Supporting Information

Table S1. Effect of microhabitat type and elevation on the expression of functional traits of *Agrostis magellanica* in sub-Antarctic tundra. "Cushion" = growing in *Azorella selago* cushion plants, "Soil" = growing away from cushion plant. Pair (in and away from cushion plant) was nested within site, which was nested within transect and added as random factors to all models. Model significance was evaluated using a Benjamini-Hochberg adjustment for multiple comparisons, with significant effects in bold.

Functional Trait	**Elevation (m a.s.l.)**	**Microhabitat type**	**R^2 (%)**	**Model p-value**
Plant height	-0.002	**Cushion < Soil**	30.8	**<0.001**
Leaf area	-0.001	Cushion < Soil	9.3	**0.004**[#]
Leaf dry matter content	-0.001	Cushion > Soil	14.2	0.195
Leaf thickness	-0.001	Cushion > Soil	11.9	0.550
Specific leaf area	0.003	Cushion > Soil	2.1	0.971
Leaf toughness	-0.001	Cushion > Soil	3.4	0.257
Chlorophyll content	0.050	Cushion < Soil	33.2	0.637

[#]Individual coefficients were not significant, however the overall model was.

Table S2. Effect of microhabitat type and elevation on the expression of seven different functional traits by seven species in a montane grassland. "Cushion" = growing in *Euphorbia clavarioides* cushion plants, "Soil" = growing away from cushion plant. Pair (in and away from cushion plant) nested within site, was included as random factors in all these models. Model significance was evaluated using a Benjamini-Hochberg adjustment for multiple comparisons, with significant effects in bold.

Functional trait	Species	Elevation (m a.s.l.)	Microhabitat type	R^2 (%)	Model p-value
Specific leaf area	*Cymbopogon pospischilii*	0.001	Cushion>Soil	1.8	0.625
	Harpochloa falx	0.001	Cushion>Soil	0.3	0.799
	Microchloa caffra	**-0.004**[#]	Cushion<Soil	14.4	0.047
	Ruschia putterillii	0.001	Cushion>Soil	0.05	0.981
	Delosperma cooperi	-0.001	Cushion<Soil	7.6	0.347
	Senecio rhomboideus	0.001	Cushion<Soil	6.3	0.461
	Oxalis obliquifolia	0.001	**Cushion<Soil**[#]	4.1	0.129
Leaf dry matter content	*Cymbopogon pospischilii*	0.001	Cushion<Soil	5.2	0.3015
	Harpochloa falx	-0.001	Cushion<Soil	0.3	0.918
	Microchloa caffra	0.001	**Cushion>Soil**[#]	4.7	0.094
	Ruschia putterillii	-0.001	Cushion>Soil	10.6	0.126
	Delosperma cooperi	0.001	Cushion>Soil	3.5	0.514
	Senecio rhomboideus	-0.001	Cushion<Soil	0.3	0.766
	Oxalis obliquifolia	-0.001	**Cushion>Soil**[#]	5.6	0.096
Leaf area	*Cymbopogon pospischilii*	0.002	Cushion>Soil	13.2	0.060
	Harpochloa falx	-0.001	Cushion>Soil	0.06	0.984
	Microchloa caffra	**-0.003**[#]	Cushion>Soil	16.1	0.024
	Ruschia putterillii	-0.001	Cushion>Soil	1.1	0.182
	Delosperma cooperi	**-0.001**[#]	Cushion<Soil	31.3	0.067
	Senecio rhomboideus	0.001	Cushion>Soil	7.7	0.233

	Oxalis obliquifolia	-0.001	**Cushion>Soil#**	8.1	0.027
Chlorophyll content	*Cymbopogon pospischilii*	0.095	Cushion>Soil	6.8	0.227
	Harpochloa falx	0.049	Cushion<Soil	7.4	0.110
	Microchloa caffra	0.122	Cushion<Soil	8.5	0.259
	Ruschia putterillii	0.001	Cushion>Soil	0.07	0.974
	Delosperma cooperi	0.137	Cushion<Soil	8.9	0.285
	Senecio rhomboideus	0.080	Cushion>Soil	4.7	0.363
	Oxalis obliquifolia	**0.085#**	Cushion>Soil	14.5	0.011
Leaf thickness	*Cymbopogon pospischilii*	**0.001#**	Cushion>Soil	17.7	0.018
	Harpochloa falx	-0.001	Cushion>Soil	0.4	0.863
	Microchloa caffra	-0.001	**Cushion>Soil#**	6.4	0.057
	Ruschia putterillii	-0.001	Cushion>Soil	3.0	0.747
	Delosperma cooperi	0.001	Cushion>Soil	7.6	0.483
	Senecio rhomboideus	0.001	Cushion>Soil	1.3	0.358
	Oxalis obliquifolia	0.001	**Cushion>Soil**	14.7	**0.002**
Leaf toughness	*Cymbopogon pospischilii*	**0.001#**	Cushion>Soil	17.8	0.015
	Harpochloa falx	-0.001	Cushion>Soil	0.8	0.773
	Microchloa caffra	-0.001	**Cushion>Soil#**	6.6	0.055
	Ruschia putterillii	-0.001	Cushion>Soil	3.8	0.712
	Delosperma cooperi	0.001	Cushion>Soil	6.4	0.502
	Senecio rhomboideus	0.001	Cushion>Soil	1.5	0.295
	Oxalis obliquifolia	0.001	**Cushion>Soil**	14.1	**0.001**
Plant height	*Cymbopogon pospischilii*	0.001	Cushion>Soil	6.0	0.476
	Harpochloa falx	-0.001	Cushion<Soil	2.3	0.376

Microchloa caffra	0.001	Cushion<Soil	0.3	0.810
Ruschia putterillii	**-0.002**	Cushion<Soil	31.7	**0.003**
Delosperma cooperi	-0.001	Cushion>Soil	10.2	0.306
Senecio rhomboideus	0.001	Cushion<Soil	1.4	0.689
Oxalis obliquifolia	-0.001	Cushion>Soil	3.0	0.286

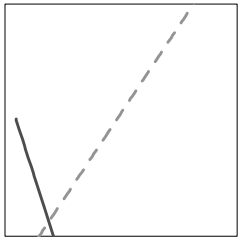
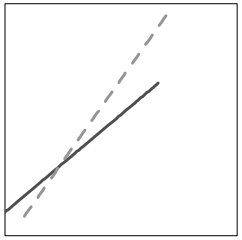
[#]Individual coefficient was significant, however the overall model was not significant.

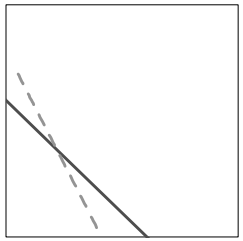
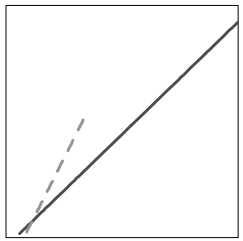
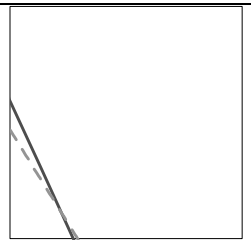
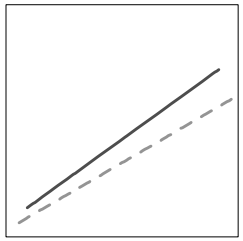
Table S3. Effect of microhabitat type and elevation on the expression of seven functional traits of all focal species in a montane grassland. "Cushion" = growing in *Euphorbia clavarioides* cushion plants, "Soil" = growing away from cushion plant. Pair (in and away from cushion plant) was nested within sites and together with species, were included as random effects. Model significance was evaluated using a Benjamini-Hochberg adjustment for multiple comparisons, with significant effects in bold.

Functional Trait	**Elevation (m a.s.l.)**	**Microhabitat type**	**R^2 (%)**	**Model p-value**
Leaf toughness	-0.001	**Cushion>Soil**	78.44	**0.001**
Specific leaf area	-0.001	**Cushion<Soil[#]**	89.20	0.037
Leaf area	0.001	**Cushion>Soil**	93.62	**0.001**
Leaf thickness	0.001	**Cushion>Soil**	78.90	**0.001**
Chlorophyll content	**0.081**	Cushion>Soil	84.65	**0.009**
Leaf dry matter content	0.001	Cushion>Soil	92.78	0.044
Plant height	-0.001	Cushion<Soil	90.64	0.228

[#]Individual coefficient was significant, however the overall model was not significant.

Table S4. A summary of all the bivariate trait relationships that differed significantly between conspecifics growing in the soil and on cushion plants. Only species with significant SMA results are shown, all of which are Type A shifts in trait relationships, representing four of the possible 147 trait pairs for the seven GG species, and six of the possible 21 trait pairs for the one MI species. Correlation and p-values values show the strength and significance of the relationship between the pair of traits, and were calculated for all individuals growing on cushion plants only and for all individuals growing on the adjacent soil only. The simplified graphical representations show the best fit regression lines for the relationship between the two traits (Trait 1 on the x-axis, Trait 2 on the y-axis), plotted separately for plants growing in the cushion plant (dashed line) and in soil (solid line; i.e. following the same format as Fig. 3). Individual data points are excluded to simplify visualizations. Model significance was evaluated using a Benjamini-Hochberg adjustment for multiple comparisons.

				Individuals growing on the cushion plant		**Individuals growing in the adjacent soil**		**SMA: Type A shift**	
Species	Trait 1	Trait 2	n (pairs)	Correlation	p-value	Correlation	p-value	p-value	Graphical Representation
Cymbopogon pospischilii	Leaf thickness	Leaf area	58	0.625	0.003	-0.028	0.920	0.013	
Oxalis obliquifolia	Plant height	Leaf area	74	0.517	0.011	0.365	0.138	0.044	

Oxalis obliquifolia	Leaf dry matter content	Specific leaf area	74	-0.726	<0.001	-0.511	0.013	0.002	
Oxalis obliquifolia	Leaf area	Specific leaf area	74	0.070	0.866	0.596	0.002	0.006	
Agrostis magellanica	Plant height	Leaf dry matter content	544	-0.171	0.013	-0.079	0.314	0.003	
Agrostis magellanica	Plant height	Leaf toughness	544	0.293	<0.001	0.369	<0.001	0.018	

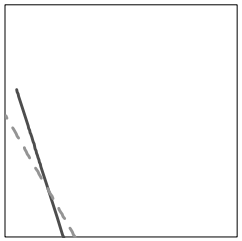
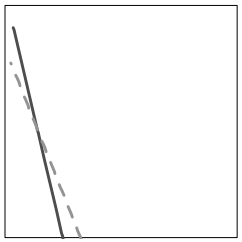
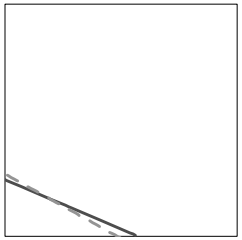
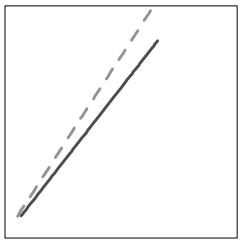
Agrostis magellanica	Plant height	Specific leaf area	544	-0.118	0.073	-0.176	0.013	<0.001	
Agrostis magellanica	Leaf thickness	Specific leaf area	544	-0.092	0.148	-0.190	0.007	<0.001	
Agrostis magellanica	Leaf dry matter content	Leaf area	544	-0.177	0.011	-0.037	0.628	0.006	
Agrostis magellanica	Leaf toughness	Leaf area	544	0.289	0.011	0.011	<0.001	0.040	

Table S5. Functional trait variation of focal species across sites, compared with published estimates of within-site variation in these traits. Coefficient of variation (CV) range indicates the 20th and 80th percentile of CV values reported for each trait reviewed by Perez-Harguindeguy et al. (2013). Coefficient of variation values from two other more limited studies, restricted to a single habitat type, are also presented for comparison: A = alpine (Albert et al. 2010), F = forest (Xu et al. 2020). NA = functional trait values not available from the study.

Species	Functional Trait	Unit	CV	CV range (Perez-Harguindeguy et al. 2013)*	CV values or range in other study systems
Agrostis magellanica	Specific leaf area	$mm^2\ mg^{-1}$	0.44	0.08 – 0.16	0.13[F]
	Leaf dry matter content	$mg\ g^{-1}$	0.70	0.04 – 0.10	0.08 – 0.25[A]
	Leaf area	mm^2	0.46	0.17 – 0.36	0.24[F]
	Chlorophyll content	$mg\ m^{-2}$	0.25	NA	0.11[F]
	Leaf toughness	N	0.46	NA	NA
	Leaf thickness	mm	0.13	NA	0.11[F]
	Plant height	mm	0.33	0.17 – 0.36	0.19 - 0.49[A]
Cymbopogon pospischilii	Specific leaf area	$mm^2\ mg^{-1}$	0.49	0.08 – 0.16	0.13[F]
	Leaf dry matter content	$mg\ g^{-1}$	0.15	0.04 – 0.10	0.08 – 0.25[A]
	Leaf area	mm^2	0.66	0.17 – 0.36	0.24[F]
	Chlorophyll content	$mg\ m^{-2}$	0.14	NA	0.11[F]
	Leaf toughness	N	0.37	NA	NA
	Leaf thickness	mm	2.72	NA	0.11[F]
	Plant height	mm	0.30	0.17 – 0.36	0.19 - 0.49[A]
Harpochloa falx	Specific leaf area	$mm^2\ mg^{-1}$	0.33	0.08 – 0.16	0.13[F]
	Leaf dry matter content	$mg\ g^{-1}$	0.15	0.04 – 0.10	0.08 – 0.25[A]
	Leaf area	mm^2	0.62	0.17 – 0.36	0.24[F]
	Chlorophyll content	$mg\ m^{-2}$	0.09	NA	0.11[F]
	Leaf toughness	N	0.23	NA	NA
	Leaf thickness	mm	0.15	NA	0.11[F]

	Plant height	mm	0.25	0.17 – 0.36	0.19 - 0.49[A]
Microchloa caffra	Specific leaf area	$mm^2 mg^{-1}$	1.86	0.08 – 0.16	0.13[F]
	Leaf dry matter content	$mg\ g^{-1}$	0.32	0.04 – 0.10	0.08 – 0.25[A]
	Leaf area	mm^2	1.70	0.17 – 0.36	0.24[F]
	Chlorophyll content	$mg\ m^{-2}$	0.14	NA	0.11[F]
	Leaf toughness	N	0.34	NA	NA
	Leaf thickness	mm	2.57	NA	0.11[F]
	Plant height	mm	0.37	0.17 – 0.36	0.19 - 0.49[A]
Oxalis obliquifolia	Specific leaf area	$mm^2 mg^{-1}$	0.48	0.08 – 0.16	0.13[F]
	Leaf dry matter content	$mg\ g^{-1}$	0.31	0.04 – 0.10	0.08 – 0.25[A]
	Leaf area	mm^2	0.47	0.17 – 0.36	0.24[F]
	Chlorophyll content	$mg\ m^{-2}$	0.19	NA	0.11[F]
	Leaf toughness	N	0.37	NA	NA
	Leaf thickness	mm	0.24	NA	0.11[F]
	Plant height	mm	0.40	0.17 – 0.36	0.19 - 0.49[A]
Ruschia putterillii	Specific leaf area	$mm^2 mg^{-1}$	1.01	0.08 – 0.16	0.13[F]
	Leaf dry matter content	$mg\ g^{-1}$	0.28	0.04 – 0.10	0.08 – 0.25[A]
	Leaf area	mm^2	1.16	0.17 – 0.36	0.24[F]
	Chlorophyll content	$mg\ m^{-2}$	0.22	NA	0.11[F]
	Leaf toughness	N	0.22	NA	NA
	Leaf thickness	mm	2.62	NA	0.11[F]
	Plant height	mm	0.43	0.17 – 0.36	0.19 - 0.49[A]
Senecio rhomboideus	Specific leaf area	$mm^2 mg^{-1}$	0.50	0.08 – 0.16	0.13[F]
	Leaf dry matter content	$mg\ g^{-1}$	0.19	0.04 – 0.10	0.08 – 0.25[A]
	Leaf area	mm^2	0.74	0.17 – 0.36	0.24[F]

	Chlorophyll content	mg m^{-2}	0.20	NA	0.11[F]
	Leaf toughness	N	0.28	NA	
	Leaf thickness	mm	0.28	NA	0.11[F]
	Plant height	mm	0.39	0.17 – 0.36	0.19 - 0.49[A]
Delosperma cooperi	Specific leaf area	mm^2 mg^{-1}	0.60	0.08 – 0.16	0.13[F]
	Leaf dry matter content	mg g^{-1}	1.41	0.04 – 0.10	0.08 – 0.25[A]
	Leaf area	mm^2	0.31	0.17 – 0.36	0.24[F]
	Chlorophyll content	mg m^{-2}	0.36	NA	0.11[F]
	Leaf toughness	N	0.43	NA	NA
	Leaf thickness	mm	0.23	NA	0.11[F]
	Plant height	mm	0.39	0.17 – 0.36	0.19 - 0.49[A]

*Values converted from percentage to raw coefficient of variation values

Albert, C.H., Thuiller, W., Yoccoz, N.G., Soudant, A., Boucher, F., Saccone, P. & Lavorel, S. 2010. Intraspecific functional variability: extent, structure and sources of variation. *Journal of Ecology* 98: 604-613.

Pérez-Harguindeguy, N., Díaz, S., Garnier, E., Lavorel, S., Poorter, H., Jaureguiberry, P., … & Cornelissen, J.H.C. 2013. New handbook for standardised measurement of plant functional traits worldwide. *Australian Journal of Botany* 61: 167-234.

Xu, W., Tomlinson, K.W., & Li, J. 2020. Strong intraspecific trait variation in a tropical dominant tree species along an elevational gradient. *Plant Diversity* 42: 1–6.

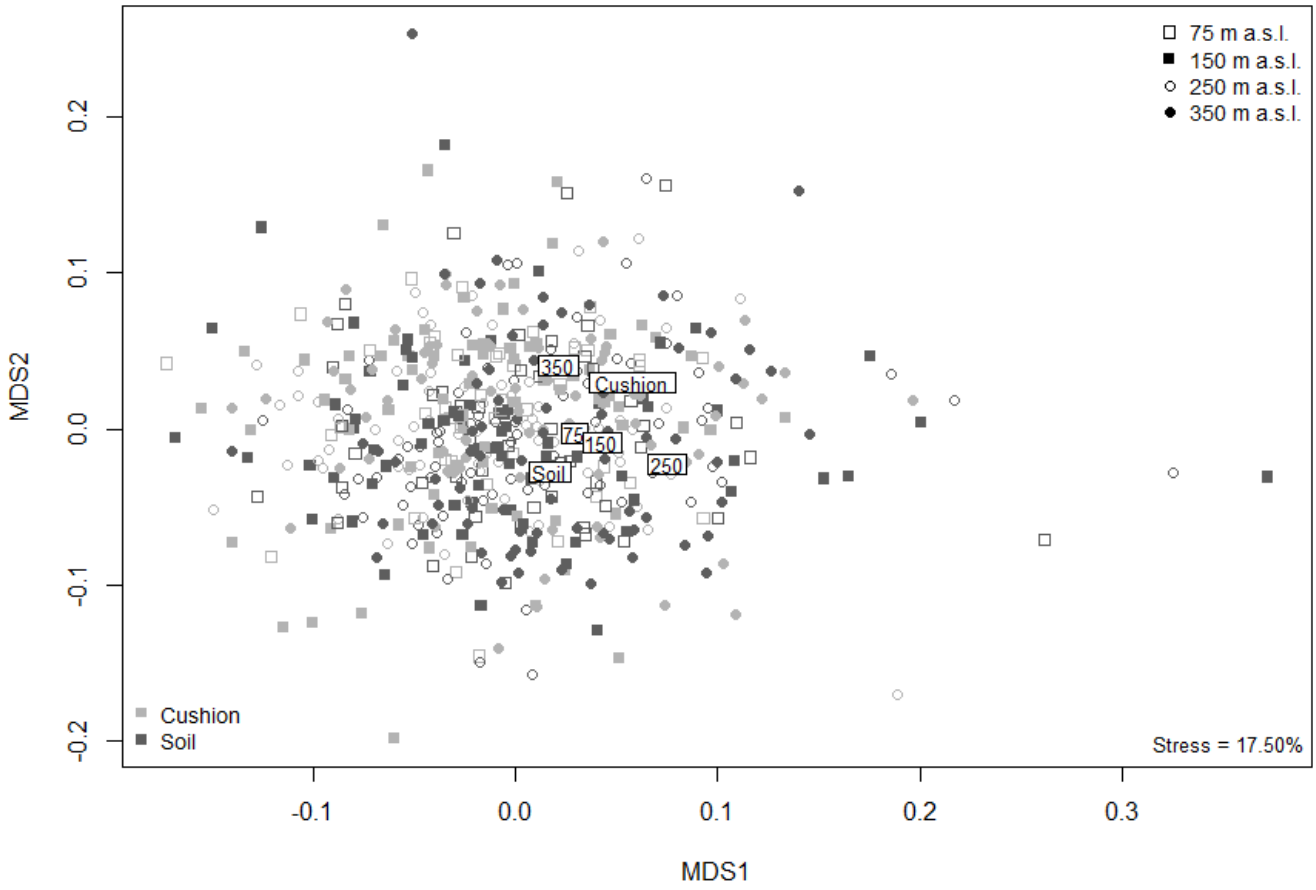


Figure S1. Non-metric multidimensional scaling ordination representing the similarity of functional trait values for all sampled *Agrostis magellanica* individuals, split by microhabitat type (i.e. growing within *Azorella selago* cushion plants *vs* on the adjacent substrate; indicated by shading and the "Cushion" and "Soil" centroids) and elevation (indicated by symbols and the "75", "150", "250" and "350" m a.s.l. centroids).

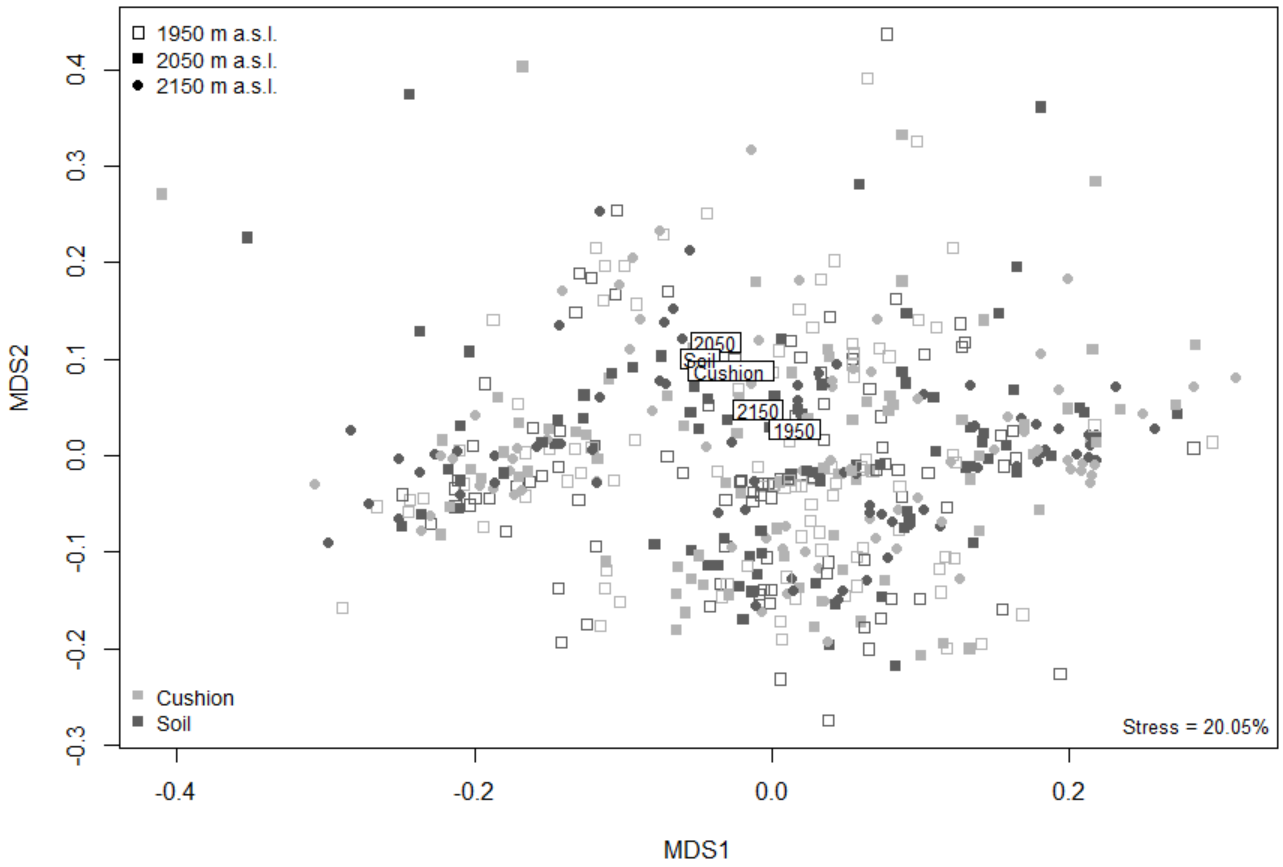


Figure S2. Non-metric multidimensional scaling ordination representing the similarity of functional trait values for all focal species, split by microhabitat type (i.e. growing in *Euphorbia clavarioides* cushion plants "Cushion" *vs* on the adjacent substrate "Soil"; indicated by shading and the "Cushion" and "Soil" centroids) and elevation (indicated by symbols and the "1950", "2050", "2150" m a.s.l. centroids).