



Biodiversity of European grasslands – gradient studies to investigate impacts of atmospheric nitrogen deposition on grasslands

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Experiments have suggested that reactive nitrogen deposition may reduce species richness in plant communities. However, until recently there was no clear evidence that regional air pollution was actually reducing biodiversity on a regional scale. An extensive field survey of acidic grasslands along a gradient of atmospheric nitrogen deposition in the UK showed a dramatic decline in plant-species richness with increasing atmospheric nitrogen deposition [1, 2]. Changes in soil chemistry were also observed [3]. Combining the results of this gradient study with experimental manipulations allowed us to estimate the timescale of the observed change in species richness.

The BEGIN project (Biodiversity of European Grasslands – the Impact of Atmospheric Nitrogen Deposition) is a collaborative EUROCORES project between The Open University (UK), Manchester Metropolitan University (UK), Bordeaux University (France), Utrecht University (The Netherlands) and The University of Bremen (Germany). This project builds on the results collected in the UK survey to investigate changes in species richness further. In addition to the 68 acid grasslands already surveyed in the UK, the BEGIN project has surveyed 70 acidic grassland sites throughout the Atlantic biogeographic region of Europe. At each site, data were collected on species composition, soil chemistry and plant-tissue chemistry. This data set is being combined with a field experiment replicated across three grasslands (Norway, Wales and Aquitaine) of the same community and an analysis of historical changes in species composition. Surveys have also been conducted in a contrasting grassland system; calcareous grasslands belonging to the Mesobromion alliance.

Initial results of the BEGIN project will be presented, demonstrating declines in species richness and changes in species composition across the Atlantic Biogeographic Zone of Europe during the last 70 years that can be related to nitrogen deposition. We will also report changes in soil chemistry along this N deposition gradient.

References

- 1 Stevens et al. 2004 Impact of nitrogen deposition on the species richness of grasslands. *Science*, 303, 1876-1879.
- 2 Stevens et al. 2006 Loss of forb diversity in relation to nitrogen deposition in the UK: regional trends and potential controls. *Global Change Biology*, 12, 1823-1833.
- 3 Stevens et al. 2009 Regional trends in soil acidification and extractable metals related to present acid deposition rates. *Environmental Pollution*, 157, 313-319.