

Wildflower strips, a help for crop protection?

A tool for conservation biological control: impact of functional diversity and mowing regime

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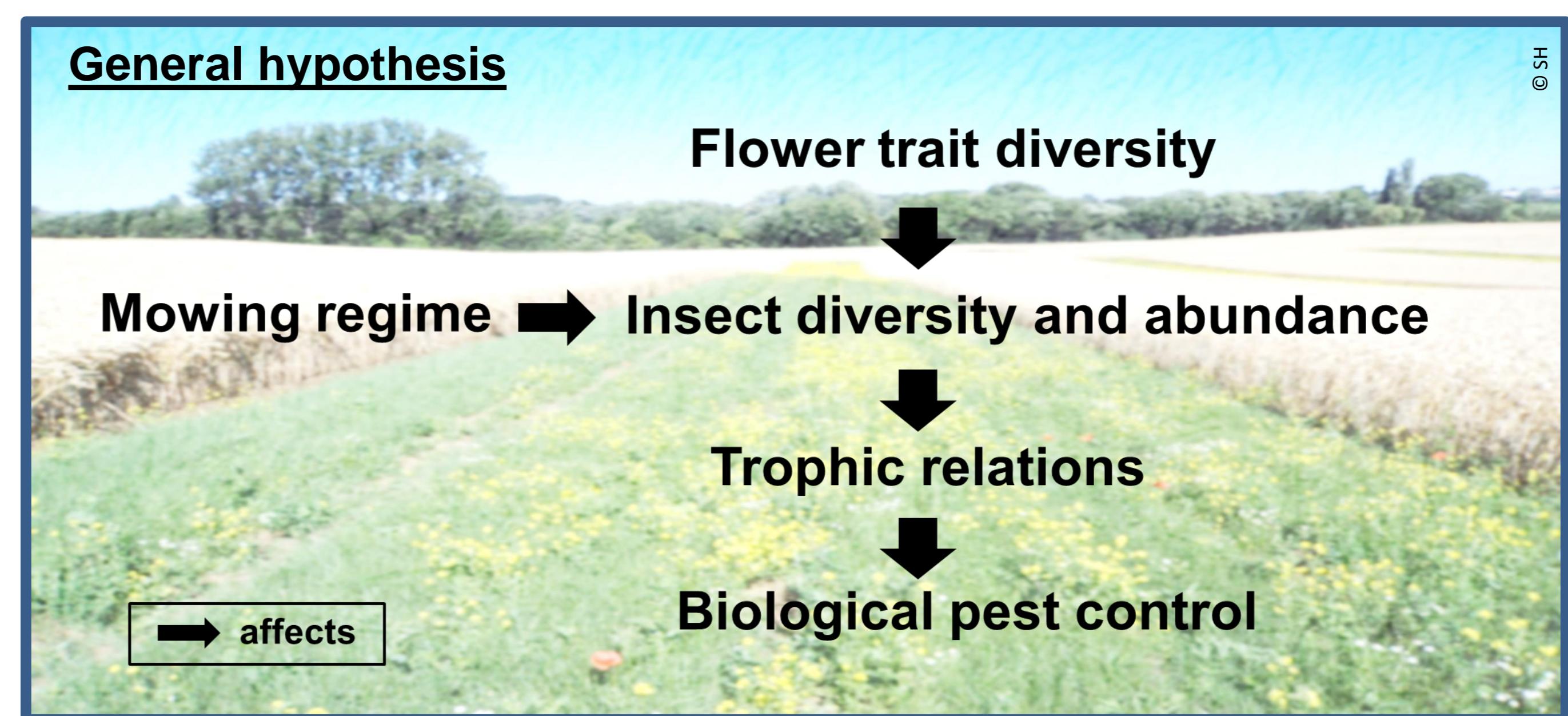
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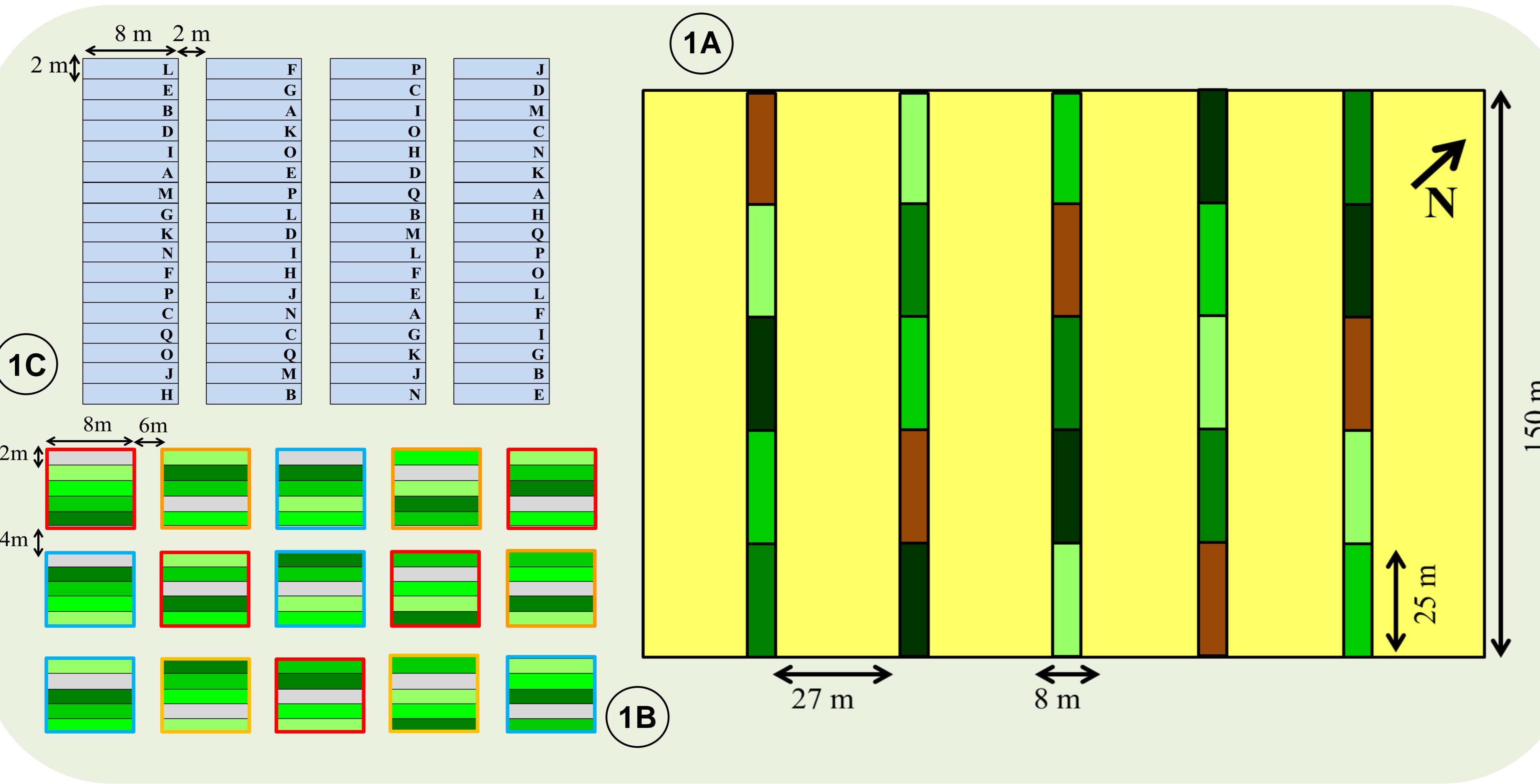
Introduction

- Conventional practices are partly responsible for the loss of biodiversity in agricultural landscapes (Krebs et al., 1999).
- Biological control methods are studied as alternatives to chemical insecticide use (Landis et al., 2000 ; Haaland et al., 2011).
- Wildflower strips at field margins are known to attract insects such as natural enemies (Pfiffner et al., 2009, Carrié et al., 2012).



How do functional diversity and mowing regime of wildflower strips affect conservation biological control?

Experimental design & Research questions



Flower species mixtures with different functional diversity level			
Very Low	Low	High	Very High
<i>Achillea millefolium</i> (A)	<i>Achillea millefolium</i> (A)	<i>Achillea millefolium</i> (A)	<i>Achillea millefolium</i> (A)
<i>Anthriscus sylvestris</i> (B)	<i>Crepis biennis</i> (C)	<i>Anthriscus sylvestris</i> (B)	<i>Anthriscus sylvestris</i> (B)
<i>Galium verum</i> (D)	<i>Galium verum</i> (D)	<i>Geranium pyrenaicum</i> (E)	<i>Lotus corniculatus</i> (K)
<i>Heracleum sphondylium</i> (F)	<i>Hypochaeris radicata</i> (G)	<i>Leontodon hispidus</i> (I)	<i>Lythrum salicaria</i> (L)
<i>Knautia arvensis</i> (H)	<i>Knautia arvensis</i> (H)	<i>Leucanthemum vulgare</i> (J)	<i>Malva moschata</i> (M)
<i>Leucanthemum vulgare</i> (J)	<i>Leontodon hispidus</i> (I)	<i>Origanum vulgare</i> (O)	<i>Medicago lupulina</i> (N)
<i>Trifolium pratense</i> (Q)	<i>Lythrum salicaria</i> (L)	<i>Prunella vulgaris</i> (P)	<i>Prunella vulgaris</i> (P)

Plant traits (used to calculate functional diversity)		
Flower color	Flower type (nectar and pollen availability)	Start time of flowering
Flowering duration	UV reflectance (periphery of the flower)	Height
	UV pattern (difference center-periphery of the flower)	

Research questions

What is the effect of...

- functional diversity (1A)
- mowing regime (1B)
- isolated flower species (1C)

...on insect diversity, their trophic relations and thus biological pest control ?

Legend

Modalities	Functional diversity		Mowing regime
	Control	2 cuts	
	Very Low	Summer and Autumn	
	Low	1 cut	
	High	Summer	
	Very High	1 cut	
		Autumn	
		Crop (succession : winter wheat, rapeseed oil)	

Material & Methods



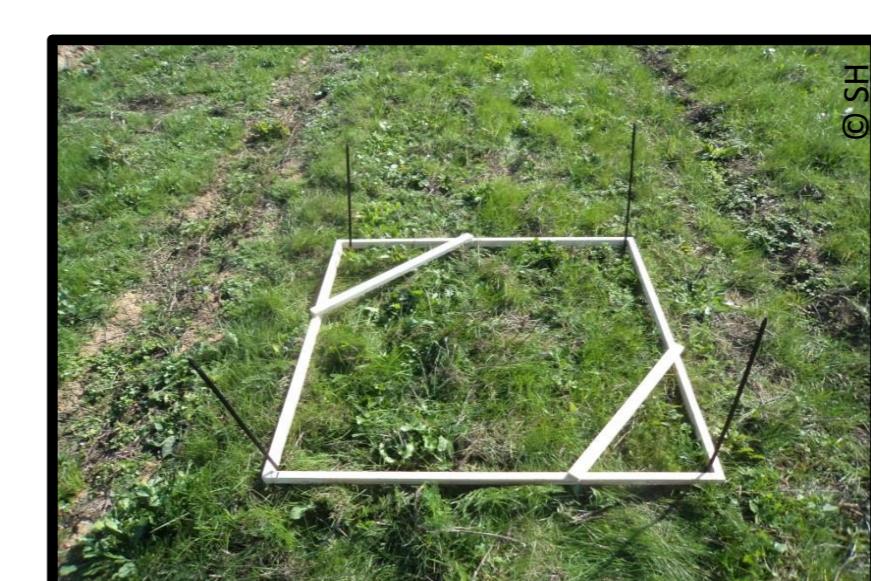
- Insect trapping and plant observation



- Sweep netting



- Insect identification
→ Setting up of Food webs



- Vegetation monitoring with quadrats



- Crop yield measurement

References

- Carrié, R., George, D., Wackers, F. (2012). Flowering forbs for field margins: selecting species that optimise ecosystem services. *Iobc Wprs Bulletin*, 75, 57-60.
- Krebs, J. R., Wilson, J. D., Bradbury, R. B., Siriwardena, G. M. (1999). The second silent spring? *Nature*, 400(6745), 611-612.
- Haaland, C., Naisbit, R. E., Bersier, L. F. (2011). Sown wildflower strips for insect conservation: a review. *Insect Conservation and Diversity*, 4(1), 60-80.
- Pfiffner, L., Luka, H., Schlatter, C., Juen, A., Traugott, M. (2009). Impact of wildflower strips on biological control of cabbage lepidopterans. *Agriculture, Ecosystems & Environment*, 129(1), 310-314.