

Evaluation of the aphid and aphidophagous beneficials diversity in a pea and potato association

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Introduction

Intercropping maintain a biodiversity that may be beneficial to pest management.

The **resource concentration hypothesis** (Root, 1973) : herbivores are more likely to find their host plants when they are grown in dense or pure stands.

The **enemies hypothesis** (Root, 1973): natural enemies are more abundant in complex environments (they can benefit from alternative sources of prey, nectar and pollen, as well as shelter and moderate microclimate).

Objectives

Assessment of the diversity of aphids and beneficial species in an association of pea and potato, and comparison with a pure culture of potatoes.

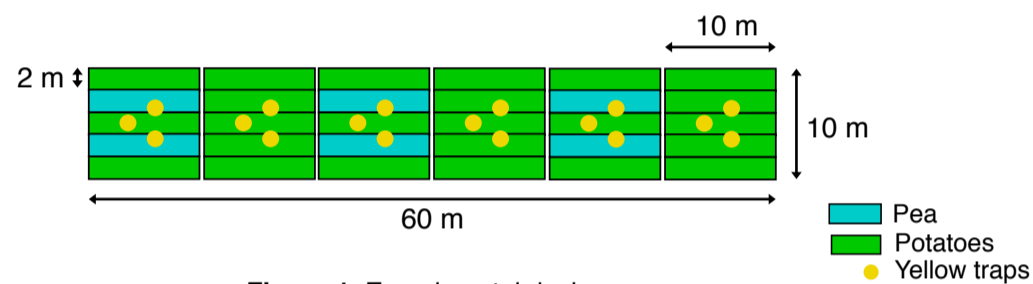
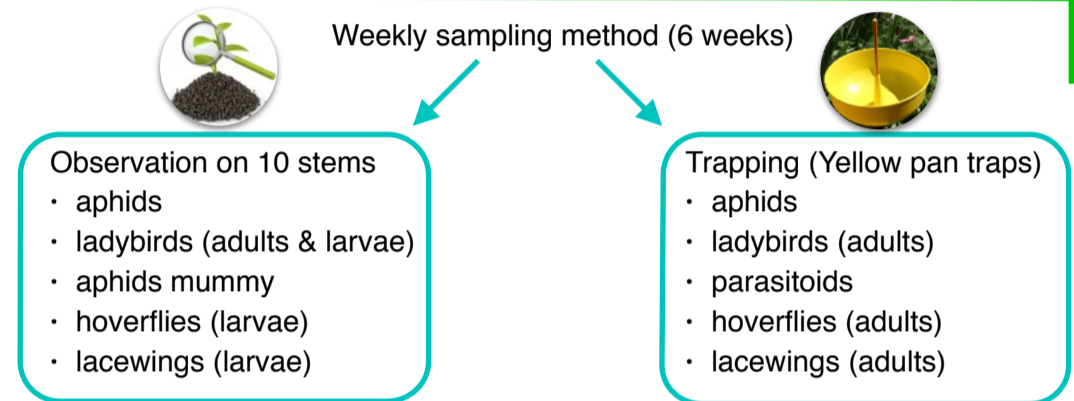


Figure 1. Experimental design

Materials and methods



Results

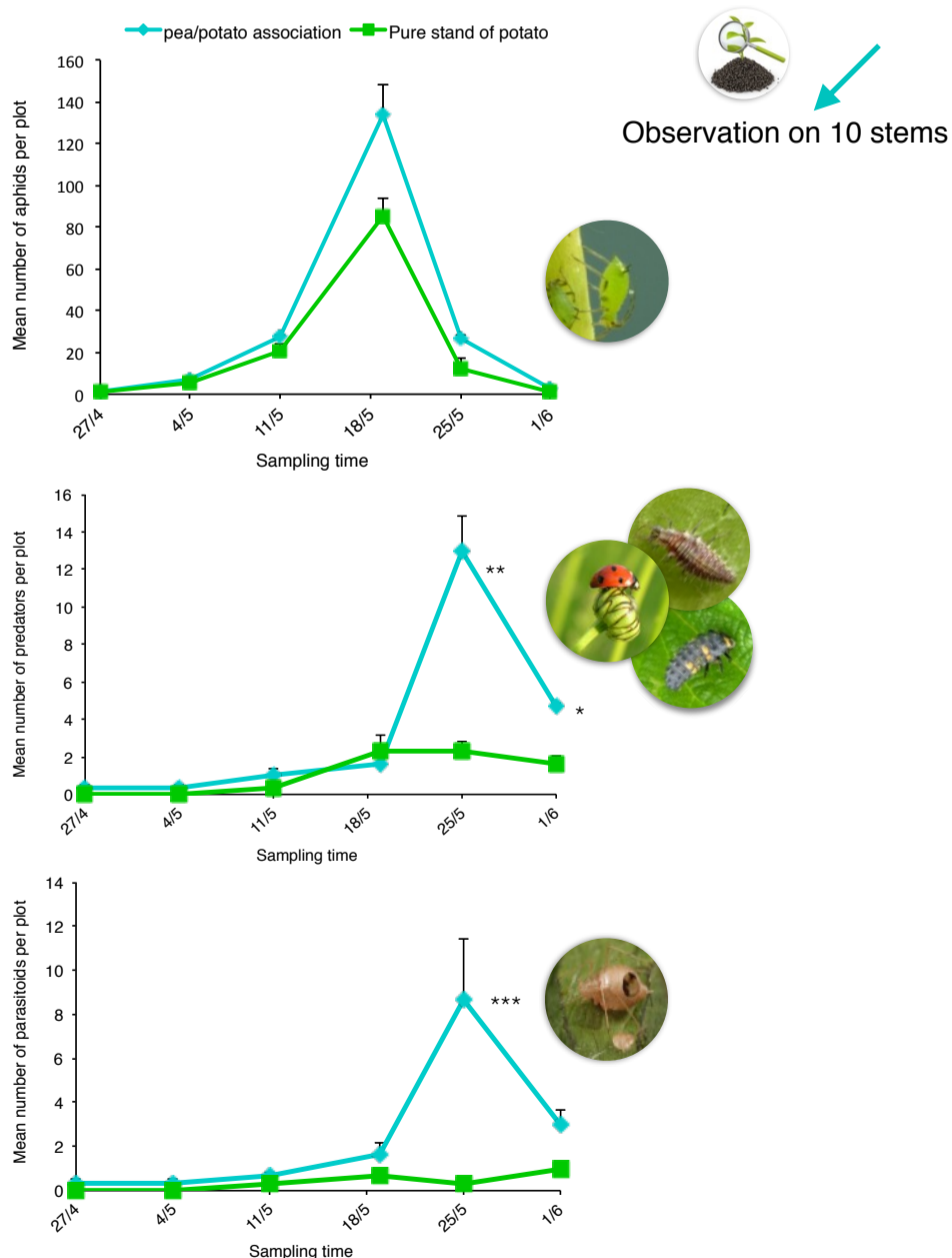


Figure 2. Changes in the mean number of observed insects per plots.

*P<0.05; **P<0.01; ***P<0.001

Trapping (Yellow pan traps)

Table 1. Abundance and diversity of beneficials trapped in the yellow pan traps

Species	Treatments		% ^a
	Pure stand	Association	
Ladybirds (Coccinellidae)	11,5% ^b		
<i>Coccinella septempunctata</i> Linnaeus	2	0	1,5
<i>Exochomus nigromaculatus</i> (Goeze)	0	1	0,8
<i>Harmonia axyridis</i> (Pallas)	47	21	51,1
<i>Hippodamia variegata</i> (Goeze)	1	0	0,8
<i>Propylea japonica</i> (Thunberg)	38	23	45,9
Hoverflies (Syrphidae)	0,3% ^b		
<i>Melanostoma scalare</i> (Fabricius)	1	0	33,3
<i>Sphaerophoria scripta</i> (Linnaeus)	2	0	66,7
Micro Hymenoptera (Braconidae)	76,1% ^b		
<i>Aphidius avenae</i> Haliday	1	0	0,1
<i>Aphidius gifuensis</i> (Ashmead)	457	406	98,4
<i>Diaeretiella rapae</i> (M'Intosh)	0	1	0,1
<i>Ephedrus persicae</i> Froggatt	0	1	0,1
<i>Lipolexis gracilis</i> Förster	2	0	0,2
<i>Lysiphlebus fabarum</i> (Marshall)	0	1	0,1
<i>Praon Gallicum</i> Stary	0	1	0,1
<i>Toxares deltiger</i> (Haliday)	2	4	0,7
<i>Trioxys anctus</i> (Haliday)	0	1	0,1
Micro Hymenoptera (Aphelinidae)	12,1% ^b		
<i>Aphelinus abdominalis</i> Dalman	82	56	98,6
<i>Aphelinus mali</i> Haldeman	1	1	1,4
Total number of beneficial species	636	517	
Proportion of total number of beneficial species (%)	55,2	44,8	

^a Proportional representation of each species by family

^b Relative occurrence of each family in the beneficial population

Discussion

- The **resource concentration hypothesis** was not confirmed. These results could be explained by the proximity of other plant species in a plot (Colignon *et al.*, 2000).
- A week after the abundance peak of aphids, the **enemies hypothesis** has been verified for auxiliary aphidophagous observed on potato.
- If observations on plants give a more realistic idea of the evolution of populations in crops, yellow traps are efficient to evaluate the entomological diversity.
- Results show that parasitoids are the most abundant beneficials, followed by ladybirds. Comparing to Europe, few hoverflies and lacewings were trapped.

Colignon P., Hastir P., Gaspar C. & Francis F. (2000). Effet de l'environnement proche sur la biodiversité entomologique en cultures maraichères de plein champ. *Parasitica* 56(2-3), p. 59-70.

Root R.B. (1973). Organization of a plant-arthropod association in simple and diverse habitats: the fauna of collards (*Brassica oleracea*). *Ecological Monographs* 43, p. 95-124.