

Flower-Foraging Insects and their Pollen Loads in French Permanent Grasslands



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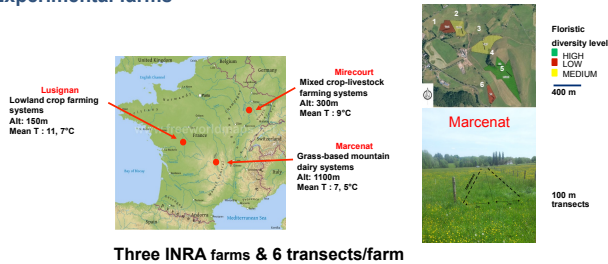
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INTRODUCTION

Semi natural grasslands are considered as a vital habitat for wild pollinators, which in return contribute to preserve the floristic diversity of this environment. The role and the importance of many flower-foraging insects in pollen transport are still poorly understood in grassland context. To study the interactions between pollinators and plants, flower-foraging insects were caught from beginning of May to end of July along three contrasted dairy farming systems in France. Sampling was carried out along six walking transects for each farming system. We developed and test in parallel a method based on DNA barcoding analysis, allowing a quick identification of the insect and its pollen load at the same time.

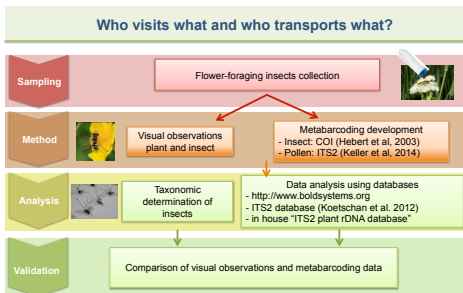
MATERIAL AND METHODS

Experimental farms

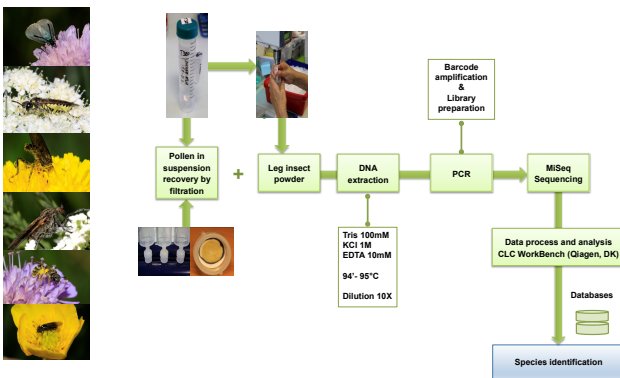


Three INRA farms & 6 transects/farm

Outline of the experimental workflow (Galliot et al, 2017)

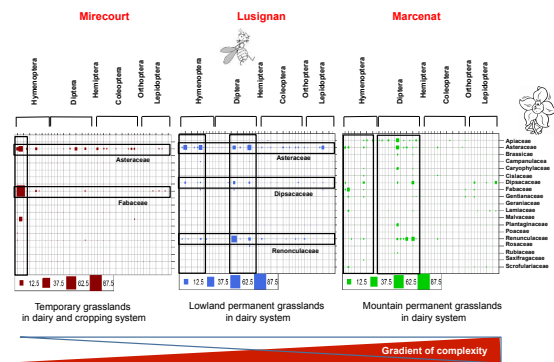


Sampling of flower-foraging insects and metabarcoding workflow

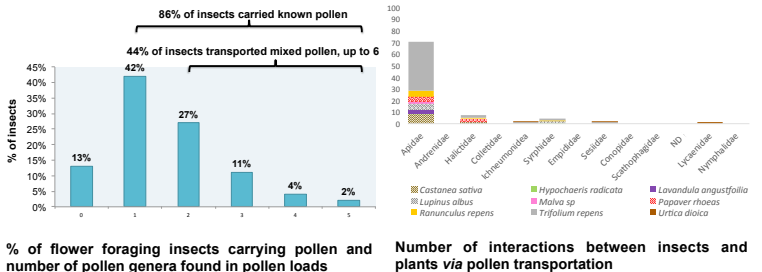


RESULTS

Flower-forager network obtained from visual surveys



Metabarcoding results at the experimental dairy farm in Marcenat



Comparison of visual observations and metabarcoding data

Only 27% of the flower-foraging insects were identified; most of the insects were not referenced in the Database. Our workflow doesn't work for small flies, DNA extraction should be improved. 86% of the flowers seen to be foraged by the insects were identified. 20% of notified species with metabarcoding were not recorded by visual surveys.

CONCLUSIONS

Our study has also proved the powerfulness of the DNA barcoding for pollination study applications. DNA barcoding will be a new tool in the taxonomists toolbox as well as being an innovative device for ecological studies. Diptera may play an important role in pollination in grasslands especially the Empididae family in our mountain grasslands. Insect transported non grassland species such as *Betula* sp, *Quercus* sp, *Salix* sp, *Castanea* sp. Metabarcoding studies highlighted the urgent need of improved database.

REFERENCES

Galliot et al. 2017. Investigating a flower-insect forager network in a mountain grassland community using pollen DNA barcoding. *J. Insect Conserv.* DOI 10.1007/s10841-017-0022-z
Hebert P.D.N. et al. 2013. A DNA 'Barcode Blitz': Rapid Digitization and Sequencing of a Natural History Collection. *PLoS ONE* 8, e6853
Keller A. et al. 2015. Evaluating multiplexed next-generation sequencing as a method in palynology for mixed pollen samples. *Plant Biol.* 17(2):558-566