



Grassland plant trait responses to change in management practices and link with plant production: results of a 7 yr experiment

Frédérique Louault (1), Katja Klumpp (1), Priscilla Note (2), Isabelle Bosio (1), Bernard Pons (1), Olivier Darsonville (1), Vincent Guillot (1), and Pascal Carrère (1)

(1) INRA, UR874 UREP, F-63039, Clermont-Ferrand, France , (2) INRA, UE1296 UEMA, F-63210, Orcival, France

Herbage production and C storage are key processes to explain and predict in semi-natural grasslands. Previous work has shown that plant functional traits affect ecosystem processes, while plant traits and ecosystems processes are affected itself by environmental conditions. However, the relative importance of biotic factors, climatic and management conditions on the processes are still difficult to quantify. Moreover, in semi-natural grasslands, management practices (fertilisation, herbage use by cut or grazing) partly determine intensity of herbage use and nutrient availability. Both are considered as important factors driving grassland ecosystem dynamics. Nevertheless, these two factors are often coupled and it appears difficult to analyse their respective role in ecosystem functioning. In order to improve our understanding of the role of plant traits on herbage production and C storage in grasslands, we examine data from a long term grassland experiment (SOERE-ACBB, France), investigating the respective role of disturbance (defoliation intensity) and nutrient availability (fertilisation level) on grassland dynamics. The grassland experimental site, set up in 2005, was historically submitted to an intensive management scheme by mowing and grazing. It is situated in semi-natural upland under semi-continental climatic conditions. The field experiment comprises two gradients of grassland management applied in a randomized design with four replicates plots per treatment.

Here, we look at the response of grassland to changes in management practices, in term of production and selected plants traits. We present yearly data on aboveground plant production and plant functional traits (community weighted mean value for leaf dry matter content, specific leaf area, Leaf N content, plant height, onset of flowering).

Aboveground plant production shows rapid and significant changes in response to nutrient availability manipulation, but does not show consistent pattern of response to manipulation of the level of disturbance. Plant traits responses to modification of management practices vary depending on the trait considered. Some traits do not respond, some appear as a response trait to one management factor only, some to the two factors. We discuss the implication of theses results for the understanding of the semi-natural grassland function. This study contributes to a better identification of the key response traits for disturbance and nutrient availability factors and effect traits for aboveground plant production.