**Supplement**

**Table S1.** Three-way ANOVA results (F values) of effects of N addition rate (rate), N form (form), moss species (species) and their interactions on moss N content, cumulative N2 fixation rates, pH and phycocyanin content. Signiﬁcant *p*-values (*p* < 0.05) in bold, n = 6.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | N content | | |  | | cumulative N2 fixation rates | | |  | | pH | | |  | | phycocyanin | | | |
|  |  | *F* | *p* |  | | *F* | | *p* |  | | *F* | | *p* |  | | *F* | | *p* |
| rate |  | 459.26 | **< 0.001** |  | | 0.70 | | 0.56 |  | | 41.30 | | **< 0.001** |  | | 3.33 | | **0.02** | |
| form |  | 4.09 | **0.02** |  | | 4.73 | | **0.01** |  | | 153.18 | | **< 0.001** |  | | 7.73 | | **< 0.001** | |
| species |  | 20.63 | **< 0.001** |  | | 33.73 | | **< 0.001** |  | | 166.04 | | **< 0.001** |  | | 15.09 | | **< 0.001** | |
| rate×form |  | 0.92 | 0.49 |  | | 2.38 | | **0.03** |  | | 72.07 | | **< 0.001** |  | | 1.59 | | 0.15 | |
| rate×species |  | 15.45 | **< 0.001** |  | | 1.18 | | 0.32 |  | | 1.51 | | 0.22 |  | | 0.86 | | 0.46 | |
| form×species |  | 0.33 | 0.72 |  | | 3.66 | | **0.03** |  | | 13.60 | | **< 0.001** |  | | 0.59 | | 0.56 | |
| rate×form×species |  | 0.31 | 0.93 |  | | 0.98 | | 0.44 |  | | 4.86 | | **< 0.001** |  | | 1.28 | | 0.27 | |

**Fig. S1** Ethylene production (mean ± SE, n = 6) as measured with the acetylene reduction assay (ARA) in response to different N addition rates and forms in two moss species (*P. schreberi* and *S. capillifolium*) once per week during the experiment. Nitrogen was added at levels within realistic and extreme deposition scenarios (right at left side of the dotted line, full symbols) or no N added (open circles). Realistic and extreme N addition scenarios correspond to 0, 0.4, 2 and 4 kg N ha-1 yr-1 and 0, 2, 10, 20 kg N ha-1 yr-1, respectively. On the x axes, half\_r and full\_r correspond to samples that received half or the full amount of the realistic N addition, and half\_e and full\_e represent samples that received half or the full amount of the extreme N addition. During recovery weeks, samples received only ddH2O.

**Fig. S2** Relationships between pH and acetylene reduction in week7. Different shapes of symbols indicate different N forms, and the different colors indicate the two moss species investigated (red=P*. schreberi*, blue=*S. capillifolium*). The vertical dotted lines show the optimum pH (5.06 for *P. schreberi* and 4.91 for *S. capillifolium*) for acetylene reduction given by the model.

Fig. S1

![Chart

Description automatically generated]()

Fig. S2

Chart

Description automatically generated