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Appendix 1

Methods for processing soil samples and measuring soil abiotic properties

On 2 July 2012, during the early stages of the growing season, we collected three to six soil samples from the top 10 cm (i.e. the layer where most biological activity is taking place) in each plot with a PVC soil corer (\varnothing 4.5 cm) to yield a minimum of 0.2 l of soil, for measurements of soil abiotic and microbial properties (Supplementary material Appendix 1 Table A1). Standardization of soil sampling was done by depth, which is a common approach investigating soil community composition across contrasting environments (Fierer and Jackson 2006, Rousk et al. 2010, Ramirez et al. 2014). Samples were bulked within each plot and stored at 4°C. Within 48 h after sampling, soil from each plot was passed through a 4 mm sieve, to remove stones and coarse plant roots. Sieving was done consistently across all vegetation types and elevations in a manner that did not lead to bias. Several measurements were performed on subsamples of soil from each plot. Gravimetric soil moisture was determined after drying at 105°C for 24 h. Soil organic matter (SOM) content was measured by loss-on-ignition in a muffle furnace (550°C for 4 h). We measured pH in fresh soil (an equivalent of 2.5 g dry soil) using a Mettler Toledo pH meter after shaking soil in 40 ml of deionized water (12 h, 150 rpm). Fresh soil (an equivalent of 5 g dry soil) was extracted with 80 ml KCl 1M (2 h, 150 rpm) and analyzed colorimetrically for concentrations of NH₄-N, NO₃-N and PO₄-P using an autoanalyzer. A subsample of soil was dried (60°C, 72 h) and ground for measurements of total C and N content by dry combustion using an elemental analyzer and P content by nitric-perchloric acid digestion (Spark 1996). We used total soil nutrient concentrations to determine C:N, C:P and N:P ratios, because the stoichiometric relationships between nutrients can provide valuable information on biogeochemical cycling and nutrient limitation (Cleveland and Liptzin 2007).

On 5 September 2012 we buried one I-button in each plot at a depth of 3 cm to measure soil temperature in the uppermost soil layer over a year (Supplementary material Appendix 1 Table A1). We calculated the mean annual soil temperature (measured from 15 September 2012 until 15

September 2013) and the mean growing season soil temperature calculated as the mean soil temperature during the months when all plots were snow free (i.e. June through September).

Table A1. Mean values for environmental variables (\pm SE) for each vegetation type at each elevation (upper sub-table), and ANOVA results testing for the effect of vegetation type and elevation and their interaction on environmental variables (lower sub-table). T_y = mean year soil temperature (September 2012 – September 2013); T_s = mean summer soil temperature (June 2013 – September 2013); moist = soil moisture content; SOM = soil organic matter content; $\text{NH}_4\text{-N}$ = ammonium concentration; $\text{PO}_4\text{-P}$ = phosphate concentration; N = total soil N concentration; P = total soil P concentration; CN = soil C:N ratio; NP = soil N:P ratio. Significant effects (lower table) are represented in boldface. Within columns numbers (across all vegetation types) followed by different letters are significantly different at $p < 0.05$ according to Tukey's HSD test.

	T_y (°C)	T_s (°C)	Moist (g g ⁻¹)	SOM (g g ⁻¹)	pH	$\text{NH}_4\text{-N}$ ($\mu\text{g g}^{-1}$)	$\text{PO}_4\text{-P}$ ($\mu\text{g g}^{-1}$)	N (%)	P (%)	CN	CP	NP	Humus depth (cm)
Heath													
450	2.54 (0.11) ^{abc}	7.77 (0.34) ^{bd}	0.41 (0.06) ^{cd}	0.23 (0.09) ^{bc}	4.51 (0.11) ^d	1.42 (0.59) ^b	5.33 (3.34) ^a	0.36 (0.08) ^d	0.04 (0.01) ^a	32.72 (1.86) ^a	364.61 (102.61) ^a	10.86 (2.62) ^{ab}	2.40 (0.36) ^c
700	0.63 (0.19) ^d	6.35 (0.23) ^e	0.62 (0.05) ^{ab}	0.59 (0.12) ^a	4.55 (0.07) ^d	2.27 (0.44) ^b	4.83 (2.09) ^a	1.05 (0.20) ^{ab}	0.11 (0.03) ^a	27.35 (2.51) ^{ab}	308.83 (57.28) ^{ab}	10.98 (1.10) ^{ab}	5.53 (0.51) ^{ab}
900	0.71 (0.10) ^d	6.63 (0.38) ^{de}	0.70 (0.01) ^a	0.53 (0.04) ^a	4.77 (0.07) ^d	2.68 (0.63) ^b	1.04 (0.14) ^a	1.19 (0.10) ^a	0.09 (0.02) ^a	21.14 (1.76) ^{bc}	340.25 (65.64) ^a	15.48 (2.08) ^{ab}	6.90 (0.42) ^a
Meadow													
450	3.37 (0.10) ^a	9.24 (0.27) ^a	0.31 (0.04) ^d	0.09 (0.02) ^c	5.46 (0.09) ^c	19.46 (5.24) ^a	0.03 (0.02) ^a	0.33 (0.08) ^d	0.03 (0.01) ^a	16.91 (1.36) ^c	147.18 (4.82) ^{ab}	8.96 (0.86) ^{ab}	2.43 (0.20) ^c
700	2.65 (0.41) ^{abc}	8.73 (0.48) ^{ab}	0.47 (0.04) ^{bcd}	0.21 (0.04) ^{bc}	5.61 (0.12) ^{bc}	12.64 (2.69) ^{ab}	0.14 (0.08) ^a	0.76 (0.11) ^{abcd}	0.08 (0.01) ^a	17.03 (2.06) ^c	146.79 (18.27) ^{ab}	8.77 (0.81) ^{ab}	3.93 (1.03) ^{bc}
900	0.75 (0.50) ^d	8.25 (0.33) ^{abc}	0.52 (0.03) ^{bc}	0.14 (0.02) ^c	6.09 (0.10) ^{ab}	18.84 (2.06) ^a	0.17 (0.11) ^a	0.58 (0.08) ^{bcd}	0.06 (<0.01) ^a	14.72 (1.43) ^c	150.58 (28.87) ^{ab}	10.02 (1.34) ^{ab}	2.76 (0.47) ^c

<u>Salix</u>													
450	2.81 (0.21) ^{ab}	8.45 (0.39) ^{ab}	0.63 (0.05) ^{ab}	0.38 (0.08) ^{abc}	5.68 (0.23) ^{bc}	23.81 (6.44) ^a	0.70 (0.65) ^a	0.94 (0.16) ^{abc}	0.08 (0.03) ^a	17.97 (1.11) ^c	264.85 (55.05) ^{ab}	14.74 (2.96) ^{ab}	3.80 (0.30) ^{bc}
700	2.28 (0.19) ^{bc}	7.01 (0.32) ^{cde}	0.64 (0.06) ^{ab}	0.43 (0.08) ^{ab}	6.49 (0.13) ^a	13.76 (2.14) ^{ab}	0.39 (0.06) ^a	1.18 (0.14) ^a	0.08 (0.02) ^a	18.36 (0.59) ^c	294.67 (41.94) ^{ab}	16.01 (2.21) ^a	6.23 (0.55) ^a
900	1.89 (0.16) ^c	6.85 (0.18) ^{de}	0.48 (0.06) ^{bc}	0.13 (0.03) ^c	5.84 (0.11) ^{bc}	13.24 (3.95) ^{ab}	0.17 (0.08) ^a	0.48 (0.12) ^{cd}	0.06 (<0.01) ^a	14.89 (0.40) ^c	117.07 (25.46) ^b	7.92 (1.81) ^b	3.50 (0.29) ^{bc}
F-value (p-value)													
Vegetation type (V)	27.66 (<0.001)	24.34 (<0.001)	12.62 (<0.001)	16.37 (<0.001)	106.47 (<0.001)	19.52 (<0.001)	7.49 (0.002)	6.18 (0.005)	0.95 (0.395)	43.32 (<0.001)	10.62 (<0.001)	3.56 (0.40)	12.03 (<0.001)
Elevation (E)	64.49 (<0.001)	18.43 (<0.001)	8.40 (0.001)	6.51 (0.004)	7.49 (0.002)	1.93 (0.159)	1.32 (0.282)	9.82 (<0.001)	4.37 (0.020)	9.96 (<0.001)	1.07 (0.356)	0.14 (0.872)	14.81 (<0.001)
V × E	7.72 (<0.001)	0.56 (0.692)	8.28 (<0.001)	4.66 (0.004)	6.36 (<0.001)	1.26 (0.310)	1.07 (0.388)	6.81 (<0.001)	1.49 (0.224)	2.74 (0.043)	1.38 (0.263)	3.90 (0.011)	6.42 (<0.001)

Numerator df for vegetation = 2, for elevation = 2, and for vegetation × elevation = 4; denominator df is estimated with the Satterthwaite method and is 32, 34 or 36, respectively

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