**Supporting Information**

Fig S1. Effect of greenhouses on mean diel air and soil temperatures at 10 cm depth measured using dataloggers through the 2008, 2009 and 2011 growing seasons (a), and daytime soil temperatures at 2 cm and 10 cm depth measured manually in summer 2006 (b).

Fig S2. Greenhouse treatment increase in mean diel temperature and 4 pm temperatures through the growing season.

Table S1. Linear regression parameters used for the hits: biomass calibration

Table S2. Bonferroni correction thresholds for the species-level analyses

Table S3. Dissolved organic, inorganic, and microbial soil C, N and P pools in the the warming and fertilization treatments

Table S4. Plant part- and age-differentiated biomass for all species and functional groups in the warming and fertilization treatments

Table S5. Effect of greenhouses on soil moisture

Table S6. Effects of greenhouse warming and low-level N additions on dissolved organic and inorganic C, N, and P pools

Table S7. Effects of factorial N and P additions on dissolved organic and inorganic C, N, and P pools

Table S8. Number of inflorescences and fruits for vascular plant species in the greenhouse warming and control plots

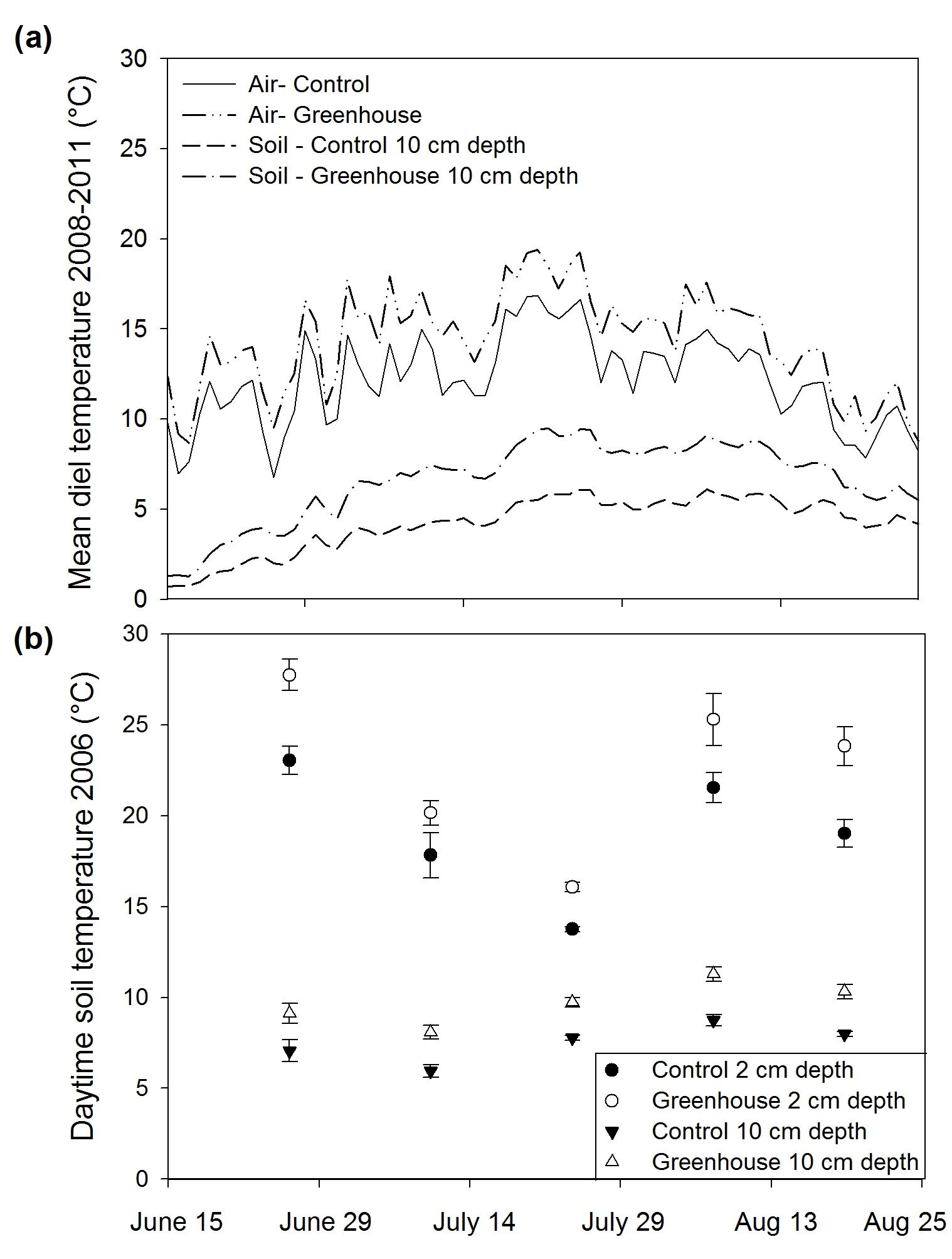


Fig S1. Effect of greenhouses on mean diel air and soil temperatures at 10 cm depth measured using dataloggers through the 2008, 2009 and 2011 growing seasons (a), and daytime soil temperatures at 2 cm and 10 cm depth measured manually in summer 2006 (b). Error bars in (b) are standard errors (n=5 plots with 12 recordings per plot per date).

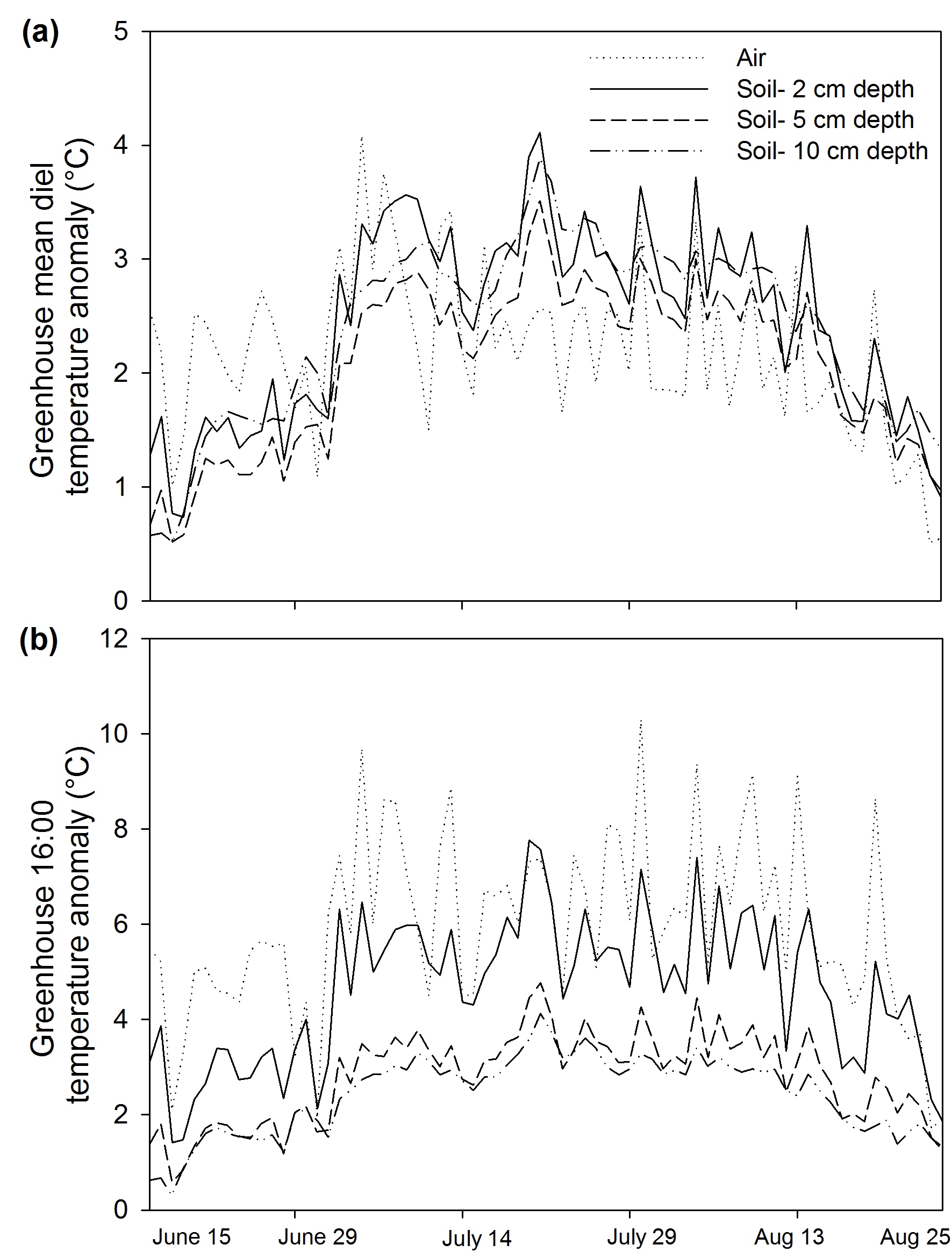


Fig S2. Greenhouse treatment increase in mean growing season air and soil diel temperatures (a), and 4 pm (close to daily peak) air and soil temperatures (b) throughout the growing seasons of 2008, 2009 and 2011 (datalogger malfunction in 2010). Data are based on 4-hourly averages of 2 probes per depth per treatment.

Table S1. Linear regression parameters used for the hits: biomass calibration. Data used in the calibration were natural log-transformed aboveground biomass and natural-log transformed number of point framing hits on aboveground biomass. Original equation: *Y = kXn*; Taking the natural log of both sides becomes: ln *Y* = *n* ln *X* + ln *k*; Let *Y’* = ln *Y* and *X’* = ln *X*; Linear equation is: *Y’*= *aX’* + *b*; Solved for *Y* is then: *Y*=*exp*(*a* ln *X* + *b*). The calibration for C. *laevigata* used the *C. islandica* equation due to insufficient *C. laevigata* hits in the 0.16 m-2 area

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  | Slope | |  | Intercept | |
|  | r2 | *P* |  | Value | 1 SE |  | Value | 1 SE |
| *Betula glandulosa* |  |  |  |  |  |  |  |  |
| Leaves | 0.38 | 0.0003 |  | 0.49 | 0.13 |  | 0.95 | 0.28 |
| Stem | 0.26 | 0.0038 |  | 0.71 | 0.22 |  | 2.34 | 0.31 |
|  |  |  |  |  |  |  |  |  |
| *Vaccinium uliginosum* |  |  |  |  |  |  |  |  |
| Leaves | 0.71 | <0.0001 |  | 0.48 | 0.06 |  | 0.28 | 0.09 |
| Stem | 0.27 | 0.0033 |  | 0.83 | 0.26 |  | 1.07 | 0.25 |
|  |  |  |  |  |  |  |  |  |
| *Rhododendron subarcticum* |  |  |  |  |  |  |  |  |
| Leaves | 0.86 | <0.0001 |  | 0.74 | 0.06 |  | 0.53 | 0.20 |
| Stem | 0.50 | <0.0001 |  | 0.82 | 0.12 |  | 2.14 | 0.36 |
|  |  |  |  |  |  |  |  |  |
| *Vaccinium vitis-idaea* |  |  |  |  |  |  |  |  |
| Leaves | 0.90 | <0.0001 |  | 0.83 | 0.05 |  | 0.36 | 0.18 |
| Stem | 0.38 | 0.0003 |  | 0.65 | 0.16 |  | 1.57 | 0.26 |
|  |  |  |  |  |  |  |  |  |
| *Andromeda polifolia* |  |  |  |  |  |  |  |  |
| Leaves | 0.57 | <0.0001 |  | 0.71 | 0.12 |  | 0.52 | 0.17 |
| Stem | 0.18 | 0.0211 |  | 0.67 | 0.27 |  | 1.02 | 0.22 |
|  |  |  |  |  |  |  |  |  |
| *Eriophorum vaginatum* | 0.79 | <0.0001 |  | 0.58 | 0.06 |  | 0.90 | 0.21 |
|  |  |  |  |  |  |  |  |  |
| *Rubus chamaemorus* | 0.80 | <0.0001 |  | 0.74 | 0.07 |  | 0.21 | 0.10 |
|  |  |  |  |  |  |  |  |  |
| Mosses | 0.59 | <0.0001 |  | 0.64 | 0.10 |  | 2.49 | 0.29 |
|  |  |  |  |  |  |  |  |  |
| Lichens |  |  |  |  |  |  |  |  |
| *Alectoris ochroleuca* | 0.59 | <0.0001 |  | 0.34 | 0.05 |  | 0.16 | 0.06 |
| *Bryocaulon divergens* | 0.23 | 0.0075 |  | 0.27 | 0.09 |  | 0.58 | 0.15 |
| *Cetraria cucullata* | 0.67 | <0.0001 |  | 0.78 | 0.10 |  | 0.37 | 0.39 |
| *Cetraria islandica* | 0.27 | 0.0034 |  | 0.29 | 0.09 |  | 0.86 | 0.14 |
| *Cetraria nivalis* | 0.08 | 0.1396 |  | 0.21 | 0.14 |  | 1.43 | 0.29 |
| *Cladina mitis* | 0.39 | 0.0002 |  | 0.44 | 0.10 |  | 1.17 | 0.21 |
| *Cladina rangiferina* | 0.44 | <0.0001 |  | 0.48 | 0.10 |  | 1.56 | 0.27 |
| *Cladonia gracilis* | 0.22 | 0.0084 |  | 0.31 | 0.11 |  | 1.13 | 0.17 |
| *Masonhalea richardsonni* | 0.80 | <0.0001 |  | 1.03 | 0.10 |  | 0.27 | 0.11 |

Table S2. Bonferroni correction thresholds for the species-level analyses. α = 0.05/(number of above- or below-ground tissues being compared for a given species). Aboveground and belowground plant parts were considered as two separate groups for the warming analysis so that α for any given aboveground part remained the same for the warming analyses and for the fertilization analyses

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Warming analysis** |  | **Fertilization analyses** |
|  | α |  | α |
| *B. glandulosa* |  |  |  |
| Leaves | 0.0167 |  | 0.0167 |
| New stem | 0.0167 |  | 0.0167 |
| Old stem | 0.0167 |  | 0.0167 |
| Fine roots | 0.0167 |  |  |
| Coarse roots | 0.0167 |  |  |
| Belowground stem | 0.0167 |  |  |
| Total aboveground | 0.05 |  |  |
| Total belowground | 0.05 |  |  |
| Total above- and belowground | 0.05 |  |  |
|  |  |  |  |
| *V. uliginosum* |  |  |  |
| Leaves | 0.0167 |  | 0.0167 |
| New stem | 0.0167 |  | 0.0167 |
| Old stem | 0.0167 |  | 0.0167 |
| Fine roots | 0.0250 |  |  |
| Coarse roots | 0.0250 |  |  |
| Total aboveground | 0.05 |  |  |
| Total belowground | 0.05 |  |  |
| Total above- and belowground | 0.05 |  |  |
|  |  |  |  |
| *R. subarcticum* |  |  |  |
| New leaves | 0.0125 |  | 0.0125 |
| New stem | 0.0125 |  | 0.0125 |
| Old leaves | 0.0125 |  | 0.0125 |
| Old stem | 0.0125 |  | 0.0125 |
| Fine roots | 0.0167 |  |  |
| Coarse roots | 0.0167 |  |  |
| Belowground stem | 0.0167 |  |  |
| Total aboveground | 0.05 |  |  |
| Total belowground | 0.05 |  |  |
| Total above- and belowground | 0.05 |  |  |
|  |  |  |  |
| *V. vitis-idaea* |  |  |  |
| New leaves | 0.0125 |  | 0.0125 |
| New stem | 0.0125 |  | 0.0125 |
| Old leaves | 0.0125 |  | 0.0125 |
| Old stem | 0.0125 |  | 0.0125 |
| Fine roots | 0.05 |  |  |
| Total aboveground | 0.05 |  |  |
| Total above- and belowground | 0.05 |  |  |
|  |  |  |  |
| *A. polifolia* |  |  |  |
| New leaves | 0.0125 |  | 0.0125 |
| New stem | 0.0125 |  | 0.0125 |
| Old leaves | 0.0125 |  | 0.0125 |
| Old stem | 0.0125 |  | 0.0125 |
| Fine roots | 0.05 |  |  |
| Total aboveground | 0.05 |  |  |
| Total above- and belowground | 0.05 |  |  |
|  |  |  |  |
| *E. vaginatum* |  |  |  |
| Blades | 0.0250 |  | 0.0250 |
| Sheaths | 0.0250 |  | 0.0250 |
| Fine roots | 0.05 |  |  |
| Total aboveground | 0.05 |  |  |
| Total above- and belowground | 0.05 |  |  |
|  |  |  |  |
| *R. chamaemorus* |  |  |  |
| Shoots | 0.05 |  | 0.05 |
| Rhizomes | 0.05 |  |  |
| Total above- and belowground | 0.05 |  |  |
|  |  |  |  |
| Mosses |  |  |  |
| *Sphagnum spp.* | 0.0250 |  | 0.0250 |
| Non-*Sphagnum spp.* | 0.0250 |  | 0.0250 |
| Total mosses | 0.05 |  | 0.05 |
|  |  |  |  |
| Lichen |  |  |  |
| Each individual spp. | 0.05 |  | 0.05 |
| Total lichens | 0.05 |  | 0.05 |

Table S3. Dissolved organic, inorganic, and microbial soil C, N and P pools in the the warming and fertilization treatments. Mean values are presented, with standard error in parentheses (n=5)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Control** |  | **Greenhouse** |  | **Low N addition** |  | **High N addition** |  | **High P addition** |  | **High N+P addition** |
| DOC (g m-2) | 9.74  (0.83) |  | 13.49  (1.92) |  | 14.83  (2.93) |  | 9.44  (0.64) |  | 11.05  (1.63) |  | 9.52  (0.89) |
| DON (mg m-2) | 572.82  (66.05) |  | 642.09  (95.15) |  | 1177.27 (189.50) |  | 9074.80 (2680.72) |  | 888.15 (142.54) |  | 3943.06 (1119.31) |
| NH4-N (mg N m-2) | 16.66  (3.51) |  | 19.33  (2.26) |  | 78.56  (35.92) |  | 5299.09 (2618.58) |  | 278.26 (167.25) |  | 1646.12 (792.33) |
| NO3-N (mg N m-2) | 0.17  (0.11) |  | 1.03  (0.61) |  | 1.80  (0.84) |  | 509.33 (174.81) |  | 12.05  (8.86) |  | 234.48 (107.92) |
| PO4-P (mg P m-2) | 51.02  (6.22) |  | 71.27  (12.97) |  | 37.63  (12.31) |  | 68.56  (18.02) |  | 2180.56 (525.48) |  | 1290.75 (253.11) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| MBC (g m-2) | 38.73 (2.14) |  | 41.00 (2.50) |  | 56.54 (7.28) |  | 37.35 (1.80) |  | 26.41 (3.53) |  | 28.09 (3.65) |
| MBN (g m-2) | 3.45 (0.19) |  | 3.40 (0.40) |  | 6.42 (0.93) |  | 6.01(1.06) |  | 4.00 (0.41) |  | 5.52 (0.64) |
| MBP (g m-2) | 0.49 (0.17) |  | 0.88 (0.29) |  | 0.36 (0.12) |  | 0.27 (0.09) |  | 0.74 (0.30) |  | 0.81 (0.20) |

Table S4. Plant part- and age-differentiated biomass (g m-2) for all species and functional groups in the warming and fertilization treatments. Mean values are presented, with standard error in parentheses (n=5); “n.a.” indicates standard error not available, as all replicates had the same extrapolated biomass at 1.0 m2

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Control** |  | **Greenhouse** |  | **Low N addition** |  | **High N addition** |  | **High P addition** |  | **High N+P addition** |
| *B. glandulosa* |  |  |  |  |  |  |  |  |  |  |  |
| Leaves | 2.68 (0.45) |  | 6.02 (1.01) |  | 4.31 (1.25) |  | 5.09 (0.80) |  | 7.41 (1.38) |  | 8.57 (1.92) |
| New stem | 0.28 (0.06) |  | 0.87 (0.27) |  | 0.22 (0.08) |  | 2.79 (1.15) |  | 0.97 (0.27) |  | 4.75 (2.44) |
| Old stem | 11.66 (1.55) |  | 31.72 (9.28) |  | 17.83 (5.48) |  | 23.99 (4.42) |  | 28.89 (7.53) |  | 29.57 (14.69) |
| Fine roots | 3.22 (1.16) |  | 11.02 (3.02) |  |  |  |  |  |  |  |  |
| Coarse roots | 7.91 (2.02) |  | 7.98 (1.91) |  |  |  |  |  |  |  |  |
| Belowground stem | 34.33 (4.53) |  | 24.15 (6.41) |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *V. uliginosum* |  |  |  |  |  |  |  |  |  |  |  |
| Leaves | 1.08 (0.37) |  | 1.32 (0.42) |  | 2.00 (0.86) |  | 0.32 (n.a.) |  | 1.69 (0.93) |  | 0.32 (n.a.) |
| New stem | 0.17 (0.07) |  | 0.27 (0.10) |  | 0.32 (0.13) |  | 0.14 (0.01) |  | 0.25 (0.04) |  | 0 (0) |
| Old stem | 3.50 (1.01) |  | 7.15 (2.95) |  | 5.68 (2.11) |  | 1.78 (0.01) |  | 2.59 (0.54) |  | 1.93 (n.a.) |
| Fine roots | 4.55 (1.32) |  | 9.39 (5.06) |  |  |  |  |  |  |  |  |
| Coarse roots | 5.00 (3.14) |  | 3.99 (2.18) |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *R. subarcticum* |  |  |  |  |  |  |  |  |  |  |  |
| New leaves | 18.04 (0.95) |  | 28.75 (2.01) |  | 16.83 (2.76) |  | 4.49 (2.15) |  | 14.59 (3.33) |  | 5.28 (2.83) |
| New stem | 2.62 (0.43) |  | 5.82 (0.58) |  | 3.66 (0.83) |  | 0.59 (0.27) |  | 2.76 (0.86) |  | 3.86 (0.90) |
| Old leaves | 12.66 (1.24) |  | 39.30 (4.09) |  | 14.21 (2.05) |  | 2.82 (1.03) |  | 6.78 (1.43) |  | 0.67 (0.40) |
| Old stem | 81.37 (13.63) |  | 146.87 (16.41) |  | 71.78 (12.79) |  | 14.14 (4.00) |  | 33.51 (11.02) |  | 14.72 (8.68) |
| Fine roots | 26.95 (6.06) |  | 67.64 (6.43) |  |  |  |  |  |  |  |  |
| Coarse roots | 101.71 (17.61) |  | 245.11 (27.75) |  |  |  |  |  |  |  |  |
| Belowground stem | 10.36 (1.25) |  | 42.06 (4.21) |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *V. vitis-idaea* |  |  |  |  |  |  |  |  |  |  |  |
| New leaves | 16.03 (0.71) |  | 18.77 (2.83) |  | 11.47 (2.46) |  | 1.96 (0.92) |  | 9.22 (2.33) |  | 0.43 (0.17) |
| New stem | 1.15 (0.17) |  | 2.16 (0.35) |  | 1.49 (0.33) |  | 0.28 (0.07) |  | 1.31 (0.50) |  | 0.58 (0.08) |
| Old leaves | 29.89 (2.78) |  | 33.95 (3.17) |  | 23.61 (5.63) |  | 3.78 (1.70) |  | 9.54 (2.30) |  | 1.29 (0.38) |
| Old stem | 12.23 (1.13) |  | 18.39 (2.58) |  | 15.45 (3.21) |  | 4.55 (0.99) |  | 9.14 (2.64) |  | 3.23 (0.08) |
| Fine roots | 83.84 (13.59) |  | 61.33 (7.05) |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *A. polifolia* |  |  |  |  |  |  |  |  |  |  |  |
| New leaves | 3.33 (1.43) |  | 3.31 (0.65) |  | 4.49 (1.26) |  | 1.67 (0.93) |  | 1.71 (0.59) |  | 0.91 (0.59) |
| New stem | 0.20 (0.07) |  | 0.37 (0.10) |  | 0.50 (0.21) |  | 0.22 (0.11) |  | 0.14 (0.04) |  | 0.18 (0.04) |
| Old leaves | 4.45 (1.91) |  | 5.46 (1.02) |  | 4.72 (1.14) |  | 1.28 (0.82) |  | 0.82 (0.24) |  | 1.03 (0.66) |
| Old stem | 4.02 (1.31) |  | 5.25 (1.66) |  | 6.99 (1.56) |  | 3.06 (1.39) |  | 1.97 (0.29) |  | 2.21 (0.56) |
| Fine roots | 16.39 (6.68) |  | 18.22 (5.18) |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *E. vaginatum* |  |  |  |  |  |  |  |  |  |  |  |
| Blades | 6.90 (1.83) |  | 13.23 (1.67) |  | 10.91 (1.86) |  | 13.67 (3.93) |  | 16.20 (5.66) |  | 51.75 (11.09) |
| Sheaths | 5.19 (1.52) |  | 9.51 (1.47) |  | 4.40 (1.23) |  | 4.92 (1.75) |  | 6.45 (2.61) |  | 19.48 (4.37) |
| Fine roots | 3.14 (0.73) |  | 6.15 (0.93) |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| *R. chamaemorus* |  |  |  |  |  |  |  |  |  |  |  |
| Shoots | 1.00 (0.40) |  | 1.11 (0.57) |  | 0.56 (0.20) |  | 0.87 (0.29) |  | 4.97 (1.84) |  | 8.33 (3.52) |
| Rhizomes | 9.02 (4.93) |  | 10.09 (5.22) |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Mosses |  |  |  |  |  |  |  |  |  |  |  |
| *Sphagnum spp.* | 6.15 (2.59) |  | 32.93 (14.27) |  | 38.62 (19.88) |  | 0.16 (0.16) |  | 14.13 (11.91) |  | 0.73 (0.73) |
| Non-*Sphagnum spp.* | 66.07 (8.81) |  | 50.75 (6.60) |  | 68.99 (13.16) |  | 40.71 (9.25) |  | 68.37 (15.90) |  | 80.28 (20.45) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Lichens |  |  |  |  |  |  |  |  |  |  |  |
| *Alectoris ochroleuca* | 1.04 (0.24) |  | 0.42 (0.15) |  | 0.81 (0.16) |  | 0.38 (0.14) |  | 0.56 (0.24) |  | 0.30 (0.08) |
| *Bryocaulon divergens* | 2.57 (0.09) |  | 1.23 (0.19) |  | 2.43 (0.39) |  | 2.08 (0.19) |  | 1.81 (0.27) |  | 1.61 (0.39) |
| *Cetraria cucullata* | 35.95 (1.70) |  | 16.94 (2.13) |  | 29.50 (3.48) |  | 25.39 (2.12) |  | 30.63 (1.57) |  | 17.13 (4.35) |
| *Cetraria islandica* | 2.65 (0.35) |  | 2.27 (0.35) |  | 2.12 (0.23) |  | 2.36 (0.43) |  | 2.49 (0.06) |  | 1.83 (0.35) |
| *Cetraria laevigata* | 1.75 0.17) |  | 1.47 (0.11) |  | 1.86 (0.26) |  | 1.36 (n.a.) |  | 1.68 (0.13) |  | 1.47 (0.11) |
| *Cetraria nivalis* | 6.26 (0.12) |  | 3.93 (0.34) |  | 6.58 (0.29) |  | 6.04 (0.28) |  | 3.32 (0.13) |  | 5.65 (0.65) |
| *Cladina mitis* | 11.16 (1.00) |  | 3.70 (0.21) |  | 10.96 (1.10) |  | 6.74 (1.16) |  | 5.75 (1.63) |  | 5.06 (0.90) |
| *Cladina rangiferina* | 21.20 (2.74) |  | 10.93 (1.01) |  | 26.08 (1.50) |  | 17.85 (2.60) |  | 14.62 (2.89) |  | 9.16 (2.11) |
| *Cladonia gracilis* | 4.27 (0.61) |  | 2.73 (0.31) |  | 4.59 (0.78) |  | 3.64 (0.59) |  | 3.32 (0.47) |  | 2.25 (0.15) |
| *Masonhalea richardsonni* | 6.54 (2.96) |  | 1.15 (0.83) |  | 1.71 (1.40) |  | 2.29 (1.98) |  | 7.40 (3.19) |  | 3.69 (2.13) |
| Total lichen | 96.97 (3.88) |  | 48.16 (3.48) |  | 90.25 (6.33) |  | 72.12 (4.25) |  | 75.31 (3.87) |  | 52.04 (8.75) |
|  |  |  |  |  |  |  |  |  |  |  |  |
| Standing dead | 100.83 (25.67) |  | 163.40 (27.70) |  | 95.73 (18.32) |  | 116.45 (22.67) |  | 142.39 (35.54) |  | 297.83 (69.37) |
| Litter | 786.30  (77.51) |  | 600.74 (121.93) |  | 857.39 (269.78) |  | 1273.93 (103.52) |  | 1068.11 (39.81) |  | 913.04 (157.12) |

Table S5. Effects of greenhouses on soil moisture. All measurements are for 0-8 cm depth, with the exception of 20 Aug Surface measurements which were 0-4 cm depth. Measurements collected at 6 tussock and 6 inter-tussock locations within each plot, at 5 dates throughout the 2006 growing season. Statistical test results from repeated measures ANOVA on 5 dates with measurements at 0-8 cm depth; no data transformation used; d.f.=degrees of freedom

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Soil moisture (%) | | | | |  |
|  | 24 June | 10 July | 24 July | 7 Aug | 20 Aug | Surface- 20 Aug |
| Tussocks: |  |  |  |  |  |  |
| Control | 21.8 (3.6) | 29.0 (2.6) | 28.1 (2.7) | 19.9 (2.3) | 18.3 (2.8) | 13.6 (2.8) |
| Warming | 24.1 (3.2) | 26.7 (3.5) | 26.8 (2.9) | 19.5 (2.0) | 18.8 (2.7) | 12.8 (2.2) |
|  |  |  |  |  |  |  |
| Treatment effect: | d.f. = 1,8 | F<0.01 | P=0.94 |  |  |  |
| Date effect: | d.f.= 4, 32 | F=8.41 | P<0.01\* |  |  |  |
| Trt\* Date effect: | d.f.= 4,32 | F=0.37 | P=0.83 |  |  |  |
|  |  |  |  |  |  |  |
|  | Soil moisture (%) | | | | |  |
|  | 24 June | 10 July | 24 July | 7 Aug | 20 Aug | Surface- 20 Aug |
| Inter-tussocks: |  |  |  |  |  |  |
| Control | 40.4 (2.4) | 41.8 (3.2) | 43.2 (1.9) | 41.5 (5.5) | 34.1 (3.7) | 22.7 (3.6) |
| Warming | 41.0 (4.0) | 51.7 (4.0) | 46.7 (4.9) | 40.2 (2.1) | 36.3 (1.8) | 21.2 (1.9) |
|  |  |  |  |  |  |  |
| Treatment effect: | d.f. = 1,8 | F=0.65 | P=0.44 |  |  |  |
| Date effect: | d.f.= 4, 32 | F=5.69 | P<0.01\* |  |  |  |
| Trt\* Date effect: | d.f.= 4,32 | F=1.28 | P=0.30 |  |  |  |

Table S6. Effects of greenhouse warming and low-level N additions on dissolved organic and inorganic C, N, and P pools. Results from two separate analyses; t-test of Greenhouses and Controls; and t-tests of Low-N and Controls. In all cases, degrees of freedom= 8. Bolded values indicate tests are significant (*P*<0.05). Symbols following *P* values indicate the data transformations used to achieve homogeneity of variances: no symbol, not transformed; †log-transformed; rc, reciprocal transform; W, Wilcoxon rank sum test on raw data

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Warming** | |  | **Low-level N addition** | |
|  |  | *T* | *P* |  | *T* | *P* |
| DOC | (g m-2) | -1.79 | 0.111 |  | -1.88 | 0.096† |
| DON | (mg m-2) | -0.60 | 0.566 |  | -3.01 | **0.017** |
| NH4-N | (mg N m-2) | -0.64 | 0.541 |  | -2.69 | **0.028rc** |
| NO3-N | (mg N m-2) | W=8 | 0.473 |  | W=4.5 | 0.106 |
| PO4-P | (mg P m-2) | -1.41 | 0.197 |  | 0.97 | 0.360 |

Table S7. Effects of factorial N and P additions on dissolved organic and inorganic C, N, and P pools. Degrees of freedom= 1,19 in all tests. Bolded values indicate tests that are significant (*P*<0.05). In the Tukey results, treatments that do not share the same superscript letter(s) are significantly different (*P*<0.05). DOC= dissolved organic carbon; DON= dissolved organic nitrogen. Symbols following variable name indicate the data transformations used to achieve homogeneity of variances: no symbol, not transformed; †log-transformed; W, Wilcoxon rank sum test on raw data

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **N effect** | |  | **P effect** | |  | **N x P interaction** | | **Post-hoc Tukey** |
|  |  | *F* | *P* |  | *F* | *P* |  | *F* | *P* |  |
| DOC | (g m-2) | 0.74 | 0.402 |  | 0.42 | 0.527 |  | 0.33 | 0.573 |  |
| DON | (mg m-2) | **W=81** | **0.019** |  | W=54 | 0.796 |  | NA |  |  |
| NH4-N† | (mg N m-2) | **69.23** | **<0.001** |  | 1.11 | 0.307 |  | **15.19** | **0.001** | Controlc; High Na; High Pb; High NPa |
| NO3-N† | (mg N m-2) | **31.4** | **<0.001** |  | 0.00 | 0.957 |  | 3.05 | 0.100 | Controlc; High Na; High Pb,c; High NPa,b |
| PO4-P† | (mg P m-2) | 0.410 | 0.531 |  | **240.83** | **<0.001** |  | 2.41 | 0.140 | Controlb; High Nb; High Pa; High NPa |

Table S8. Number of inflorescences and fruits for vascular plant species in the greenhouse warming and control plots. Mean values are presented, with standard error in parentheses (n=5)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Inflorescences**  **(# m-2)** | |  | **Fruit set**  **(# m-2)** | |
|  | Control | Warming |  | Control | Warming |
| *B. glandulosa* | 9.0 (4.3) | 0 (0) |  |  |  |
| *V. uliginosum* | 2.0 (1.5) | 4.0 (1.3) |  | 0.2 (0.2) | 0 (0) |
| *R. subarcticum* | 258.8 (64.9) | 445.2 (75.5) |  |  |  |
| *V. vitis-idaea* | 25.4 (19.1) | 121.4 (46.3) |  | 5.6 (5.4) | 23.8 (11.9) |
| *A. polifolia* | 17.0 (8.6) | 27.2 (17.7) |  |  |  |
| *E. vaginatum* | 2.2 (1.1) | 2.2 (0.7) |  |  |  |
| *R. chamaemorus* | 0.2 (0.2) | 1.4 (0.7) |  | 0 (0) | 0 (0) |