

## APPENDICES

**Appendix 1.** Summary statistics and variance partitioning analysis (among regions and seed destinations) for soil variables obtained from 76 sowing points. Statistical significance for the variation of each variable among regions and seed destinations are also given. Significant differences ( $P > 0.05$ ) are bold-typed. Variance partitioning were performed through a hierarchical design (ant nest was nested within region). The model was fitted with Restricted Maximum Likelihood to take into account the unbalanced nature of this design.

Soil parameter	Range	CV (%)	Explained Variance (%)					
			Among regions	Between destinations	Difference among regions		Difference between destinations	
					F	<i>P</i>	F	<i>P</i>
<i>Soil texture</i>								
Clay (%)	12.10-48.70	36.75	62.12	7.88	14.28	<b>0.019</b>	1.92	0.141
Sand (%)	2.40-22.0	48.03	20.18	0.14	3.814	0.111	0.96	0.418
Gravel (%)	4.50-65.80	63.85	81.58	11.82	63.28	<b>&lt;0.0001</b>	0.19	0.902
Silt (%)	14.70-62.50	30.55	81.50	10.20	58.41	<b>&lt;0.0001</b>	0.09	0.963

*Soil chemistry*

CaCO <sub>3</sub> (%)	<0.50-46.0	149.01	82.28	0.12	56.46	<b>&lt;0.0001</b>	0.02	0.996
Organic Carbon (%)	0.88-14.40	51.56	1.16	43.90	0.568	0.615	5.28	<b>0.004</b>
pH	5.10-8.30	13.77	38.62	22.80	20.68	<b>0.014</b>	3.38	<b>0.026</b>
P (mg/kg)	<1.0-85.70	115.71	17.55	7.31	3.47	0.148	1.59	0.204
Organic matter (%)	1.53-24.80	51.56	25.83	43.45	1.17	0.434	5.24	<b>0.0043</b>
N (%)	0.07-1.224	59.32	30.71	18.55	2.64	0.206	2.17	0.109
Organic N (%)	0.085-1.225	50.34	1.15	43.93	0.57	0.614	5.28	<b>0.0041</b>
K (mg/kg)	41.0-663.0	62.16	81.17	1.25	34.97	<b>0.0012</b>	0.39	0.758
C/N	10.40-11.70	2.36	1.02	44.7	0.164	0.855	5.38	<b>0.0037</b>

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**Appendix 2.** Principal components analysis conducted on soil parameters for 76 seed sowing points in three different regions and two potential seed destinations for *H. foetidus* seeds. Values highlighted in bold type are those parameters that weight in a significant proportion (> 0.6) on each factor.

Soil parameter	Correlation to principal factors (PC)	
	PC1	PC2
Clay	-0.316	<b>0.661</b>
Sand	0.039	0.505
Gravel	-0.013	<b>-0.964</b>
Silt	0.261	<b>0.782</b>
CaCO <sub>3</sub>	-0.544	0.298
Organic C	<b>0.977</b>	-0.017
pH	-0.487	<b>0.686</b>
P	0.553	-0.593
N	<b>0.920</b>	-0.077
K	0.057	-0.489
C/N	<b>0.802</b>	0.047
Organic N	<b>0.977</b>	-0.017
Organic matter	<b>0.977</b>	-0.018
Fraction of Variance (%)	41.31	26.12

**Appendix 3.** Principal components analysis conducted on soil parameters for 23 ant nests of 5 different ant species in the southern region of Cazorla. Values highlighted in bold type are those parameters that weighted in a significant proportion (> 0.6) on each factor.

Soil parameter	Correlation to principal factors (PC)	
	PC1	PC2
Clay	-0.133	<b>0.781</b>
Sand	0.023	0.032
Gravel	-0.049	<b>-0.956</b>
Silt	0.178	<b>0.844</b>
CaCO <sub>3</sub>	<b>-0.780</b>	-0.116
Organic C	<b>0.971</b>	0.057
pH	<b>-0.733</b>	0.139
P	0.519	-0.026
N	<b>0.971</b>	0.060
K	<b>0.859</b>	-0.299
C/N	<b>0.970</b>	0.058
Organic N	<b>0.705</b>	0.311
Organic matter	<b>0.884</b>	0.096
Fraction of Variance (%)	63.14	24.78

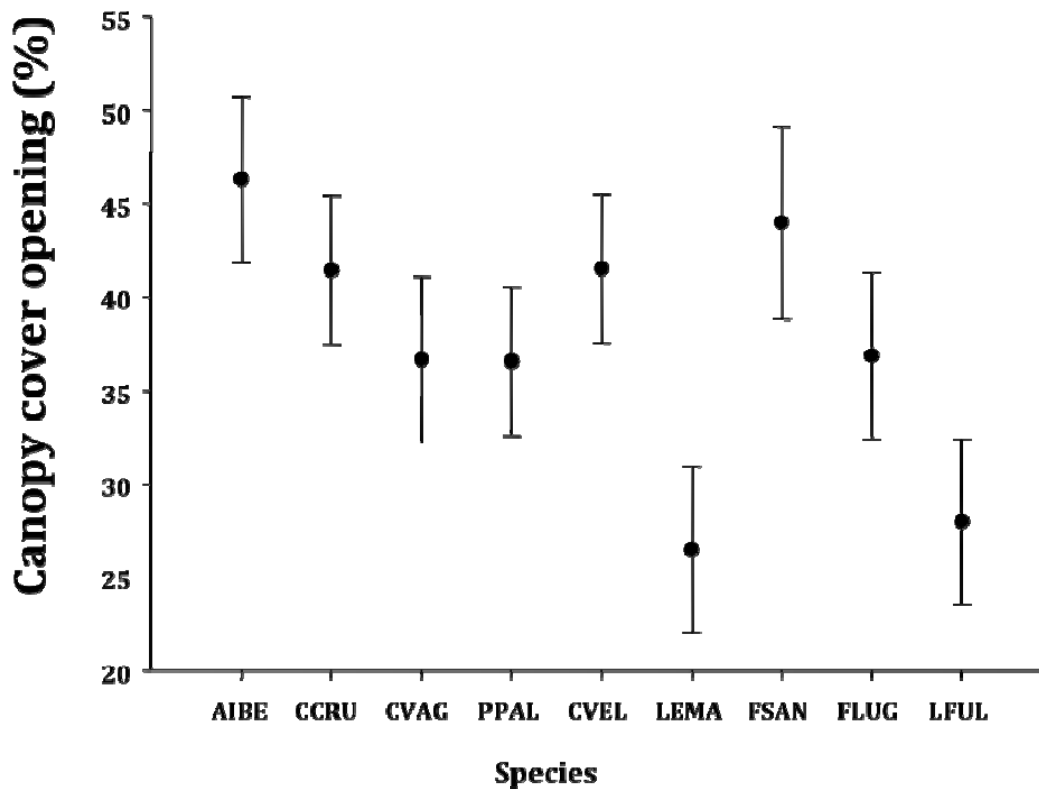
**Appendix 4 .** Average observed ( $\pm 1$  S.D.) values of soil parameters for 23 nests of 5 different ant species in the region of Cazorla. Underlined values are the highest value observed. Statistic and its significance come from univariate tests (ANOVA) conducted for each soil parameter separately. Significant differences ( $P > 0.05$ ) are bold-typed.

Soil Parameters	Ant species					F	p
	<i>A. iberica</i>	<i>C. cruentatus</i>	<i>P. pallidula</i>	<i>C. velox</i>	<i>C. vagus</i>		
<b>Soil texture</b>							
Clay (%)	<u>35.0 <math>\pm</math> 12.51</u>	32.94 $\pm$ 5.87	32.5 $\pm$ 4.82	32.74 $\pm$ 1.06	27.2 $\pm$ 7.12	0.71	0.593
Sand (%)	11.55 $\pm$ 6.13	10.9 $\pm$ 6.48	<u>12.16 <math>\pm</math> 4.63</u>	8.04 $\pm$ 4.00	9.8 $\pm$ 4.99	0.45	0.767
Gravel (%)	16.7 $\pm$ 13.53	19.4 $\pm$ 8.49	18.06 $\pm$ 5.41	17.14 $\pm$ 7.02	<u>26.45 <math>\pm</math> 26.14</u>	0.36	0.827
Silt (%)	36.72 $\pm$ 9.13	36.78 $\pm$ 8.14	37.2 $\pm$ 1.75	<u>42.04 <math>\pm</math> 3.56</u>	36.55 $\pm$ 14.84	0.38	0.813
<b>Soil chemistry</b>							
CaCO <sub>3</sub> (%)	14.25 $\pm$ 15.97	24.56 $\pm$ 22.5	18.38 $\pm$ 20.1	<u>27.76 <math>\pm</math> 18.1</u>	0.175 $\pm$ 0.05	1.68	0.196
Organic Carbon (%)	3.98 $\pm$ 1.98	3.02 $\pm$ 1.78	3.76 $\pm$ 1.18	2.49 $\pm$ 1.0	<u>6.22 <math>\pm</math> 1.10</u>	4.24	<b>0.013</b>
pH	7.88 $\pm$ 0.35	7.99 $\pm$ 0.34	7.90 $\pm$ 0.14	<u>8.11 <math>\pm</math> 0.21</u>	7.48 $\pm$ 0.44	2.58	0.072
P (mg/kg)	3.72 $\pm$ 2.73	4.02 $\pm$ 3.39	9.88 $\pm$ 7.83	5.36 $\pm$ 4.65	<u>20.0 <math>\pm</math> 18.93</u>	2.38	0.091
Organic matter (%)	6.87 $\pm$ 3.42	5.21 $\pm$ 3.08	6.49 $\pm$ 2.03	4.30 $\pm$ 1.72	<u>10.72 <math>\pm</math> 19.91</u>	4.23	<b>0.013</b>

N (%)	$0.28 \pm 0.13$	$0.27 \pm 0.15$	$0.27 \pm 0.10$	$0.21 \pm 0.08$	<u><math>0.48 \pm 0.22</math></u>	2.59	0.071
Organic N (%)	$0.37 \pm 0.17$	$0.26 \pm 0.15$	$0.33 \pm 0.09$	$0.22 \pm 0.08$	<u><math>0.53 \pm 0.09</math></u>	4.23	<b>0.013</b>
K (mg/kg)	$226.25 \pm 147.7$	$185.8 \pm 31.79$	$220.2 \pm 34.5$	$156.2 \pm 48.9$	<u><math>283.0 \pm 170.8</math></u>	1.06	0.402
C/N	$11.37 \pm 0.33$	$11.24 \pm 0.38$	$11.42 \pm 0.15$	$11.24 \pm 0.26$	<u><math>11.57 \pm 0.05</math></u>	1.26	0.323

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**Appendix 5 .** Variation in the percentage (%) of openness of the canopy cover above nests of 9 ant dispersers of *H. foetidus* in the Iberian Peninsula. (Aibe =*A. iberica*, Ccru = *C. cruentatus*, Cvag = *C. vagus*, Cvel = *C. velox*, Ppal = *P. pallidula*, Lema = *L. emarginatus*, Fsan = *F. sanguinea*, Flug = *F. lugubris*, Lful = *L. fuliginosus*).



**Appendix 6 .** Average observed ( $\pm 1$  S.D.) values of soil parameters for 15 nests of 4 different ant species in the regions of Peña Negra (*F. sanguinea* and *L. emarginatus*) and Caurel (*L. fuliginosus* and *F. lugubris*). Underlined values are the highest value observed. Statistic and its significance come from univariate tests (ANOVA) conducted for each soil parameter separately. Significant differences ( $P > 0.05$ ) are bold-typed.

Soil Parameters	Ant species							
	<i>F. sanguinea</i>	<i>L. emarginatus</i>	F	p	<i>L. fuliginosus</i>	<i>F. lugubris</i>	F	p
<b>Soil texture</b>								
Clay (%)	13.4 $\pm$ 0.62	<u>17.0 <math>\pm</math> 2.24</u>	6.98	<b>0.045</b>	16.1 $\pm$ 1.64	<u>17.1 <math>\pm</math> 1.52</u>	0.69	0.443
Sand (%)	<u>6.6 <math>\pm</math> 1.44</u>	6.07 $\pm$ 1.26	0.26	0.628	<u>9.6 <math>\pm</math> 2.75</u>	9.0 $\pm$ 4.82	0.03	0.856
Gravel (%)	<u>59.53 <math>\pm</math> 5.71</u>	52.32 $\pm$ 4.11	3.83	0.107	15.46 $\pm$ 5.87	<u>35.95 <math>\pm</math> 18.29</u>	3.35	0.126
Silt (%)	20.43 $\pm$ 3.89	<u>24.57 <math>\pm</math> 2.06</u>	3.41	0.124	<u>58.76 <math>\pm</math> 3.31</u>	37.92 $\pm$ 13.6	6.45	<b>0.049</b>
<b>Soil chemistry</b>								
CaCO <sub>3</sub> (%)	<u>0.2 <math>\pm</math> 0.0</u>	0.18 $\pm$ 0.04	0.71	0.436	0.07 $\pm$ 0.05	<u>0.22 <math>\pm</math> 0.12</u>	3.93	0.104
Organic Carbon (%)	3.9 $\pm$ 0.8	<u>4.61 <math>\pm</math> 0.65</u>	1.69	0.249	6.82 $\pm$ 0.93	<u>9.44 <math>\pm</math> 3.67</u>	1.39	0.291
pH	5.16 $\pm$ 0.11	<u>6.26 <math>\pm</math> 0.07</u>	236.4	<b>&lt;0.001</b>	<u>6.2 <math>\pm</math> 0.1</u>	5.84 $\pm$ 0.63	0.92	0.382
P (mg/kg)	12.36 $\pm$ 4.68	<u>39.65 <math>\pm</math> 10.30</u>	17.6	<b>0.009</b>	7.66 $\pm$ 1.90	<u>47.07 <math>\pm</math> 27.96</u>	5.65	0.063



Organic matter (%)	6.73 ± 1.38	<u>7.94 ± 11.12</u>	1.66	0.253	11.77 ± 1.61	<u>16.27 ± 6.34</u>	1.37	0.293
N (%)	0.25 ± 0.06	<u>0.34 ± 0.05</u>	4.88	0.078	0.61 ± 0.09	<u>0.74 ± 0.34</u>	0.38	0.563
Organic N (%)	0.34 ± 0.06	<u>0.39 ± 0.05</u>	1.66	0.253	0.58 ± 0.07	<u>0.81 ± 0.31</u>	1.38	0.292
K (mg/kg)	191.0 ± 63.49	<u>543.5 ± 85.5</u>	35.5	<b>0.002</b>	62.66 ± 19.14	<u>207.5 ± 122.7</u>	3.95	0.103
C/N	11.46 ± 0.05	<u>11.52 ± 0.05</u>	2.10	0.211	11.6 ± 0.0	11.65 ± 0.05	2.10	0.203

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