APPENDIX A

TABLE A1. Restoration sites in Coto Brus Canton, Costa Rica. Forest cover was calculated for each plot and is shown here as the range of values within a site (N = 3 plots per site, 30 plots total).

Site	Year planted	Elevation (m.a.s.l.)	Forest area within 100 m (%)	Forest area within 500 m (%)	Reference forest
BB	2004	1290	1-14	19-23	no
EC	2006	1180	54-61	38-47	no
GN	2005	1170	23-49	32-37	no
HB	2005	1120	20-51	24-27	no
JG	2005	1180	33-50	56-62	yes
LL	2004	1160	28-36	45-51	yes
MM	2004	1100	52-66	67-89	yes
OM	2005	1120	3-9	18-19	yes
RS	2004	1190	29-44	36-40	yes
SG	2004	1110	0-4	9-12	no

TABLE A2. Restoration treatment effects on seed abundance (seeds m^{-2} y^{-1}). Means and standard errors are reported. Superscript letters denote significant differences in post-hoc tests (Tukey's HSD, $\alpha = 0.05$). *P* values are Bonferroni-adjusted for family-wise error. Significant results are highlighted in bold. Abundance is reported for all subsets that included more than 50 observations. Abundance was log-transformed in all cases to meet model assumptions.

Variable	Control	Island	Plantation	Reference	ANOVA $F_{3,22}$	*P*
Trees						
Small animal-dispersed	378.3 ± 230.7	196.4 ± 119.3	264.0 ± 219.9	880.7 ± 732.6	1.9	0.765
Large animal-dispersed	**0.2 ± 0.1^{a}**	**4.6 ± 2.9^{b}**	**5.8 ± 3.0^{b}**	**27.7 ± 9.7^{c}**	**19.1**	**<0.001**
Small wind-dispersed	380.0 ± 165.2	165.3 ± 48.9	116.8 ± 40.4	161.3 ± 87.9	0.7	1.000
Large wind-dispersed	0.0 ± 0.0	0.9 ± 0.7	0.6 ± 0.4	0.3 ± 0.2	1.3	1.000
All tree seeds	758.4 ± 234.9	367.3 ± 123.5	387.2 ± 215.6	1070.0 ± 745.8	1.9	0.834
Shrubs						
Small animal-dispersed	785.0 ± 455.3	261.0 ± 153.8	49.0 ± 12.0	15.9 ± 3.5	3.4	0.137
Large animal-dispersed	1.2 ± 0.6	7.4 ± 4.7	1.0 ± 0.7	4.1 ± 2.4	1.5	0.993
Small wind-dispersed	**138.5 ± 44.4^{a}**	**127.0 ± 44.7^{ab}**	**37.9 ± 13.5^{bc}**	**16.3 ± 12.2^{c}**	**6.1**	**0.014**
All shrub seeds	**924.6 ± 497.8^{a}**	**395.5 ± 168.6^{a}**	**87.9 ± 19.3^{ab}**	**36.3 ± 11.7^{b}**	**4.7**	**0.046**
Other life forms						
Epiphytes	**0.2 ± 0.1^{a}**	**0.2 ± 0.1^{a}**	**0.0 ± 0.0^{a}**	**3.2 ± 1.2^{b}**	**12.3**	**<0.001**
Herbs	1.7 ± 0.6	2.2 ± 0.9	0.6 ± 0.3	8.3 ± 7.8	0.5	1.000
Lianas	**0.1 ± 0.1^{a}**	**0.3 ± 0.2^{a}**	**1.7 ± 1.3^{a}**	**5.9 ± 2.8^{b}**	**9.2**	**0.002**
Vines	11.7 ± 6.9	19.6 ± 6.1	14.4 ± 5.2	11.9 ± 3.0	0.6	1.000
All seeds	1700.3 ± 496.4	786.5 ± 180.7	493.2 ± 207.5	1160.9 ± 738.6	4.3	0.076

TABLE A3. Candidate models used in GLMM analysis. All models included a random site effect (intercept varying).

Name	df	Fixed effects
Null	3	[Intercept]
F_{100}	4	Forest area within 100 m [%]
F_{500}	4	Forest area within 500 m [%]
Trt	5	Restoration treatment [factor: control, island, plantation]
Trt + F_{100}	6	Restoration treatment [factor] + Forest area within 100 m [%]
Trt + F_{500}	6	Restoration treatment [factor] + Forest area within 500 m [%]
Trt × F_{100}	8	Restoration treatment [factor] × Forest area within 100 m [%]
Trt × F_{500}	8	Restoration treatment [factor] × Forest area within 500 m [%]

TABLE A4. GLMM model comparisons for (A) seed community structure and composition and (B) seed abundance. ΔAICc values are shown. Models correspond to Table A3. ΔAICc values < 2 are in bold. Seed community structure and composition models (A) used Gaussian error distribution. Seed abundance models (B) used negative binomial error distribution.

(A) Model comparisons (ΔAICc) for seed community structure and composition

Response variable	Null	F_{100}	F_{500}	Trt	Trt + F_{100}	Trt + F_{500}	Trt × F_{100}	Trt × F_{500}
All species								
Rarified species richness [S] (N = 304)	11.20	18.45	17.07	**0.00**	7.90	6.76	21.62	19.71
True diversity [exp(H')][1]	**0.00**	10.02	7.06	2.77	10.02	10.89	34.84	31.01
Evenness [J]	**0.00**	12.20	8.85	7.94	20.86	17.91	46.60	42.47
Similarity to reference [Chao-Jaccard][2]	**0.00**	9.93	8.72	4.38	14.75	13.82	32.13	28.92
Similarity to reference [Sørensen]	**0.00**	14.85	13.65	15.62	30.99	30.06	57.60	58.93
Trees								
Rarified species richness [S] (N = 18)	8.18	17.06	17.05	**0.00**	9.42	9.81	28.20	27.74
True diversity [exp(H')][1]	2.68	13.63	13.44	**0.00**	11.53	11.74	33.45	33.26
Evenness [J]	**0.00**	12.62	11.84	6.15	19.29	18.91	43.96	43.07
Similarity to reference [Chao-Jaccard] [2]	**0.00**	10.01	9.73	4.05	14.35	14.19	31.78	30.44
Similarity to reference [Sørensen]	**0.00**	13.25	13.63	13.72	27.18	28.02	54.77	55.65
Shrubs								
Rarified species richness [S] (N = 25)	**0.00**	7.55	4.72	4.23	12.53	9.81	30.82	27.95
True diversity [exp(H')]	**0.00**	6.54	3.89	4.09	11.25	8.81	29.20	26.29
Evenness [J]	**0.00**	12.39	11.80	11.01	24.20	23.54	50.33	47.17
Similarity to reference [Chao-Jaccard] [2]	**0.00**	10.10	7.34	1.63	12.07	9.90	29.88	25.86
Similarity to reference [Sørensen]	**0.00**	13.93	9.62	13.14	27.99	23.75	57.40	50.96

[1] Variable was log-transformed.
[2] Variable was rank-transformed.

(B) Model comparisons (ΔAICc) for seed abundance

Response variable	Null	F_{100}	F_{500}	Trt	Trt + F_{100}	Trt + F_{500}	Trt × F_{100}	Trt × F_{500}
Trees								
Small animal-dispersed	**0.61**	**0.63**	**0.00**	4.15	4.71	3.37	11.69	9.07
Large animal-dispersed	14.89	17.38	17.55	**0.00**	3.15	3.14	6.93	7.66
Small wind-dispersed	**0.70**	2.14	**0.00**	2.52	4.05	3.04	9.65	8.39
Large wind-dispersed	**0.00**	2.38	2.63	**1.95**	5.08	3.27	10.41	9.24
Planted tree species	5.39	7.74	7.95	**0.00**	**1.79**	2.23	3.73	7.20
All tree seeds	**0.08**	2.63	2.70	**0.00**	3.03	3.03	9.89	9.25
Shrubs								
Small animal-dispersed	**0.98**	2.61	2.91	**0.00**	2.58	2.89	7.81	2.88
Large animal-dispersed	2.10	**0.00**	4.73	5.34	3.67	8.43	8.65	15.41
Small wind-dispersed	**1.79**	4.45	4.20	**0.00**	2.98	3.15	6.38	**1.90**
All shrub seeds	4.57	6.81	6.37	**0.00**	2.92	2.87	7.40	2.68
Other life forms								
Epiphytes	**0.00**	2.18	2.60	3.31	6.31	6.23	436.02	431.30
Herbs	**0.00**	2.67	2.55	2.89	5.97	5.92	11.89	11.82
Lianas	7.76	7.54	10.37	6.83	7.19	9.85	**0.00**	14.82
Vines	**0.00**	**1.86**	**1.02**	4.78	7.01	6.32	5.47	6.67
All seeds	7.29	9.09	9.76	**0.00**	2.48	3.01	9.16	8.97

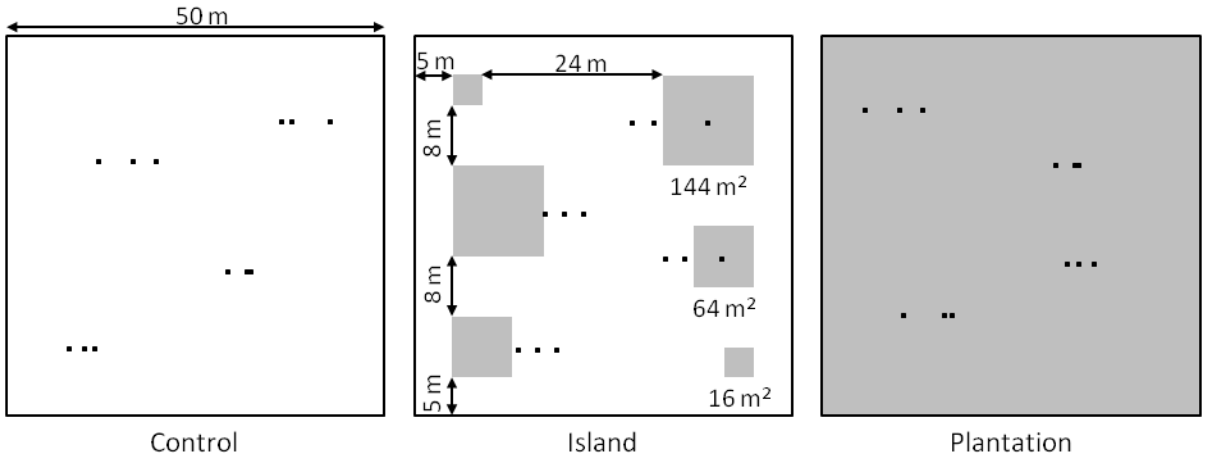

FIG. A1. Experimental design. Planted areas are shaded gray, although tree island sizes had expanded differentially at the sites by the time of seed rain sampling. Black dots represent seed trap locations at one of the ten sites.

FIG. A2. Seed traps in a restoration site at Las Cruces Biological Station, Costa Rica. Traps were 0.25 m^2 with a frame made from soldered rebar and a sheet of cut and sewn fiberglass window screening connected to the frame with plastic zip ties. The aperture of the fiberglass window screening was 0.69 mm. Pocket depth was 30 cm. The rim was 55 cm above the ground. Photo Credit: J. Leighton Reid.

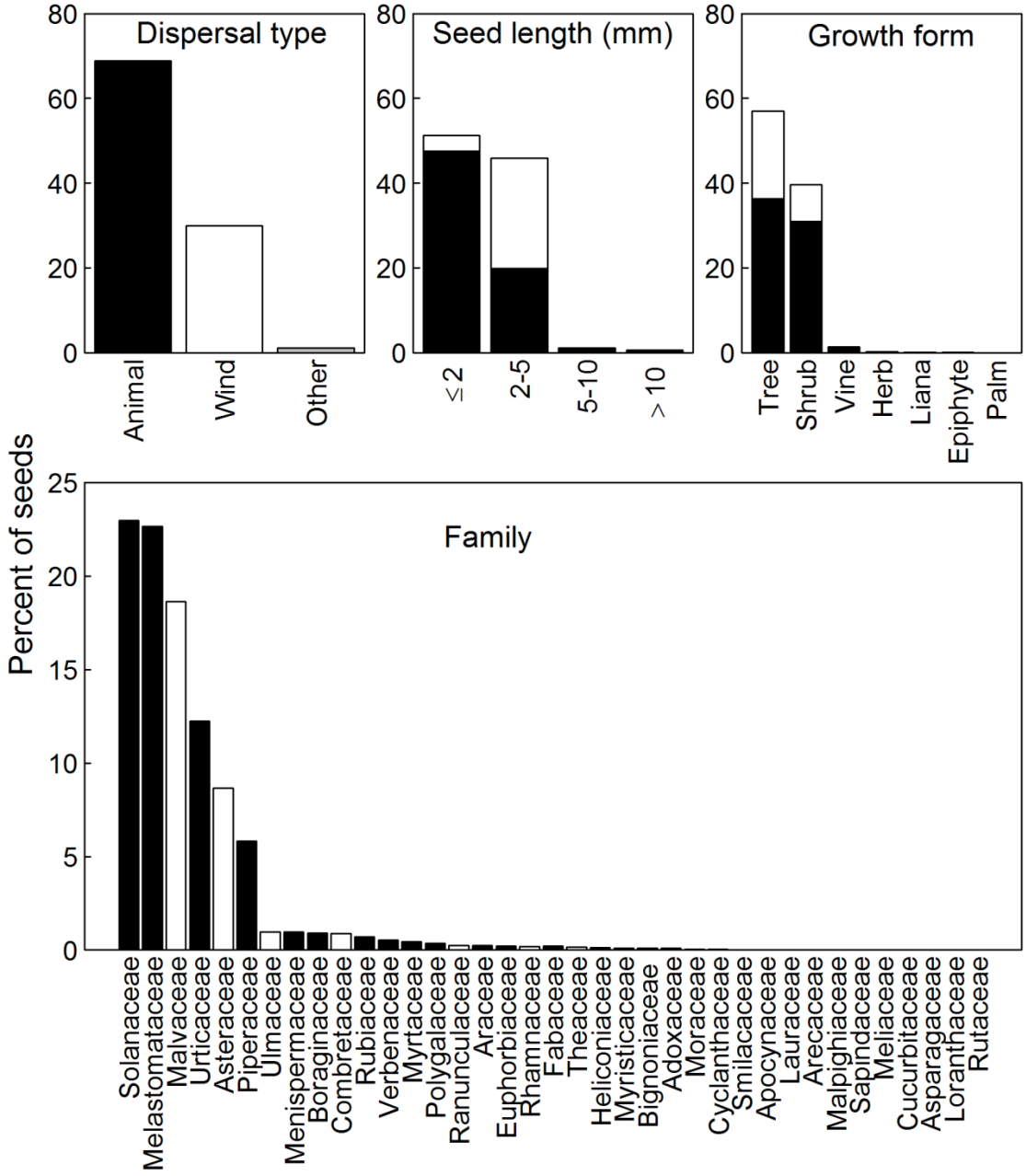

FIG. A3. Distribution of seed abundance by dispersal type, seed length, growth form, and family. Colors denote dispersal type: animal-dispersed [black], wind-dispersed [white], or other [gray]. Note that two common families, Poaceae and Asteraceae, are under-represented because some or all species were excluded from analysis.

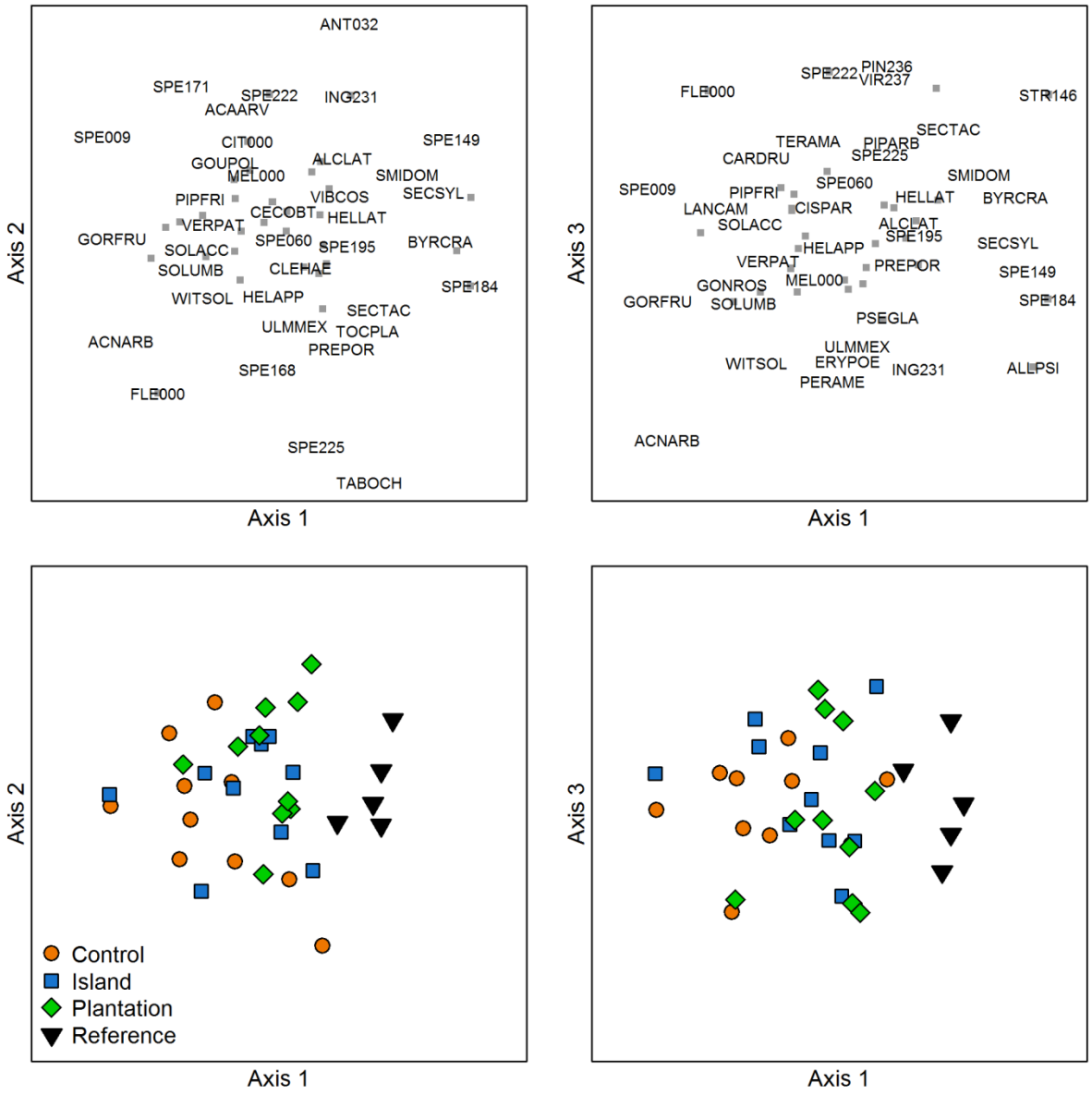

FIG. A4. Detail of three-dimensional non-metric scaling fit based on Chao-Jaccard dissimilarity (stress = 0.19). Upper panels: Six-letter codes refer to first three letters of genus and species (Appendix B). Gray squares represent taxa where names overlapped; seed abundance dictates priority. Lower plots: Treatment types are denoted by colored symbols.

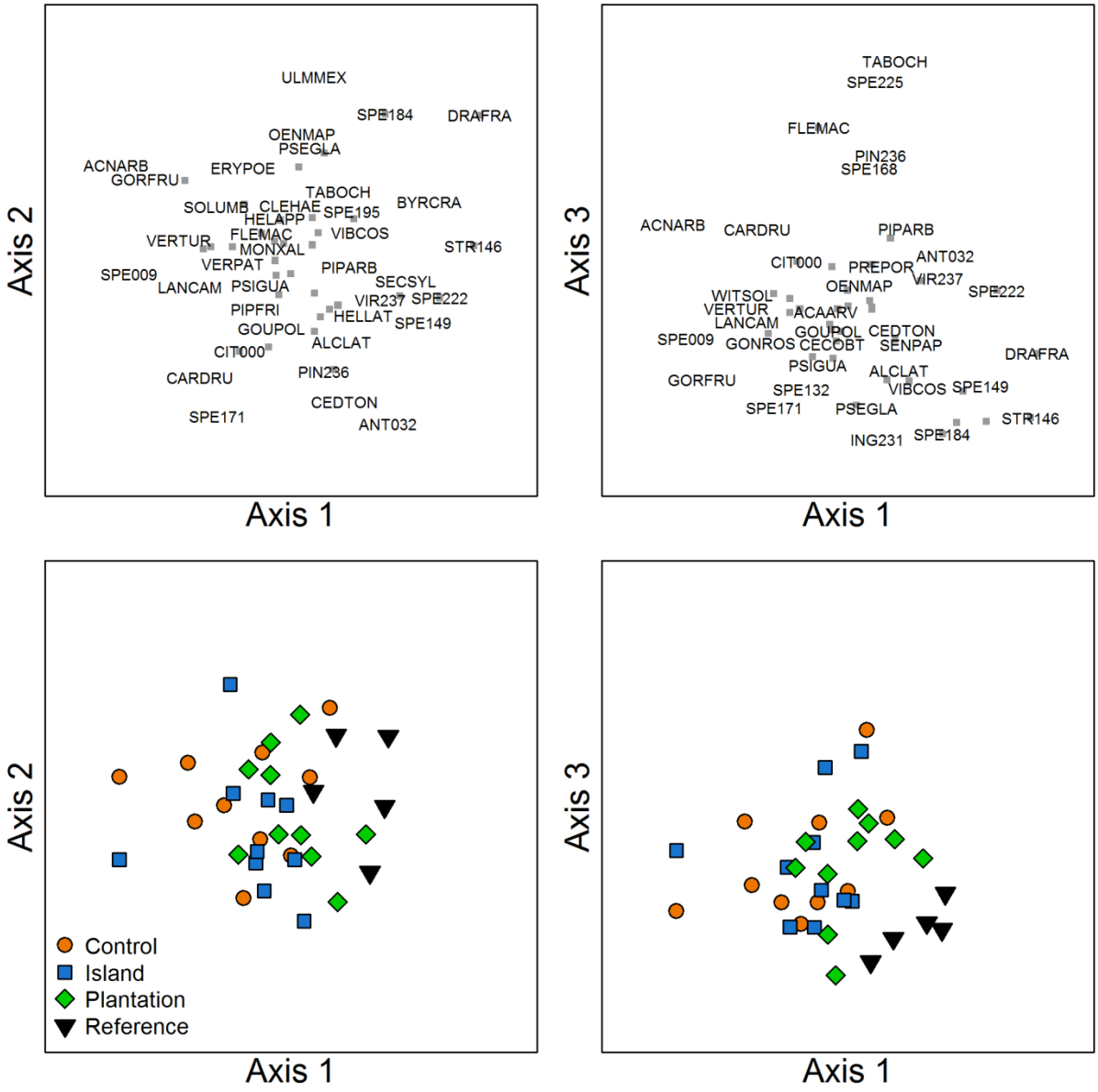

FIG. A5. Detail of three-dimensional non-metric scaling fit based on Sørenson dissimilarity (stress = 0.17). Upper panels: Six-letter codes refer to first three letters of genus and species (Appendix B). Gray squares represent taxa where names overlapped; seed abundance dictates priority. Lower plots: Treatment types are denoted by colored symbols.