Relative growth rate of rich fen bryophytes
-a greenhouse experiment on common and rare species

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Background
Rich fens are among the most species rich habitats in the Northern hemisphere, and many rare and endangered species are restricted to these habitats. During the past century European rich fen-areas have decreased, and characteristic bryophyte species have become rare. The major threats to the habitat type are changed hydrology and raised nutrient availability.

Aim: We study the effect of different nutrient levels and water type on the relative growth rate and tissue nutrient content of two rare (Hamatocaulis vernicosus and Paludella squarrosa) and two common (Calliergonella cuspidata and Bryum pseudotriquetrum) rich fen bryophytes.

Experiment
The four species, Bryum pseudotriquetrum (BP), Calliergonella cuspidata (CC), Hamatocaulis vernicosus (HV) and Paludella squarrosa (PS) were grown in mixture at three different levels of nitrogen (addition of 0 mg N/L, 1 mg N/L or 3 mg N/L), three different levels of phosphorus (addition of 0 mg P/L, 0.05 mg P/L or 0.1 mg P/L) and two types of water (rain water or groundwater). The experiment ran for 10 months in an unheated greenhouse. Relative growth rate (RGR) was calculated and tissue content of N and P was measured.

Results I
Irrespective of treatment, C. cuspidata had the highest relative growth rate, whereas the two rare species, P. squarrosa and H. vernicosus, had lowest relative growth rate, which correspond to the species being restricted to very nutrient poor habitats.

Results II
The figure shows the relative percentage of explained variation (partial R²) of relative growth rate in each species. The species are very differently impacted by treatment parameters.

Conclusions
• The high RGR of Calliergonella cuspidata compared to the other species in this experiment irrespective of nutrient level offers an explanation to, why the species is much more common.
• All species, but particularly P. squarrosa, had higher RGR in ground water compared to rainwater.
• Effects of N and P are not unambiguous, but the two rare species are most affected by N levels.