The influence of nitrogen deposition on phosphatase activity in *Cladonia portentosa*

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We have demonstrated that the common heathland lichen *Cladonia portentosa* (Dufour) Coem. expresses both acid phosphomonoesterase (PMEase) and phosphodiesterase (PDEase) activity. A capacity to utilise the organic fraction of phosphorus available in atmospheric deposits may confer an ecological advantage to *C. portentosa* growing under nutrient-limiting conditions. Nitrogen enrichment of oligotrophic habitats can lead to increased plant demand for phosphorus. Previous studies on *C. portentosa* have demonstrated a strong covariance between thallus nitrogen and phosphorus concentrations. Therefore we investigated the relationship between N enrichment and phosphomonoesterase activity in the apices (top 10 mm) of this common heathland lichen. Under field conditions at Whim Bog, *C. portentosa* cushions were subject to either NO_3^- or NH_4^+ treatments at 8 (control), 16, 32 and 64 kg N ha^{-1} yr^{-1}. The effect of enhanced deposition of both phosphorus and potassium was also investigated. There was a significant increase in PMEase activity with increasing N deposition (as either NO_3^- or NH_4^+) suggesting that as nitrogen supply increases, *C. portentosa* has the capacity to allocate an increasing quantity of nitrogen to phosphatase synthesis. Such high levels of activity may also help to explain the observed relationship between thallus nitrogen and phosphorus concentrations. Phosphomonoesterase activity was not stimulated in treatments receiving P and K in addition to N; this was interpreted as an effect of increased availability of inorganic P. It was concluded that N enrichment promotes phosphatase synthesis and phosphorus capture in *C. portentosa* thus maintaining N:P stoichiometry.