Effects of Nitrogen addition and mowing management on acidic grassland after 3 years

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Introduction

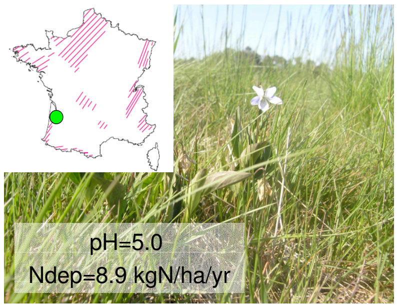
Experiments on calcareous grasslands have showed that nitrogen is an limiting nutrient reducing species richness (Bobbink et al., 1991). A major source of nitrogen reaches semi-natural ecosystems via atmospheric deposition. However there was no clear evidence of reduction caused by regional air until Stevens *et al.,2004* showed a decline in species richness of UK acidic grasslands in relation to nitrogen deposition. So what could suggest experiments of N addition on acidic grasslands?

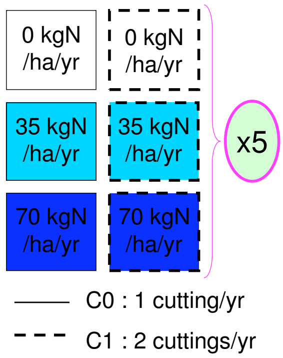
Objectives

- To determinate the effects of **increasing N-addition** on **biomass** and **species richness**
- To examine **mitigation** via more biomass cutting
- To investigate the **competition for light** as a factor explaining biodiversity loss as a result of N-addition

Materials & Methods

- Study site : Acidic grassland of *Violion caninae* community in France (Habitat 6230 of Natura 2000)





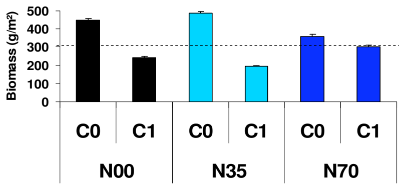
Set-up of one of the 5 replicate blocks contening 6 plots of 2x2m

- Variables :
  - Biomass = Aboveground biomass on subplot of 50x50 cm (g/m²)
  - Species richness = Nb of species on plot of 2x2 m
  - % Extenuation = % Light intercepted by plant cover

Results

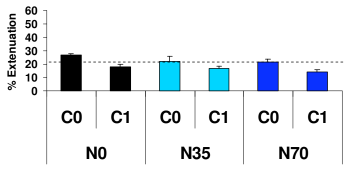
Total (a) and grasses biomass (b) in July 2009

(a) Nitrogen NS ; Cutting*** ; Nitrogen x Cutting (*)

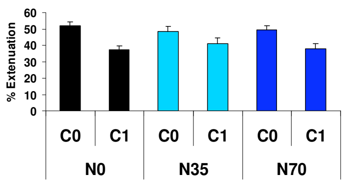


Light extenuation of (a) February and (b) June 2009

(a) Nitrogen* ; Cutting***

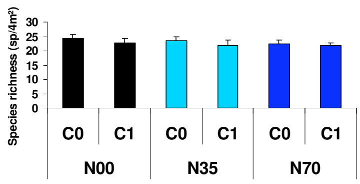


(b) Nitrogen NS x Cutting***

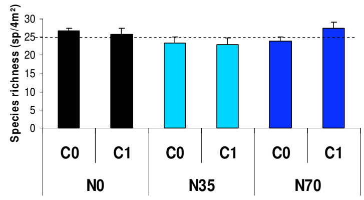


Species richness of (a) 2007 and (b) 2009

(a) Nitrogen NS ; Cutting NS



(b) Nitrogen (*) ; Cutting NS



Discussion

After 3 years, a significant effect of cutting shows a decrease of total biomass with C1. There is a marginally significant effect between cutting and nitrogen on total biomass with no more effect of cuttings at N70. Light measurements confirm a decrease of plant cover at C1 and only a temporal effect of nitrogen with a higher percent of light extenuation at the beginning of the season vegetation at N0. N-additions show no effect on biomass but suggest a decline in species richness in relation to nitrogen increase with a possible mitigation effect of cuttings at N70.

Conclusion

✓ **Significant effect of cutting** on biomass and light extenuation

✓ **No effect of N-addition** on biomass but a tendency to reduce species richness

✓ Mechanisms behind the **decline of biodiversity** could be a **toxicity of ammonium** rather a competition for light

References: Bobbink, R. (1991) Effects of nutrient enrichment in Dutch chalk grassland. *Journal of applied ecology*, **28**, 28-41.

Stevens, C.J. *et al.* (2004) Impact of nitrogen deposition on the species richness of grasslands. *Science Magazine*, **303**, 1876-1879.

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