**Carbon storage in grasslands: the impact of atmospheric nitrogen pollution**

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Human processes account for the conversion of more N2 into reactive N than is produced naturally in the world per year. This has caused significant changes to the global N cycle, and has disrupted the sensitive nutrient balance of ecosystems worldwide. It is known that the C and N cycles are very closely linked. Soil is a major C sink, which makes it essential for climate change mitigation. By looking at the effects of N dose and form on the above and belowground C pools of acid grasslands, this project aims to further our understanding of how grassland soil can be managed as a C sink, and what processes should be prioritised when devising mitigation strategies for the effects of N on these systems.

In 2007, replicated N-addition experiments were set up on two species-rich, acid grassland sites; one in Trefor, North Wales, the other in Revna, Norway. Since then, N has been added in three doses (0, 35 and 70 kg N ha-1 yr-1) and three forms (oxidised N, reduced N and a 50-50 combination). In 2013 and 2014, analyses of soil, aboveground biomass and gas fluxes were carried out to see if the treatments have had any effects on the amount of C stored in these grasslands.

Although preliminary analysis of the data collected so far does not show significant differences between treatments, some interesting patterns have emerged. In Wales, for example, the 50-50 combination treatments seem to be having a negative impact on aboveground biomass. This is not seen in Norway, where reduced aboveground biomass is only present in the reduced nitrogen treatment, an effect probably caused by increased acidity in these plots. In addition, the combination treatments have decreased the CN ratio of the vegetation at the Welsh site, potentially making litter in these plots more readily decomposable – an effect present in the oxidised and reduced treatments, but to a much lesser extent. Interestingly, although N addition seems to have led to some changes in the vegetation at these sites, no treatment effects were found at either site when soil C and N were analysed. There were also no changes in the C and N content of soil microbial biomass as well as soil at different depths. Further investigations such as organic matter fractionations and ingrowth cores will be carried out in order to build a better picture of what may be happening at these sites.