# Linking functional diversity of floral traits with land-use intensification to study pollination function in permanent grasslands

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## Abstract

Permanent grasslands cover one third of the total utilised agricultural area in Europe. They play a major role in livestock feeding and ecosystem service supply. European grasslands are submitted to agricultural practices with different levels of intensity defining land-use intensification. Land-use intensification impacts indirectly pollinator communities due to change in flower traits. These modifications of the plant-pollinator interactions and pollinator communities can impact pollination function in grasslands. However, little is known about the mechanisms explaining the modification of pollinator communities and pollination function due to change in flower traits with land-use intensification. Furthermore, no study establishes these links with a set of quantitative flower traits giving a holistic view of flower. Hence, we will answer to the following questions: (1) what are the impacts of contrasting land-use intensification levels on functional diversity of flower traits of grasslands? (2) What are the consequences of these impacts on plant-pollinator interaction frequencies, which are proxies of pollination function? We selected 16 grassland plots with a contrasting level of intensification in the North East of France (Moselle). 2800 pollinators belonging mainly to three Orders (Hymenoptera, Diptera, Lepidoptera) were captured in interaction with flowers on transects five times from May to August 2017 on each plot. Flower areas were measured on 47 grassland plant species. Using linear mixed models, our first results indicate a negative relationship between the land-use intensification and the community weighted mean of flower area. We also found a positive relationship between the flower area (community weighted mean and functional diversity) and plant-pollinator interaction frequencies. These results suggest an impact of land-use intensification on diversity of floral traits and change in plant-pollinator interactions. Our future measurements of other flower and pollinator traits will allow us to better understand the relationships between level of land-use intensification and pollination function in European grasslands.

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