

# 1 Supporting information

## 2 Appendix S1 Nitrogen fixation potential

### 3 MATERIALS AND METHODS

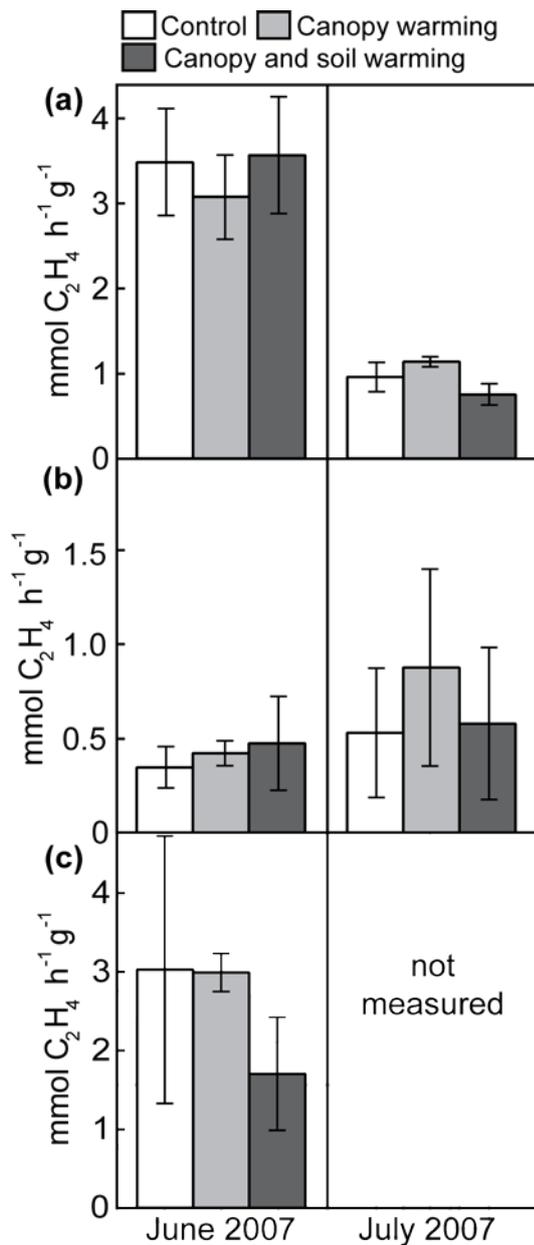
4 Samples for nitrogen fixation measurements were randomly selected and carefully removed  
5 from the plots. They consisted of whole, cleaned thalli or tufts of ca. 25 cm<sup>2</sup> which were  
6 measured using the acetylene reduction assay (Stewart, W.D.P., Fitzgerald, G.P., Burris, R.H.  
7 (1967) *In situ* studies on N<sub>2</sub> fixation using acetylene reduction technique. *Proceedings of the*  
8 *National Academy of Sciences of the United States of America*, **58**, 2071–2078). Acetylene  
9 reduction rates of *Peltigera aphthosa* and *Hylocomium splendens* were measured twice during  
10 the growing season after the first winter warming event (2007), whereas *Nephroma arcticum*  
11 was measured only during the first event. Due to the relatively large size of the samples and  
12 the restricted amount of samples in the plots, nitrogen fixation activity was not assessed later.  
13 Samples were wetted the evening before and kept moist overnight. They were placed in air-  
14 tight chambers outdoors and incubated with 10% (v:v) acetylene for ca. 2 h (exact incubation  
15 time noted for every sample). Mean chamber temperatures (1-3 °C higher than ambient) and  
16 PPFD during incubation were 11.8 °C and 332 μmol m<sup>-2</sup> s<sup>-1</sup> (June), and 12.0 °C and 276 μmol  
17 m<sup>-2</sup> s<sup>-1</sup> (July). Gas samples were measured according to Zielke *et al.* (Zielke, M., Ekker, A.S.,  
18 Olsen, R.A., Spjelkavik, S., Solheim, B. (2002) The influence of abiotic factors on biological  
19 nitrogen fixation in different types of vegetation in the High Arctic. *Arctic, Antarctic and*  
20 *Alpine Research*, **34**, 293–299).

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### 22 RESULTS

23 The warming treatments did not affect ethylene production in *Peltigera aphthosa*,  
24 *Hylocomium splendens* and *Nephroma arcticum* (Fig. S1). In *P. aphthosa*, there was a time  
25 effect with values being higher in June 2007 than in July 2007.

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28 **Fig. S1.** Nitrogen fixation rates of (a) *Peltigera aphthosa* (treatment:  $F_{2,11} = 0.16$ ,  $P = 0.86$ ,  
 29 time:  $F_{1,11} = 46.59$ ,  $P = 0.000$ ), (b) *Hylocomium splendens* (treatment:  $F_{2,13} = 0.75$ ,  $P = 0.49$ ,  
 30 time:  $F_{1,13} = 0.10$ ,  $P = 0.76$ ), and (c) *Nephroma arcticum* (treatment:  $F_{1,4} = 0.63$ ,  $P = 0.47$ ).  $n$   
 31 = 4-6 per treatment and time combination. Error bars are  $\pm 1$  standard error. n.m. = not  
 32 measured.