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Eprints ID: 17610

To cite this version: Alignier, Audrey and Andrieu, Emilie and Bedoussac, Laurent and Journet, Etienne-Pascal and Ouin, Annie and Sarthou, Jean-Pierre and Vialatte, Aude and Brin, Antoine *Is there a synergy between hedges and intercrops for pest biocontrol ?* (2013) In: 11th International Association Ecology Congress - INTECOL 2013, 18 August 2013 - 23 August 2013 (Londres, United Kingdom).

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Is there a synergy between distance from the hedge and intercrop for pest biocontrol?

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Identifying alternative cropping systems: a major challenge in agroecology

To achieve sustainability, we need to identify alternative cropping systems that can both ensure sufficient levels of food production and reduction in pesticide inputs while maintaining ecosystem integrity and simultaneously delivering multiple ecosystem services.



How to promote biological control by natural enemies in crop fields ?

Promoting relevant management practices of semi-natural elements, i.e. hedgerows

Increase crop diversity both in time and space (rotation and intercropping respectively)

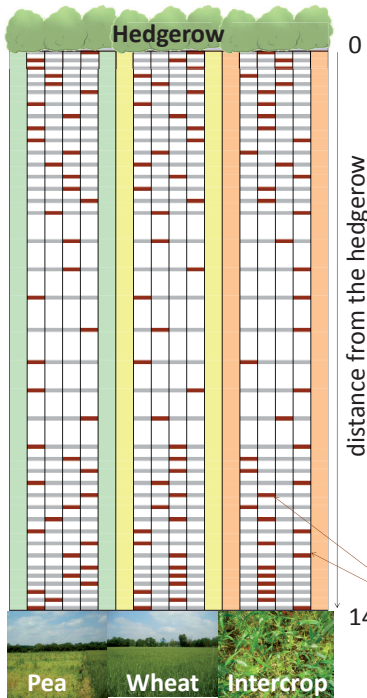
Combination = synergy ?

What is intercropping ?



Intercropping creates structures of mixed plant populations with "barrier" or "dilution of resources" effects which can reduce the pressure of pathogens, weeds and pests compared with that exerted on sole crops.

Field surveys of pest abundance and effectiveness of biological control



One field separated in 3 blocks:
 - Pea (sole crop)
 - Wheat (sole crop)
 - Pea and Wheat (intercrop)

Random sampling design according to the distance from the hedgerow.

Prey (aphids, slugs, eggs of *Sitona*) and weed seeds were stuck on sandpaper cards.

Pea bruchids were sampled on 10 cloves infields, at each distance. The number of bruchids and parasitoids were counted.

flora surveys and cards position



Aphids stuck



Weed seeds stuck

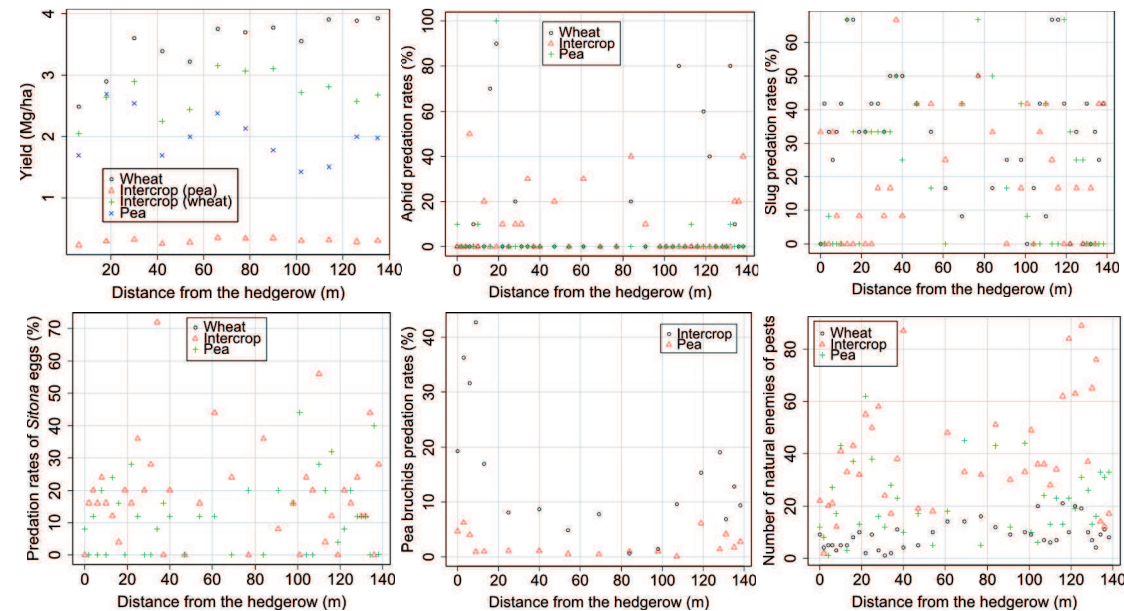


Pea infested by bruchids

Absence of a global synergy between distance from the hedgerow and intercrop in supporting biocontrol of pests and weeds

	Aphid predation	Slug predation	Weed seed predation	<i>Sitona</i> eggs predation	Bruchids predation	Nb of pest enemies
Distance	+	-	-	ns	-	+
Crop [pea]	ns	-	+	-	-	+
Crop [intercrop]	ns	-	-	na	-	+
Interaction	-	ns	+/-	+	+	-

Results of GLMMs including Distance, Type of Crop (sole crops vs intercrop) and their interaction as fixed effect and the position of the survey as random effect (when available). na: not available; ns: not significant; +/- significant but depending on the weed species considered.



A great variability in pest biocontrol was observed. This study calls for a deepened multi-species approach in order to find trade-offs between agricultural practices and field edge management to optimize regulating ecosystem services such as pest biocontrol.

This work was conducted under the BQR project HaiesCAFARR.