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Appendix 1

Supplementary data are available and consist of the following tables.

Table A1. Morphological characters measured on individuals of alpine and montane populations of *Heliosperma pusillum* s.l. in six population pairs and the reduced set of morphological characters.

Table A2. Settings of climate chambers to imitate natural conditions in alpine and montane populations of *Heliosperma pusillum* s.l.

Table A3. Differences between alpine and montane populations of *Heliosperma pusillum* s.l. in mean Landolt indicator values as well as in mean daily mean temperature of air and soil measured by data loggers.

Table A4. Differences between alpine and montane populations of *Heliosperma pusillum* s.l. in means of the reduced set morphological characters.

Table A1. Thirty-eight morphological characters measured on individuals of alpine and montane populations of *Heliosperma pusillum* s.l. in six population pairs (a), as well as reduced set of aggregated morphological characters tested by linear models (b).

(a) Morphological character	Description
Ratio of Branching (BBHG) to Plant height (PLHG)	BBHG: Length (in mm) of the main shoot from the basis to the lower bracts of the terminal inflorescence PLHG: Length (in mm) of the main shoot from the basis to the apex including the terminal flower
Ratio of Insertion of the lowest axillary shoot (AXBH) to PLHG	AXBH: Length (in mm) of the main shoot from the stem basis to the node supporting the lowest axillary shoot
Number of internodes (PLIN)	Number of internodes along the main shoot
Basal axillary shoot length (AXBL)	Length (in mm) of the lowest axillary shoot
Axillary shoot number (AXSN)	Total number of sterile and fertile shoots in leaf axils
Internode length above middle leaves (LFMIL)	Length (in mm) of the internode above the middle leaf pair
Internode length below upper leaves (LFUIL)	Length (in mm) of the internode below the uppermost leaf pair
Glandular, multicellular trichome density on the lower shoot (STLPDGLM)	Number of glandular multicellular trichomes observed on 0.25×1 mm surface area of the lower part of the main shoot
Eglandular trichome density on the lower shoot (STLPDEGL)	Number of eglandular trichomes observed on 0.25×1 mm surface area of the lower part of the main shoot
Glandular, multicellular trichome density on the upper shoot (STUPDGLM)	Number of glandular multicellular trichomes observed on 0.25×1 mm surface area of the upper part of the main shoot
Eglandular trichome density on the upper shoot (STUPDEGL)	Number of eglandular trichomes observed on 0.25×1 mm surface area of the upper part of the main shoot
Basal leaf length (LFBL)	Length (in mm) of a leaf of the basal leaf pair
Middle leaf length (LFML)	Length (in mm) of a leaf of the middle leaf pair
Upper leaf length (LFUL)	Length (in mm) of a leaf of the uppermost leaf pair
Basal leaf width (LFBW)	Maximum width (in mm) of a leaf of the basal leaf pair
Middle leaf width (LFMW)	Maximum width (in mm) of a leaf of the middle leaf pair
Upper leaf width (LFUW)	Maximum width (in mm) of a leaf of the uppermost leaf pair
Multicellular trichomes on the adaxial epidermis of basal leaves (LFBTGLM)	Presence / absence (coded as 1/0) of glandular multicellular trichomes on the adaxial epidermis of the basal leaf pair
Multicellular trichomes on the adaxial epidermis of middle leaves (LFMTGLM)	Presence / absence (coded as 1/0) of glandular multicellular trichomes on the adaxial epidermis of leaves of the middle leaf pair
Multicellular trichomes on the adaxial epidermis of upper leaves (LFUTGLM)	Presence / absence (coded as 1/0) of glandular multicellular trichomes on the adaxial epidermis of the uppermost leaf pair
Eglandular trichomes on the adaxial epidermis of basal leaves (LFBTEGL)	Presence / absence (coded as 1/0) of eglandular trichomes on the adaxial epidermis of the basal leaf pair
Eglandular trichomes on the adaxial epidermis of middle leaves (LFMTEGL)	Presence / absence (coded as 1/0) of eglandular trichomes on the adaxial epidermis of leaves of the middle leaf pair
Eglandular trichomes on the adaxial epidermis of upper leaves (LFUTEGL)	Presence / absence (coded as 1/0) of eglandular trichomes on the adaxial epidermis of the upper leaf pair
Glandular unicellular trichome density on basal leaves (LFBTD)	Number of glandular unicellular trichomes observed on 1×1 mm surface area measured in the middle of a leaf of the basal leaf pair
Glandular unicellular trichome density on middle leaves (LFMTD)	Number of glandular unicellular trichomes observed on 1×1 mm surface area measured in the middle of a leaf of the middle leaf pair
Glandular unicellular trichome density on upper leaves (LFUTD)	Number of glandular unicellular trichomes observed on 1×1 mm surface area measured in the middle of a leaf of the middle leaf pair
Glandular unicellular trichome density on the margin of basal leaves (LFBTDM)	Number of glandular unicellular trichomes observed along 1 mm length of the margin of a leaf of the basal leaf pair
Glandular unicellular trichome density at the margin of middle leaves (LFMTDM)	Number of glandular unicellular trichomes observed on 1×1 mm surface area of the margin of a leaf of the middle leaf pair
Glandular unicellular trichome density at the margin of upper leaves (LFUTDM)	Number of glandular unicellular trichomes observed along 1 mm length of the margin of a leaf of the uppermost leaf pair
Calyx length (CALE)	Length (in mm) of the calyx
Calyx tooth length (CTLE)	Length (in mm) of one tooth of the calyx
Calyx tooth width (CTWI)	Width (in mm) of one tooth of the calyx

Petal claw length (PTCL)	Length (in mm) of one petal claw
Petal limb length (PTLL)	Length (in mm) of one petal limb
Petal limb width (PTWL)	Width (in mm) of one petal limb
Position of the widest region of the petal limb (PTWL)	Length (in mm) from the basis of one petal limb to its maximum width
Limb lobes middle incision length (PLLI)	Length (in mm) of the middle incision of one limb lobe
Coronal scale length (PCSL)	Length (in mm) of the coronal scale
Coronal scale width (PCSW)	Width (in mm) of the coronal scale
b) Reduced set of morphological characters	Description
Growth habit	Ratio of BBHG to PLHG
Glandular trichome occurrence on leaves	LFBTGLM+ LFMTGLM+ LFUTGLM standardised to 0/1
Stem trichome density	Mean of STLPDGLM+STLPEGL and STUPDGLM+STUPDEGL
Leaf trichome density	Mean of LFBTD, LFMTD, LFUTD, LFBTDM, LFMTDM and LFUTDM
Leaf length	LFML
Flower size	PTLL

Table A2. Settings of climate chambers to imitate natural conditions in alpine and montane populations of *Heliosperma pusillum* s.l. based on measurements of temperature and irradiance on sunny days during the vegetation period.

Time [h]	montane populations		alpine populations	
	Temperature [°C]	PPFD [$\mu\text{mol m}^{-2}\text{s}^{-1}$]	Temperature [°C]	PPFD [$\mu\text{mol m}^{-2}\text{s}^{-1}$]
0	15	0	8	0
1	15	0	8	0
2	15	0	8	0
3	15	0	8	0
4	15	0	8	0
5	15	0	8	0
6	17	30	12	1026
7	17	30	16	1026
8	19	70	20	1026
9	19	70	23	1026
10	19	70	23	1026
11	20	90	23	1026
12	20	130	20	1026
13	20	130	17	1026
14	20	170	13	1026
15	20	130	13	481
16	20	90	13	481
17	20	90	13	481
18	20	90	13	481
19	20	60	13	481
20	17	40	13	481
21	16	20	13	481
22	15	0	8	0
23	15	0	8	0

Table A3. Differences between alpine and montane populations of *Heliosperma pusillum* s.l. in mean Landolt indicator values as well as in mean daily mean temperature of air (ΔT_{air}) and soil (ΔT_{soil}) measured by data loggers. Mean Landolt indicator values, i.e. soil moisture (F), light (L), temperature (T), continentality (C), soil humus content (H), soil nutrients (N), soil moisture variability (W), soil reaction (R), soil aeration (D) were derived from plant species surrounding 27–31 individuals of alpine and montane populations of *Heliosperma pusillum* s.l. in six population pairs in the eastern Alps. Shown are differences between mean values of daily mean temperatures. Positive and negative values indicate higher and lower means of mean indicator values and mean temperatures in alpine compared to montane populations, respectively. Air temperature measurements for population pair 6 are not available. Asterisks in the body and the header of the table indicate significant differences between the alpine and montane populations in a single population pair and across all population pairs, respectively. Significance was evaluated at a level of $\alpha < 0.05$ after Bonferroni correction.

Pop. pair	ΔF^*	ΔL^*	ΔT^*	ΔC^*	ΔH^*	ΔN	ΔW^*	ΔR^*	ΔD^*	ΔT_{air}^*	ΔT_{soil}^*
1	0.43*	0.80*	-1.17*	0.12	-0.57*	-0.31*	-0.01	-0.17	-0.10	-2.7*	-2.56*
2	0.63*	1.17*	-1.17*	-0.48*	-0.56*	-0.28*	-0.23*	0.11	0.45	-5.3*	-4.13*
3	1.01*	0.33*	-0.73*	-0.27*	0.23	0.55*	0.29*	-0.74*	-1.16*	-5.6*	-5.20*
4	0.86*	0.12	-0.41*	-0.43*	-0.87*	0.14*	0.20	-0.22*	-0.60*	-4.0*	-2.33*
5	-0.14	0.68*	-0.42*	0.02	-0.84*	-0.60*	-0.10	0.42*	0.68*	-1.1*	-0.97*
6	0.96*	0.21*	-0.74*	-0.32*	-0.21	0.49*	0.27*	-0.66*	-1.01*		-6.50*

Table A4. Differences between alpine and montane populations of *Heliosperma pusillum* s.l. in means of the reduced set of morphological characters measured in six population pairs. Positive and negative values indicate higher and lower means of morphological characters in alpine compared to montane populations, respectively. Positive values indicate higher means of morphological characters in individuals of alpine compared to montane populations. Asterisks in the body and the header of the table indicate significant differences between the alpine and montane populations in a single population pair and across all population pairs, respectively. Significance was evaluated at a level of $\alpha < 0.05$ after Bonferroni correction.

Population pair	Δ Growth habit*	Δ Stem trichomes*	Δ Leaf length	Δ Leaf trichomes*	Δ Multicellular glands*	Δ Flower size*
1	-0.12*	-6.14*	-12.38*	-5.24*	-0.05	0.93*
2	-0.07*	-16.18*	-6.95*	-15.70*	-0.9	0.57*
3	-0.06*	-15.30*	7.85*	-18.13*	-0.1	0.85*
4	0.02	-12.83*	8.56*	-5.24*	-1	0.54
5	-0.07*	-4.05	4.05	-0.97	0	0.87*
6	-0.26*	-38.73*	-14.14	-26.80*	-1	0.46