Floral enrichment effect on the biodiversity and ecosystem services in European agricultural landscapes along a European Gradient with Climate and landscape variations.

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Résumé

Biodiversity loss is one of the most pressing issues that humanity has to face. In conventional farmland it can lead to a loss of beneficial organisms, such as pollinators and predators of pests which can provide ecosystem services. This biodiversity can be preserved through the improvement of plants biodiversity through the establishment of agroecological infrastructure such as hedges and/or flowering strips. Their effect is depending on important factors, such as the climatic conditions and their spatial disposition. The later needs to be done in an effective way to maximize the ecosystem services, (pest and weed controls and pollination), and to make sure to avoid disservices (presence of weeds and pests, loss of crop yields).
As part of a project using the approach of living labs, that promote the involvement of citizens in science, 20 farmers are actively participating in a collective monitoring of the farmland biodiversity on a large range of taxa. In our study, we determine the effect of floral enrichment, and analyze the separated and complementary role of hedges and flower strips by comparing 4 modalities: presence of Hedge alone (HC), Hedge with Floral strip (HF), Floral strip along a Grass margin (GF) and Grass margin alone (GC). We chose to monitor the interaction of pollinating species (syrphids and bees) with each species of flowers in the flowering strip, either wild flowers or implemented in our flowering strips, as well as the interaction between each species of aphids of cereals, their parasitoids and their hyperparasitoids, in order to analyze the abundances, diversity and community networks and thus the improvements of the ecosystem services brought by the presence of the enrichments on the pest regulation. We expect the biocontrol to be more efficient near the flowering strips, but also a potential complementarity of both the hedge and flowering strips.
Furthermore, this study is done in both winter and spring seasons, and along a climatic gradient from the mild Atlantic climate to the more continental climate of central Europe, in connection with the living labs and 20 farmers at 5 locations : Brittany and Picardie in France, Belgium, Germany and Czech Republic. Along this climatic gradient, it is expected that the climatic context plays a major role on the potential of ecosystem services in each

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area. In winter, we expect to find more activity at the west of the gradient, with an earlier biocontrol of the aphids by the parasitoids. This study will thus help to provide European-wide solutions relevant in each location according to land-use and climate change and help to effectively design plant enrichment that supports pest and weed control as well as pollination at the European scale.

Mots-Clés: Biodiversity, farmland, pollinator, climate, ecosystemic, aphids, parasitoids, hyperparasitoids, syrphids, bees, floral enrichment