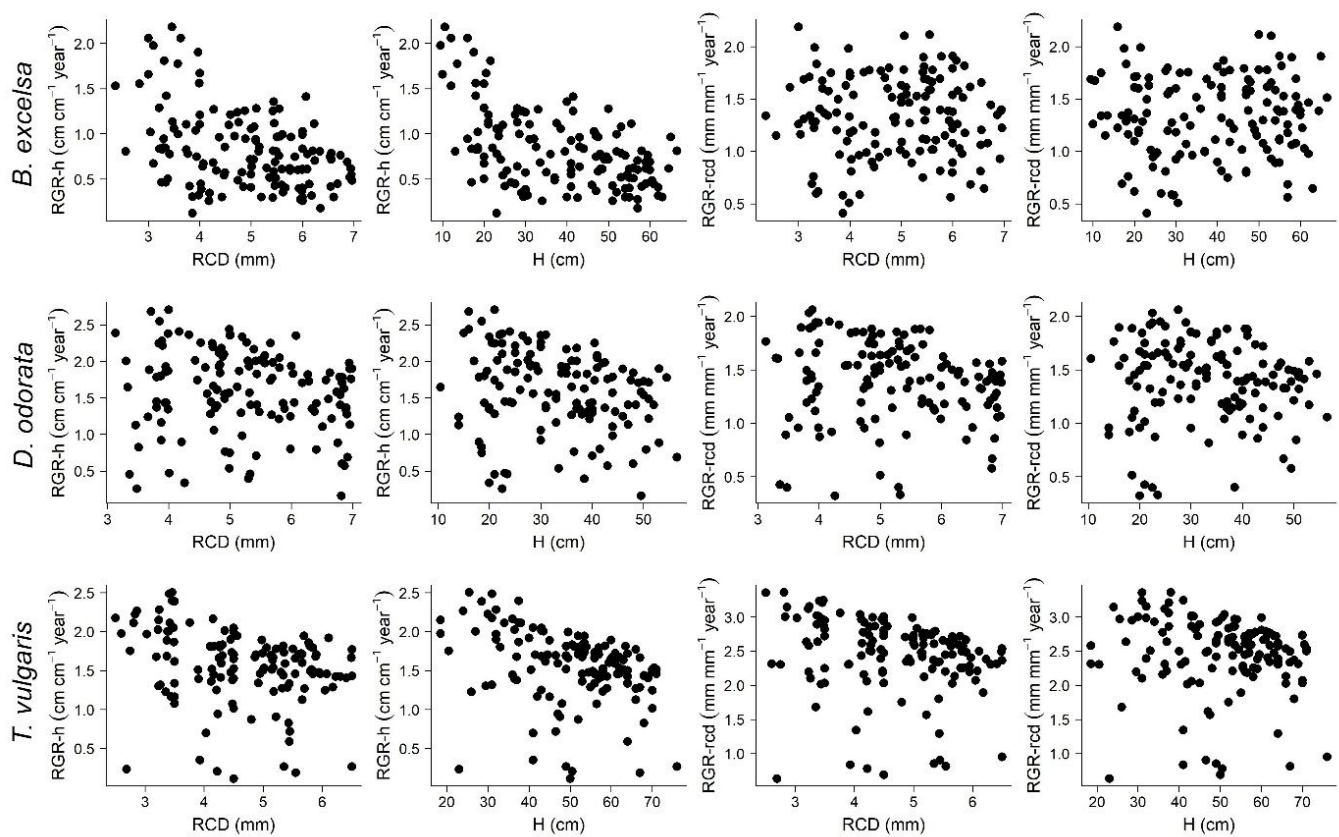


## Supplementary Material

**Tab. S1** - Soil fertility and texture (mean  $\pm$  standard deviation) of site study before soil preparation (n = 3). \*  $P < 0.05$ ; \*\*  $P < 0.01$ ; \*\*\*  $P < 0.001$ ; n.s. (not significant)  $P \geq 0.05$ . Note: No interaction was observed using two-way anova.

Characteristic	Manual preparation		Mechanical preparation		Factors	
	0-20 cm	20-40 cm	0-20 cm	20-40 cm	Site	Depth
pH <sub>H2O</sub>	4.62 $\pm$ 0.12	4.65 $\pm$ 0.08	4.59 $\pm$ 0.26	4.66 $\pm$ 0.01	n.s.	n.s.
pH <sub>KCl</sub>	4.07 $\pm$ 0.02	4.13 $\pm$ 0.03	4.06 $\pm$ 0.06	4.12 $\pm$ 0.01	n.s.	*
C (g kg <sup>-1</sup> )	17.33 $\pm$ 1.97	8.56 $\pm$ 0.20	17.59 $\pm$ 1.17	8.06 $\pm$ 0.61	n.s.	***
SOM (g kg <sup>-1</sup> )	29.88 $\pm$ 3.39	14.75 $\pm$ 0.35	30.33 $\pm$ 2.02	13.90 $\pm$ 1.05	n.s.	***
Ca <sup>2+</sup> (mg kg <sup>-1</sup> )	66.53 $\pm$ 31.33	31.33 $\pm$ 10.57	57.53 $\pm$ 54.66	21.63 $\pm$ 17.76	n.s.	n.s.
Mg <sup>2+</sup> (mg kg <sup>-1</sup> )	14.20 $\pm$ 2.25	8.07 $\pm$ 2.72	16.37 $\pm$ 7.78	8.27 $\pm$ 4.35	n.s.	**
Al <sup>3+</sup> (mg kg <sup>-1</sup> )	105.82 $\pm$ 2.89	89.33 $\pm$ 5.42	113.91 $\pm$ 20.40	90.53 $\pm$ 4.53	n.s.	**
P (mg kg <sup>-1</sup> )	2.57 $\pm$ 0.83	0.68 $\pm$ 0.20	2.53 $\pm$ 0.96	1.68 $\pm$ 1.61	n.s.	n.s.
K (mg kg <sup>-1</sup> )	30.10 $\pm$ 5.20	21.10 $\pm$ 1.00	29.10 $\pm$ 5.29	16.77 $\pm$ 3.79	n.s.	**
Fe (mg kg <sup>-1</sup> )	168.72 $\pm$ 24.35	186.02 $\pm$ 30.41	203.15 $\pm$ 52.02	159.95 $\pm$ 42.80	n.s.	n.s.
Zn (mg kg <sup>-1</sup> )	0.16 $\pm$ 0.19	0.00 $\pm$ 0.00	0.22 $\pm$ 0.29	0.02 $\pm$ 0.04	n.s.	n.s.
Mn (mg kg <sup>-1</sup> )	2.86 $\pm$ 0.34	2.03 $\pm$ 0.54	2.77 $\pm$ 1.19	1.58 $\pm$ 0.39	n.s.	*
Sand (%)	13.02 $\pm$ 1.42	9.67 $\pm$ 0.62	14.35 $\pm$ 0.93	9.58 $\pm$ 0.70	n.s.	**
Silt (%)	16.41 $\pm$ 3.14	11.50 $\pm$ 6.99	13.40 $\pm$ 4.04	11.09 $\pm$ 1.82	n.s.	n.s.
Clay (%)	70.57 $\pm$ 3.69	78.83 $\pm$ 7.60	72.25 $\pm$ 4.96	79.33 $\pm$ 0.54	n.s.	n.s.



**Fig. S1** - Relationship between initial morphological attributes - root collar diameter (RCD) and height (H) and relative growth rates in height (RGR-h) and root collar diameter (RGR-rcd) one year after planting.

**Tab. S2** - Mean  $\pm$  standard deviation for the morphological attributes of seedlings of three species according to container size. Different letters indicate significant differences between container sizes for each species according to t-tests ( $P < 0.05$ ). Height (H, cm), root collar diameter (RCD, mm), height/diameter ratio (H/D), leaves number (LN), total leaf area (TLA, cm<sup>2</sup>), leaf size (LS, cm<sup>2</sup>), specific leaf area (SLA, cm<sup>2</sup> g<sup>-1</sup>), root length (RL, cm), root diameter (RD, mm), fine roots number (FR), leaf dry mass (LDM, g), stem dry mass (SDM, g), root dry mass (RDM, g), total dry mass (TDM, g), leaf mass fraction (LMF, g g<sup>-1</sup>), leaf area fraction (LAF, cm<sup>2</sup> g<sup>-1</sup>), stem mass fraction (SMF, g g<sup>-1</sup>), root mass fraction (RMF, g g<sup>-1</sup>), root/shoot ratio (R/S, g g<sup>-1</sup>), shoot/height ratio (S/H, g cm<sup>-1</sup>), Dickson' Quality Index (DQI), and seed mass (SM, g).

Variable	<i>B. excelsa</i>		<i>D. odorata</i>		<i>T. vulgaris</i>	
	675 cm <sup>3</sup>	1,200 cm <sup>3</sup>	675 cm <sup>3</sup>	1,200 cm <sup>3</sup>	675 cm <sup>3</sup>	1,200 cm <sup>3</sup>
H	26.48 $\pm$ 9.02 b	45.86 $\pm$ 11.46 a	23.82 $\pm$ 6.40 b	40.90 $\pm$ 9.71 a	34.75 $\pm$ 10.25 b	51.86 $\pm$ 11.39 a
RCD	3.97 $\pm$ 0.66 a	5.27 $\pm$ 0.83 b	4.05 $\pm$ 0.48 b	5.77 $\pm$ 0.82 a	3.55 $\pm$ 0.84 b	4.56 $\pm$ 0.90 a
H/D	6.60 $\pm$ 1.69 b	8.69 $\pm$ 1.72 a	5.87 $\pm$ 1.29 b	7.04 $\pm$ 1.17 a	9.83 $\pm$ 2.14 b	11.39 $\pm$ 1.75 a
LN	7.70 $\pm$ 2.39 a	8.15 $\pm$ 2.37 a	21.72 $\pm$ 9.91 a	26.53 $\pm$ 7.88 a	32.67 $\pm$ 10.10 a	34.86 $\pm$ 6.95 a
TLA	225.33 $\pm$ 124.44 b	302.67 $\pm$ 115.93 a	305.24 $\pm$ 213.93 a	429.02 $\pm$ 153.16 a	271.46 $\pm$ 121.52	626.94 $\pm$ 219.88 a
LS	28.04 $\pm$ 9.71 b	37.52 $\pm$ 11.10 a	57.22 $\pm$ 19.90 b	73.66 $\pm$ 19.48 a	45.25 $\pm$ 17.47 b	112.19 $\pm$ 42.78 a
SLA	164.66 $\pm$ 26.76 a	152.10 $\pm$ 14.50 a	247.56 $\pm$ 17.57 b	240.97 $\pm$ 26.68 a	192.40 $\pm$ 26.14 a	188.95 $\pm$ 24.84 a
RL	12.00 $\pm$ 4.95 a	13.57 $\pm$ 6.24 a	13.92 $\pm$ 4.49 b	16.10 $\pm$ 3.33 a	13.25 $\pm$ 5.31 a	17.04 $\pm$ 5.65 a
RD	2.75 $\pm$ 1.10 b	3.75 $\pm$ 0.86 a	2.99 $\pm$ 0.74 b	3.85 $\pm$ 0.71 a	2.33 $\pm$ 0.74 b	3.22 $\pm$ 0.63 a
FR	14.85 $\pm$ 7.39 a	15.50 $\pm$ 6.65 a	24.08 $\pm$ 12.28 a	28.50 $\pm$ 9.98 a	13.50 $\pm$ 6.27 b	19.50 $\pm$ 9.54 a
LDM	1.43 $\pm$ 0.90 b	2.05 $\pm$ 0.92 a	1.55 $\pm$ 1.17 b	2.33 $\pm$ 0.87 a	1.60 $\pm$ 0.67 b	4.04 $\pm$ 1.52 a
SDM	1.59 $\pm$ 1.20 b	2.72 $\pm$ 1.22 a	1.38 $\pm$ 1.17 b	2.72 $\pm$ 1.10 a	0.78 $\pm$ 0.37 b	2.97 $\pm$ 1.32 a
RDM	0.69 $\pm$ 0.36 b	1.52 $\pm$ 0.63 a	0.99 $\pm$ 0.65 b	2.12 $\pm$ 0.79 a	0.72 $\pm$ 0.25 b	1.82 $\pm$ 0.68 a
TDM	3.72 $\pm$ 2.36 b	6.30 $\pm$ 2.49 a	3.92 $\pm$ 2.85 b	7.17 $\pm$ 2.65 a	3.10 $\pm$ 1.24 b	8.83 $\pm$ 3.39 a
LMF	0.39 $\pm$ 0.07 b	0.32 $\pm$ 0.05 a	0.40 $\pm$ 0.09 b	0.33 $\pm$ 0.05 a	0.51 $\pm$ 0.05 b	0.46 $\pm$ 0.04 a
LAF	64.76 $\pm$ 17.58 a	48.88 $\pm$ 7.65 b	82.08 $\pm$ 20.64 a	62.57 $\pm$ 14.25 b	85.82 $\pm$ 10.79 a	72.64 $\pm$ 10.12 b
SMF	0.40 $\pm$ 0.08 a	0.43 $\pm$ 0.09 a	0.33 $\pm$ 0.07 b	0.37 $\pm$ 0.03 a	0.25 $\pm$ 0.05 b	0.33 $\pm$ 0.04 a
RMF	0.20 $\pm$ 0.06 b	0.25 $\pm$ 0.08 a	0.26 $\pm$ 0.04 b	0.29 $\pm$ 0.04 a	0.24 $\pm$ 0.03 b	0.21 $\pm$ 0.03 a
R/S	0.26 $\pm$ 0.10 b	0.35 $\pm$ 0.16 a	0.36 $\pm$ 0.08 b	0.42 $\pm$ 0.08 a	0.31 $\pm$ 0.05 b	0.27 $\pm$ 0.06 a
S/H	0.08 $\pm$ 0.02 b	0.10 $\pm$ 0.02 a	0.09 $\pm$ 0.03 b	0.13 $\pm$ 0.03 a	0.07 $\pm$ 0.02 b	0.13 $\pm$ 0.04 a
DQI	0.30 $\pm$ 0.15 b	0.54 $\pm$ 0.19 a	0.42 $\pm$ 0.24 b	0.80 $\pm$ 0.29 a	0.23 $\pm$ 0.07 b	0.60 $\pm$ 0.23 a
SM	1.97 $\pm$ 0.79 b	2.96 $\pm$ 1.07 a	-	-	-	-

**Tab. S3** - Mean  $\pm$  standard deviation for the morphophysiological attributes of seedlings of three species according to diameter class (n = 10). RCD class 1:  $3 \leq \text{RCD} < 4$  mm; 2:  $4 \leq \text{RCD} < 5$  mm; 3:  $5 \leq \text{RCD} < 6$  mm; and 4:  $6 \leq \text{RCD} < 7$  mm for *B. excelsa* and *D. odorata*; 1:  $2.5 \leq \text{RCD} < 3.5$  mm; 2:  $3.5 \leq \text{RCD} < 4.5$  mm; 3:  $4.5 \leq \text{RCD} < 5.5$  mm; 4:  $5.5 \leq \text{RCD} < 6.5$  mm for *T. vulgaris*. Height (H, cm), root collar diameter (RCD, mm), height/diameter ratio (H/D), leaves number (LN), total leaf area (TLA, cm<sup>2</sup>), leaf size (LS, cm<sup>2</sup>), specific leaf area (SLA, cm<sup>2</sup> g<sup>-1</sup>), root length (RL, cm), root diameter (RD, mm), fine roots number (FR), leaf dry mass (LDM, g), stem dry mass (SDM, g), root dry mass (RDM, g), total dry mass (TDM, g), leaf mass fraction (LMF, g g<sup>-1</sup>), leaf area fraction (LAF, cm<sup>2</sup> g<sup>-1</sup>), stem mass fraction (SMF, g g<sup>-1</sup>), root mass fraction (RMF, g g<sup>-1</sup>), root/shoot ratio (R/S, g g<sup>-1</sup>), shoot/height ratio (S/H, g cm<sup>-1</sup>), Dickson' Quality Index (DQI), seed mass (SM, g), chlorophyll content (SPAD), and maximum quantum yield of primary PSII photochemistry ( $F_v/F_m$ ).

Variable	<i>B. excelsa</i>				<i>D. odorata</i>				<i>T. vulgaris</i>			
	RCD1	RCD2	RCD3	RCD4	RCD1	RCD2	RCD3	RCD4	RCD1	RCD2	RCD3	RCD4
H	24.4 $\pm$ 5.7	33.1 $\pm$ 8.3	49.8 $\pm$ 7.6	56.4 $\pm$ 8.0	24.3 $\pm$ 4.5	21.2 $\pm$ 4.3	37.8 $\pm$ 7.1	45.6 $\pm$ 6.5	28.0 $\pm$ 5.1	47.0 $\pm$ 8.6	53.5 $\pm$ 9.4	60.3 $\pm$ 6.6
RCD	3.8 $\pm$ 0.2	4.6 $\pm$ 0.3	5.5 $\pm$ 0.3	6.4 $\pm$ 0.3	3.9 $\pm$ 0.1	4.7 $\pm$ 0.2	5.5 $\pm$ 0.3	6.5 $\pm$ 0.2	3.0 $\pm$ 0.2	3.9 $\pm$ 0.3	4.9 $\pm$ 0.3	5.8 $\pm$ 0.3
H/D	6.4 $\pm$ 1.6	7.3 $\pm$ 1.8	9.1 $\pm$ 1.5	8.8 $\pm$ 1.4	6.2 $\pm$ 1.2	4.5 $\pm$ 0.9	6.9 $\pm$ 1.4	7.1 $\pm$ 1.1	9.2 $\pm$ 1.3	12.0 $\pm$ 1.5	10.9 $\pm$ 1.6	10.4 $\pm$ 1.3
LN	6.5 $\pm$ 2.1	7.0 $\pm$ 1.6	8.8 $\pm$ 2.0	9.4 $\pm$ 2.6	5.0 $\pm$ 1.2	4.1 $\pm$ 1.3	5.9 $\pm$ 2.2	6.7 $\pm$ 1.9	5.5 $\pm$ 2.0	6.2 $\pm$ 1.3	5.5 $\pm$ 1.0	6.1 $\pm$ 1.3
TLA	165.5 $\pm$ 68.0	177.1 $\pm$ 46.8	294.4 $\pm$ 88.2	419.0 $\pm$ 78.9	209.4 $\pm$ 77.5	218.6 $\pm$ 61.8	370.4 $\pm$ 141.7	608.3 $\pm$ 170.0	193.5 $\pm$ 89.6	451.7 $\pm$ 108.5	636.5 $\pm$ 160.0	799.5 $\pm$ 100.8
LS	24.9 $\pm$ 5.4	26.3 $\pm$ 8.6	33.6 $\pm$ 7.4	46.3 $\pm$ 9.0	41.9 $\pm$ 11.5	55.0 $\pm$ 12.8	65.3 $\pm$ 11.0	91.3 $\pm$ 7.0	35.8 $\pm$ 12.6	75.6 $\pm$ 22.4	119.9 $\pm$ 30.5	137.2 $\pm$ 38.8
SLA	171.6 $\pm$ 35.3	166.8 $\pm$ 11.3	149.0 $\pm$ 9.2	146.1 $\pm$ 11.4	254.7 $\pm$ 10.5	254.7 $\pm$ 19.1	234.1 $\pm$ 28.5	233.8 $\pm$ 11.7	184.2 $\pm$ 24.8	201.4 $\pm$ 18.2	194.6 $\pm$ 35.4	179.7 $\pm$ 13.1
RL	13.6 $\pm$ 6.8	9.6 $\pm$ 3.3	11.3 $\pm$ 4.0	16.7 $\pm$ 5.7	13.9 $\pm$ 4.3	11.6 $\pm$ 3.8	15.9 $\pm$ 3.1	17.7 $\pm$ 3.4	14.1 $\pm$ 5.7	14.8 $\pm$ 5.4	17.5 $\pm$ 6.2	17.4 $\pm$ 5.8
RD	1.9 $\pm$ 0.4	3.2 $\pm$ 0.6	3.7 $\pm$ 0.8	4.2 $\pm$ 0.9	2.3 $\pm$ 0.5	3.0 $\pm$ 0.3	3.9 $\pm$ 0.6	4.0 $\pm$ 0.5	1.9 $\pm$ 0.5	3.1 $\pm$ 0.4	3.2 $\pm$ 0.4	3.7 $\pm$ 0.5
FR	12.1 $\pm$ 7.9	14.4 $\pm$ 4.1	17.9 $\pm$ 5.1	19.4 $\pm$ 5.1	16.3 $\pm$ 9.7	23.6 $\pm$ 11.2	29.0 $\pm$ 7.8	32.4 $\pm$ 11.7	13.4 $\pm$ 7.6	16.2 $\pm$ 7.7	23.6 $\pm$ 11.0	16.4 $\pm$ 7.0
LDM	1.0 $\pm$ 0.4	1.1 $\pm$ 0.3	2.0 $\pm$ 0.7	2.9 $\pm$ 0.7	1.0 $\pm$ 0.4	1.0 $\pm$ 0.3	2.1 $\pm$ 0.9	3.3 $\pm$ 0.8	1.2 $\pm$ 0.5	2.6 $\pm$ 0.6	4.1 $\pm$ 0.9	5.4 $\pm$ 0.9
SDM	0.8 $\pm$ 0.2	1.3 $\pm$ 0.4	2.7 $\pm$ 0.7	3.8 $\pm$ 0.7	0.7 $\pm$ 0.2	0.8 $\pm$ 0.2	2.4 $\pm$ 0.7	3.6 $\pm$ 0.5	0.5 $\pm$ 0.2	1.6 $\pm$ 0.5	2.9 $\pm$ 0.6	4.2 $\pm$ 0.9
RDM	0.5 $\pm$ 0.3	0.9 $\pm$ 0.5	1.3 $\pm$ 0.4	1.7 $\pm$ 0.6	0.6 $\pm$ 0.2	0.7 $\pm$ 0.2	1.9 $\pm$ 0.5	2.5 $\pm$ 0.3	0.6 $\pm$ 0.2	1.2 $\pm$ 0.4	1.7 $\pm$ 0.4	2.4 $\pm$ 0.4
TDM	2.3 $\pm$ 0.8	3.3 $\pm$ 1.0	6.0 $\pm$ 1.5	8.4 $\pm$ 1.7	2.2 $\pm$ 0.6	2.5 $\pm$ 0.5	6.3 $\pm$ 1.7	9.4 $\pm$ 1.1	2.3 $\pm$ 0.8	5.5 $\pm$ 1.5	8.7 $\pm$ 1.6	12.0 $\pm$ 1.9
LMF	0.43 $\pm$ 0.08	0.33 $\pm$ 0.07	0.33 $\pm$ 0.04	0.35 $\pm$ 0.06	0.44 $\pm$ 0.09	0.41 $\pm$ 0.05	0.32 $\pm$ 0.08	0.34 $\pm$ 0.06	0.51 $\pm$ 0.05	0.49 $\pm$ 0.05	0.47 $\pm$ 0.05	0.45 $\pm$ 0.04
LAF	73.0 $\pm$ 20.6	55.4 $\pm$ 9.9	48.5 $\pm$ 5.6	50.4 $\pm$ 9.4	91.2 $\pm$ 21.1	85.5 $\pm$ 13.0	58.5 $\pm$ 14.6	63.8 $\pm$ 12.9	82.3 $\pm$ 1.8	84.1 $\pm$ 11.1	72.7 $\pm$ 9.8	67.3 $\pm$ 6.4
SMF	0.35 $\pm$ 0.07	0.41 $\pm$ 0.10	0.46 $\pm$ 0.06	0.45 $\pm$ 0.04	0.30 $\pm$ 0.05	0.32 $\pm$ 0.04	0.38 $\pm$ 0.07	0.39 $\pm$ 0.03	0.24 $\pm$ 0.06	0.29 $\pm$ 0.03	0.33 $\pm$ 0.03	0.35 $\pm$ 0.04
RMF	0.22 $\pm$ 0.07	0.26 $\pm$ 0.09	0.22 $\pm$ 0.06	0.20 $\pm$ 0.06	0.26 $\pm$ 0.05	0.27 $\pm$ 0.03	0.30 $\pm$ 0.04	0.27 $\pm$ 0.04	0.25 $\pm$ 0.04	0.22 $\pm$ 0.02	0.20 $\pm$ 0.03	0.20 $\pm$ 0.02
R/S	0.30 $\pm$ 0.14	0.37 $\pm$ 0.19	0.29 $\pm$ 0.10	0.26 $\pm$ 0.09	0.36 $\pm$ 0.10	0.38 $\pm$ 0.06	0.42 $\pm$ 0.07	0.38 $\pm$ 0.09	0.34 $\pm$ 0.07	0.29 $\pm$ 0.04	0.25 $\pm$ 0.04	0.26 $\pm$ 0.03
S/H	0.07 $\pm$ 0.01	0.07 $\pm$ 0.01	0.10 $\pm$ 0.02	0.12 $\pm$ 0.02	0.07 $\pm$ 0.01	0.09 $\pm$ 0.01	0.12 $\pm$ 0.03	0.15 $\pm$ 0.02	0.06 $\pm$ 0.02	0.09 $\pm$ 0.01	0.13 $\pm$ 0.02	0.16 $\pm$ 0.01
DQI	0.23 $\pm$ 0.08	0.33 $\pm$ 0.14	0.47 $\pm$ 0.13	0.66 $\pm$ 0.17	0.24 $\pm$ 0.03	0.36 $\pm$ 0.09	0.69 $\pm$ 0.20	0.97 $\pm$ 0.13	0.19 $\pm$ 0.06	0.35 $\pm$ 0.08	0.58 $\pm$ 0.11	0.83 $\pm$ 0.08
SM	1.5 $\pm$ 0.3	1.9 $\pm$ 0.4	2.9 $\pm$ 0.7	3.6 $\pm$ 1.0	-	-	-	-	-	-	-	-
SPAD	38.9 $\pm$ 1.6	39.4 $\pm$ 1.6	36.5 $\pm$ 3.6	40.2 $\pm$ 5.9	27.7 $\pm$ 4.5	25.9 $\pm$ 5.6	24.2 $\pm$ 2.8	24.8 $\pm$ 2.9	31.7 $\pm$ 5.6	25.1 $\pm$ 3.4	24.4 $\pm$ 6.7	23.1 $\pm$ 3.2
$F_v/F_m$	0.81 $\pm$ 0.03	0.80 $\pm$ 0.05	0.83 $\pm$ 0.02	0.82 $\pm$ 0.01	0.79 $\pm$ 0.03	0.74 $\pm$ 0.08	0.69 $\pm$ 0.07	0.76 $\pm$ 0.05	0.80 $\pm$ 0.03	0.72 $\pm$ 0.07	0.75 $\pm$ 0.05	0.77 $\pm$ 0.01

**Tab. S4** - Correlations between seed mass and 21 morphological attributes measured in nursery for *Bertholletia excelsa*. \*  $P < 0.05$ ; \*\*  $P < 0.01$ ; \*\*\*  $P < 0.001$ ; n.s. (not significant)  $P \geq 0.05$ .

Variable	Seed mass
H	0.75***
RCD	0.85***
H/D	0.45**
LN	0.47**
TLA	0.75***
LS	0.67***
SLA	-0.52**
RL	0.18 n.s.
RD	0.70***
FR	0.14 n.s.
LDM	0.80***
SDM	0.88***
RDM	0.72***
TDM	0.88***
LMF	-0.32*
LAF	-0.50**
SMF	0.39*
RMF	-0.12 n.s.
R/S	-0.12 n.s.
S/H	0.76***
DQI	0.80***

**Tab. S5** - Summary of significance of GLMM for initial root collar diameter, site quality and interaction effects on field survival one year after planting for *Bertholletia excelsa*, *Dipteryx odorata* and *Tachigali vulgaris*.

<b>Factors</b>	<b><i>B. excelsa</i></b>	<b><i>D. odorata</i></b>	<b><i>T. vulgaris</i></b>
Root collar diameter (RCD)	0.308	0.0521	0.175
Site quality (SQ)	0.483	0.4575	0.598
RCD x SQ	0.448	0.5242	0.534
R <sup>2</sup>	0.56	0.80	0.10