of identity allocation.

Scenario	***P1***	***P2***	***P3***	***P4***	***P5***	***P6***
sc1	A	B	C	D	E	F
sc2	A	A	B	C	D	E
sc3	A	B	A	C	D	E
sc4	A	B	C	A	D	E
sc5	A	B	C	D	A	E
sc6	A	B	C	D	E	A
sc7	A	B	B	C	D	E
sc8	A	B	C	B	D	E
sc9	A	B	C	D	B	E
sc10	A	B	C	D	E	B
sc11	A	B	C	C	D	E
sc12	A	B	C	D	C	E
sc13	A	B	C	D	E	C
sc14	A	B	C	D	D	E
sc15	A	B	C	D	E	D
sc16	A	B	C	D	E	E
sc17	A	A	A	B	C	D
sc18	A	A	B	A	C	D
sc19	A	A	B	C	A	D
sc20	A	A	B	C	D	A
sc21	A	B	A	A	C	D
sc22	A	B	A	C	A	D

sc23	A	B	A	C	D	A
sc24	A	B	C	A	A	D
sc25	A	B	C	D	A	A
sc26	A	B	B	B	C	D
sc27	A	B	B	C	B	D
sc28	A	B	B	C	D	B
sc29	A	B	C	B	B	D
sc30	A	B	C	B	D	B
sc31	A	B	C	D	B	B
sc32	A	B	C	C	C	D
sc33	A	B	C	C	D	C
sc34	A	B	C	D	C	C
sc35	A	B	C	D	D	D
sc36	A	A	A	A	B	C
sc37	A	A	A	B	A	C
sc38	A	A	A	B	B	A
sc39	A	B	A	A	A	C
sc40	A	B	A	C	A	A
sc41	A	B	C	A	A	A
sc42	A	A	B	C	A	A
sc43	A	A	B	A	C	A
sc44	A	A	B	A	A	C
sc45	A	B	B	B	B	C
sc46	A	B	B	B	C	B
sc47	A	B	B	C	B	B
sc48	A	B	C	B	B	B
sc49	A	B	C	C	C	C
sc50	A	A	A	A	A	B
sc51	A	A	A	A	B	A
sc52	A	A	A	B	A	A
sc53	A	A	B	A	A	A
sc54	A	B	A	A	A	A
sc55	A	B	B	B	B	B
sc56	A	A	A	A	A	A

Table S6. List of models developed for determine the generalization between pollen types. The Akaike Information Criterion (AIC) was used for ranking the binomial generalized linear models. The best model (Δ AIC < 2) is presented in blue while the null model is presented in red. Across the 56 concurrent models, five models was retained in the top-model set with a Δ AIC < 10 (in bold). Letters (A-F) indicate the sequence of combinations. *i* = for model *I*; Δ*i* (AIC) = [AIC*i* – min(AIC)]

Model rank *i*	**Pollen identity replacement**						**Intercept *i***	**Estimate *i***	**Std. Error *i***	**Z score *i***	**P value *i***	**AIC *i***	**Δ*i* (AIC)**
	P1	*P2*	*P3*	*P4*	*P5*	*P6*							
1	**A**	**B**	**C**	**A**	**D**	**E**	**-0.665**	**0.858**	**0.163**	**5.273**	**1.34e-07**	**1133.162**	**0**
2	**A**	**A**	**B**	**A**	**C**	**D**	**-0.705**	**0.701**	**0.149**	**4.719**	**2.37e-06**	**1138.885**	**5.723**
3	**A**	**B**	**A**	**A**	**C**	**D**	**-0.709**	**0.683**	**0.146**	**4.664**	**3.09e-06**	**1139.469**	**6.307**
4	**A**	**A**	**B**	**C**	**D**	**E**	**-0.605**	**0.746**	**0.169**	**4.423**	**9.75e-06**	**1141.731**	**8.569**
5	**A**	**B**	**A**	**C**	**D**	**E**	**-0.606**	**0.718**	**0.165**	**4.34**	**1.42e-05**	**1142.505**	**9.343**
6	A	A	A	B	C	D	-0.642	0.644	0.152	4.246	2.18e-05	1143.338	10.176
7	A	A	A	A	B	C	-0.779	0.611	0.149	4.102	4.09e-05	1144.305	11.143
8	A	B	C	D	E	F	-0.567	0.688	0.179	3.834	0.00012	1146.71	13.548
9	A	A	B	A	C	A	-0.727	0.549	0.144	3.81	0.00014	1146.799	13.637
10	A	B	C	D	E	B	-0.575	0.602	0.166	3.631	0.00028	1148.308	15.146
11	A	A	B	C	D	A	-0.597	0.543	0.153	3.557	0.00038	1148.857	15.695
12	A	B	C	A	A	D	-0.624	0.517	0.148	3.492	0.00048	1149.292	16.13
13	A	A	B	C	A	D	-0.596	0.528	0.152	3.474	0.00051	1149.438	16.276
14	A	B	C	D	A	E	-0.56	0.552	0.167	3.299	0.00100	1150.625	17.463
15	A	B	C	D	B	E	-0.56	0.537	0.165	3.25	0.00115	1150.961	17.799
16	A	B	A	C	A	D	-0.592	0.487	0.151	3.223	0.00127	1151.108	17.946
17	A	B	C	D	E	D	-0.575	0.518	0.164	3.154	0.00161	1151.538	18.376
18	A	A	A	B	A	C	-0.629	0.434	0.143	3.028	0.00246	1152.31	19.148
19	A	B	C	D	C	E	-0.557	0.504	0.166	3.028	0.00246	1152.343	19.181
20	A	B	C	D	E	A	-0.547	0.505	0.168	3.01	0.00261	1152.471	19.309
21	A	B	C	D	E	E	-0.552	0.49	0.163	3.01	0.00261	1152.478	19.316
22	A	A	B	A	A	C	-0.657	0.427	0.143	2.983	0.00286	1152.568	19.406
23	A	B	B	C	D	E	-0.55	0.49	0.164	2.994	0.00275	1152.57	19.408
24	A	A	A	A	B	A	-0.82	0.508	0.173	2.938	0.00330	1152.626	19.464
25	A	B	A	A	A	C	-0.654	0.401	0.144	2.788	0.00530	1153.692	20.53
26	A	B	C	D	E	C	-0.544	0.452	0.166	2.717	0.00658	1154.141	20.979
27	A	B	B	B	B	B	-0.083	-0.448	0.166	-2.707	0.00679	1154.236	21.074
28	A	B	A	C	D	A	-0.563	0.404	0.151	2.673	0.00753	1154.384	21.222
29	A	B	C	D	B	B	-0.557	0.379	0.149	2.538	0.01116	1155.103	21.941
30	A	B	C	B	D	E	-0.542	0.398	0.159	2.511	0.01204	1155.232	22.07

31	A	B	C	C	D	E	-0.542	0.391	0.157	2.49	0.01276	1155.34	22.178
32	A	A	B	C	A	A	-0.579	0.341	0.144	2.375	0.01756	1155.889	22.727
33	A	A	A	A	A	B	-0.728	0.391	0.171	2.289	0.02210	1156.19	23.028
34	A	B	C	D	D	E	-0.529	0.372	0.164	2.275	0.02290	1156.368	23.206
35	A	B	C	A	A	A	-0.589	0.299	0.143	2.091	0.03657	1157.144	23.982
36	A	B	C	B	D	B	-0.55	0.3	0.147	2.044	0.04100	1157.352	24.19
37	A	B	B	C	D	B	-0.533	0.302	0.15	2.018	0.04357	1157.465	24.303
38	A	B	C	D	A	A	-0.525	0.3	0.151	1.978	0.04791	1157.629	24.467
39	A	A	B	A	A	A	-0.659	0.314	0.16	1.964	0.04959	1157.631	24.469
40	A	B	B	C	B	D	-0.53	0.292	0.149	1.956	0.05050	1157.714	24.552
41	A	A	A	B	B	A	-0.557	0.246	0.142	1.726	0.08431	1158.549	25.387
42	A	B	C	D	C	C	-0.51	0.224	0.15	1.491	0.13606	1159.312	26.15
43	A	A	A	B	A	A	-0.57	0.221	0.151	1.463	0.14355	1159.383	26.221
44	A	A	A	A	A	A	-0.52	0.193	0.143	1.352	0.17628	1159.533	26.371
45	A	B	A	C	A	A	-0.504	0.187	0.148	1.261	0.20713	1159.703	26.541
46	A	B	C	D	D	D	-0.505	0.18	0.147	1.228	0.21958	1159.94	26.778
47	A	B	C	C	D	C	-0.489	0.141	0.144	0.981	0.32645	1160.025	26.863
48	A	B	B	B	C	D	-0.482	0.133	0.146	0.911	0.36252	1160.568	27.406
49	A	B	C	B	B	D	-0.54	0.144	0.163	0.883	0.37713	1160.705	27.543
50	A	B	A	A	A	A	-0.362	-0.124	0.143	-0.867	0.38586	1160.749	27.587
51	A	B	B	B	B	C	-0.364	-0.117	0.143	-0.82	0.41209	1160.782	27.62
52	A	B	C	C	C	C	-0.481	0.104	0.142	0.732	0.46390	1160.861	27.699
53	A	B	B	C	B	B	-0.472	0.103	0.146	0.707	0.47969	1160.995	27.833
54	A	B	C	C	C	D	-0.445	0.026	0.142	0.18	0.85691	1161.034	27.872
55	A	B	C	B	B	B	-0.429	-0.005	0.143	-0.033	0.97376	1161.5	28.338
56	A	B	B	B	C	B	-0.413	-0.007	0.144	0.007	0.98650	1161.532	28.37

Table S7- Values of statistical parameters obtained when analyzing the total % PER for each pollen type (assuming P1=P4) by mean of a GLM. These results are represented in Figure 5a.

	Estimate	Std. Error	*Z* value	*P* value
P2-(P1=P4)	0.029	0.223	0.131	0.997
P3-(P1=P4)	-0.037	0.200	-1.871	0.327
P5-(P1=P4)	-0.523	0.226	-2.308	0.139
P6-(P1=P4)	-0.536	0.237	-2.265	0.153
P3-P2	-0.403	0.253	-1.594	0.495
P5-P2	-0.552	0.271	-2.038	0.243
P6-P2	-0.565	0.279	-2.027	0.248
P5-P3	-0.149	0.255	-0.583	0.977
P6-P3	-0.162	0.264	-0.613	0.972
P6-P5	-0.013	0.280	-0.046	0.995