

---

# Landscape potential in pollen provisioning for beneficial insects favours biological control in crop fields

Aude Vialatte<sup>\*1,2</sup>, Noelline Tsafack, Diab Alhassan, Rémi Dufflot<sup>3</sup>, Manuel Plantegenest<sup>4</sup>, Annie Ouin<sup>2</sup>, Johanna Villenave, and Aude Ernoult<sup>3</sup>

<sup>1</sup>Ecole Nationale Supérieure Agronomique de Toulouse (ENSAT) – Ministère de l’agriculture, Institut national de la recherche agronomique (INRA) – Avenue de l’Agrobiopole, BP 107, Auzeville-Tolosane, F 31326 Castanet-Tolosan Cedex, France

<sup>2</sup>Dynamiques Forestières dans l’Espace Rural (DYNAFOR) – Institut national de la recherche agronomique (INRA) : UR1201, Institut National Polytechnique de Toulouse, Ecole Nationale Supérieure Agronomique de Toulouse – France

<sup>3</sup>ECOBIO – CNRS – France

<sup>4</sup>Institut de Génétique, Environnement et Protection des Plantes (IGEPP) – Institut national de la recherche agronomique (INRA) : UMR1349, Agrocampus Ouest – AGROCAMPUS OUEST, UMR1349 IGEPP, F-35042 Rennes, France, France

## Abstract

The importance of landscape complexity for biological control is well-known, but the functional roles of habitats are poorly understood. We evaluated the relative importance of various non-crop and cultivated habitats as floral sources for hoverfly and parasitoid communities, and their effect on aphid abundance in crop fields in Brittany, France. The gut contents of adult hoverflies sampled in 41 cereal fields were analysed to determine which plant species are exploited. The relative value of each habitat in providing adequate pollen resources was evaluated by vegetation survey in this site. Then, 15 cereal fields were selected along a gradient of landscape complexity. The proportion of each habitat in landscape buffers surrounding these fields was calculated and used to assess the potential level of pollen resources provision in the surrounding landscape (LP index). The abundance of aphids, hoverfly larvae and aphid parasitism was monitored in spring. The habitat that provided the highest quantity of adequate pollen resources was grassy strips, while crop fields appeared also to provide significant pollen resources consumed by hoverflies. Aphid abundance significantly decreased with an increase of the LP index. However, an unexpected negative relationship was observed between the LP index value and the abundance of predatory hoverfly larvae. The positive relationship between the aphid parasitism rate and the LP index suggests that aphid parasitoids may benefit from the same floral resources as hoverflies. Their high crop habitat specialism may give them a competitive advantage over hoverflies in crop fields where both aphid and floral resources are abundant.

**Keywords:** Aphid, biocontrol, ecosystem services, floral food supply, grasslands, grassy strips, hoverfly, landscape functionality, parasitoids, semi, natural habitats

---

\*Speaker