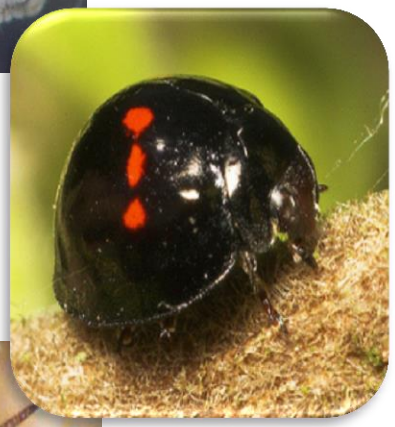
P.Guignebault

Biological control of the White Peach Scale on blackcurrant : The RhizoDia project

Why this project ?

- **Critical** situation for the sector
  - 50% of the plantations are concerned
  - Yield losses can reach 50% in 2 or 3 years
- Main **grown varieties** are very **sensitive**
- **Unsufficient efficiency of chemical control**
  - White oil
  - Thiaclopride (end of use)
  - Chlorpyriphos méthyl
- Main predators or parasitoïds of the White Peach Scale are either **sensitive to pesticides**, poorly present in orchads, or **too hard to breed**.

Encarsia berlesei



Chilocorus bipustulatus

Aphytis proclia

Why this project ?

Rhyzobius lophantae : interests

- ✓ **Specific** to white scales
- ✓ **No known parasites**
- ✓ Already **naturalized** in France
- ✓ Can live **several days** without food (transport)

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Preliminay results : 5 trials between 2012 & 2015

Tested variables :

- Amount of ladybugs to introduce (25 000 to 100 000)
- Adequate numbers of releases (1 to 4)
- Releasing methods

One release bag every two bushes

Results

- Good propagation of the *R.lophanthae* : possibility of less dense releases

16 000 *R.lophantae* released on 0,5 hectares
Presence on 5 to 6 hectares (around 6000/ha)
No additional information on amount to introduce

- Good efficiency at the plot level : decrease in the white peach scale population, very weak second swarming. No results regarding the control plot !

- No information on optimal releasing period, but (temporary) incidence of mechanical harvest on *R. lophanthae* population.

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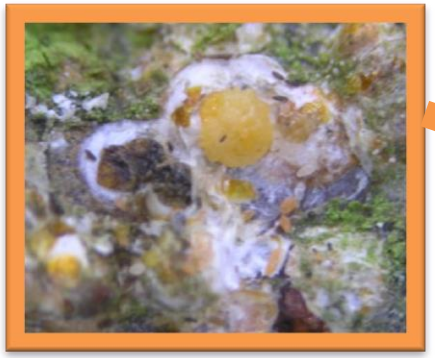
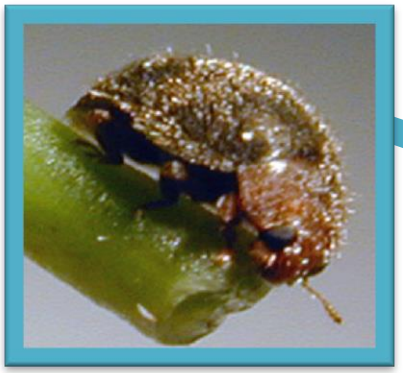
Project Rhizodia: 2016-2018



Blackcurrant pest
Pseudaulacaspis pentagona



Specific predator of the white peach scale
Rhyzobius lophanthae

AFB ex-ONEMA

Project Rhizodia

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La Morinière
CA Bourgogne
Koppert

With financial help from Afidem

Can *R.lophanthae* be a biocontrol solution on *P.pentagona* populations ?

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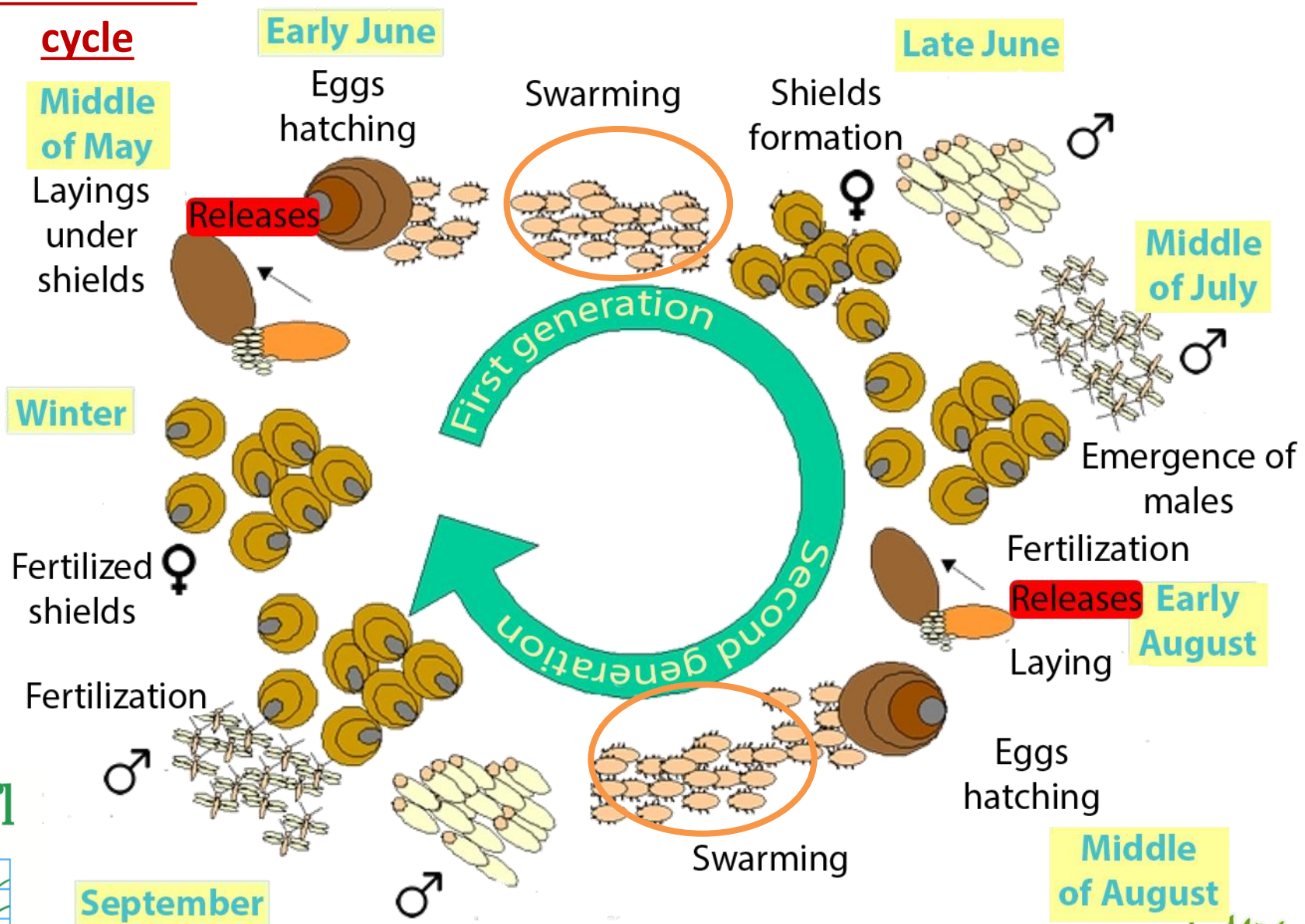
White scale cycle



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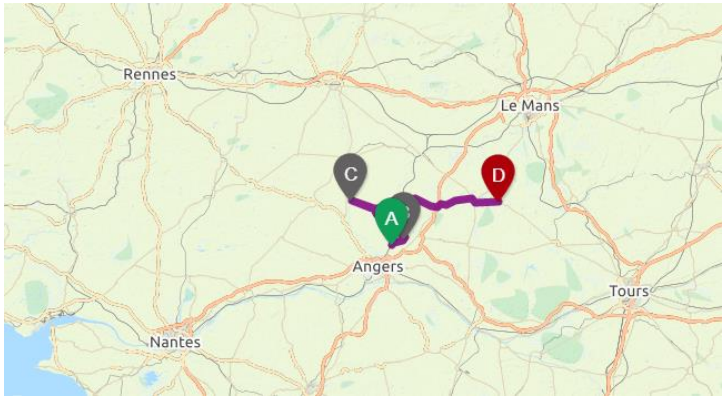
Trial setting

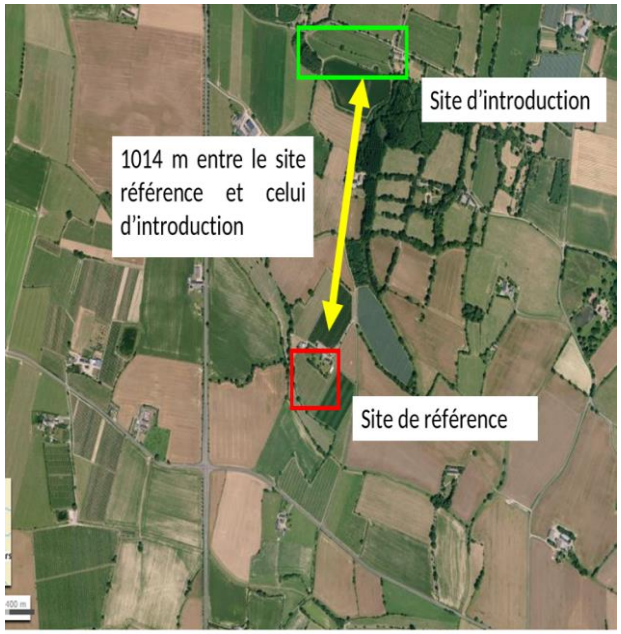
Varieties : Blackdown → site 1

Noir de Bourgogne → sites 2-3-4-5



Val de Loire, sites 1 et 2 (A), 3 (C) et 4 (D)

Côte d'Or, site 5



Dispositif parcelle

Presented results

Sites 1 to 4 → 2 modalities

- Introduction - plot : releases of *R.lophantae* - no insecticide
- Reference - plot : insecticides but no anti – white-scales

Site 1 → 3 modalities

- Introduction - plot : releases of *R.lophanthae* - no insecticide
- Reference – plot : insecticides but no anti – white-scales

Reference ++ plot : Chlorpyriphos-Methyl 2016 & 2017

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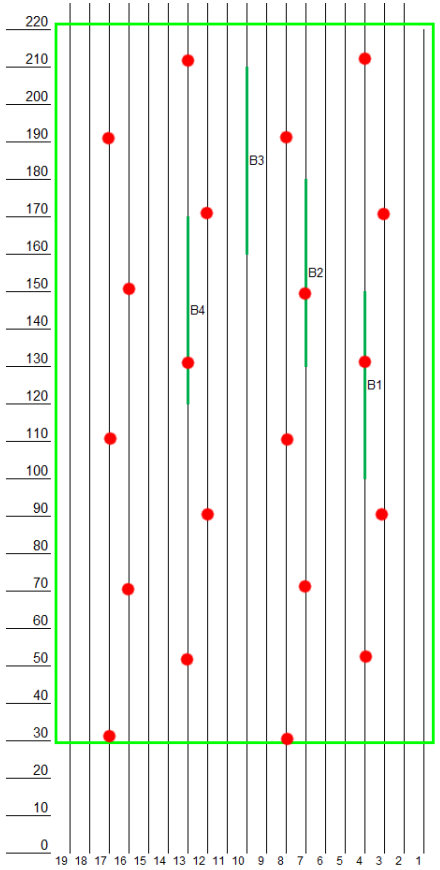
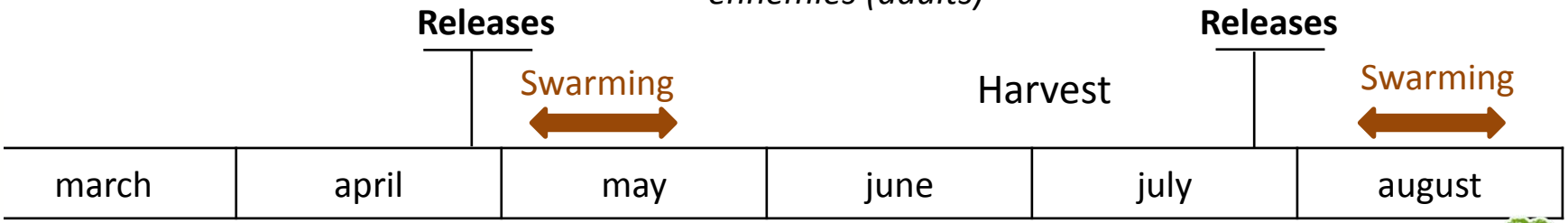
Releases of *Rhyzobius lophanthae*

- Packs containing 200 ladybugs
- Homegeneous distribution in the plots
- Density = 10 000/ha/year
- 2 releases (5000/ha):
  - Late april (laying)
  - Late july (laying)

Packaging bags of the natural ennemies (adults)



Releases plan



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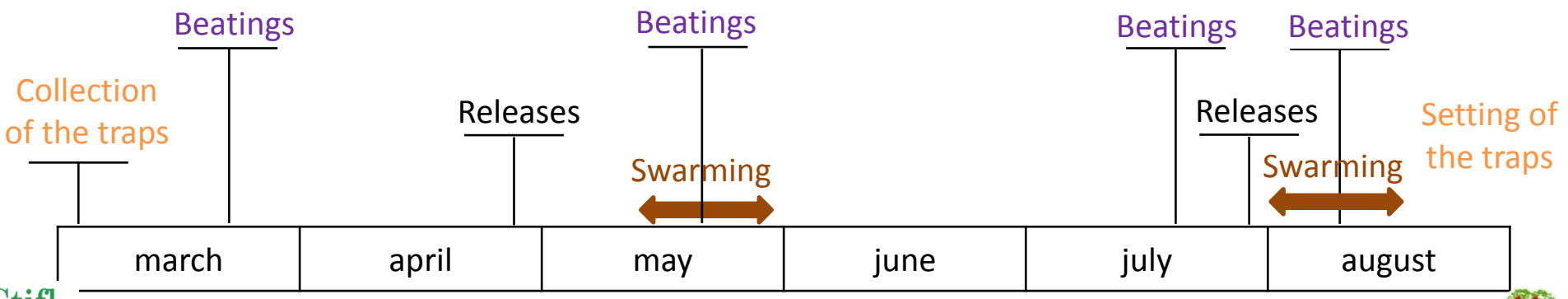
Monitoring of *Rhyzobius lophanthae*

Collection of the traps in the end of winter
- 20 cardboard strips/plot
- 10 bundles of 8 bamboos/plot

Beating of infested bushes :
20 beatings/plot

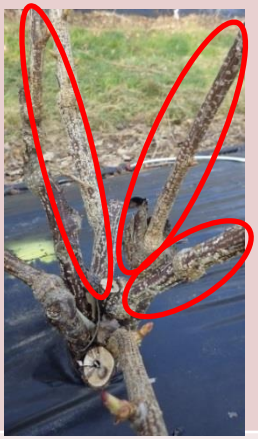
Molecular caracterisation of individuals at Antibe's INRA



Monitoring of white scales population

N°1: Visual evaluation of the degree of infestation of the bushes

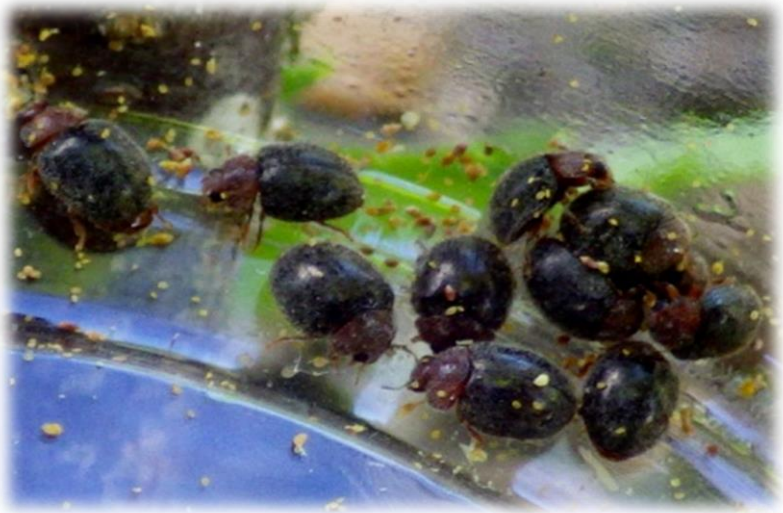
In each plot→ 4 x 50 bushes

0	1	2	3
			
Healthy bush No trace of infestation	**Early infestation** 1 branch infested at the base	**Settled infestation** 1 or 2 branches infected all the way	**Important infestation** More than 2 branches infested all the way

N°2: monitoring of the density of white-scales on the branches

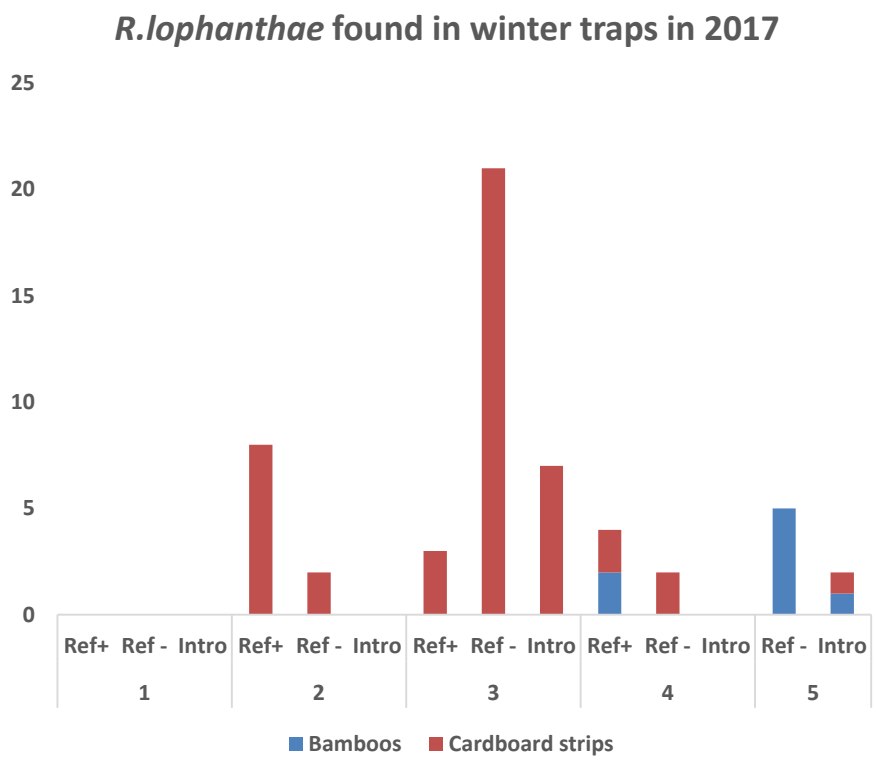
Conts on 20 branches per plot

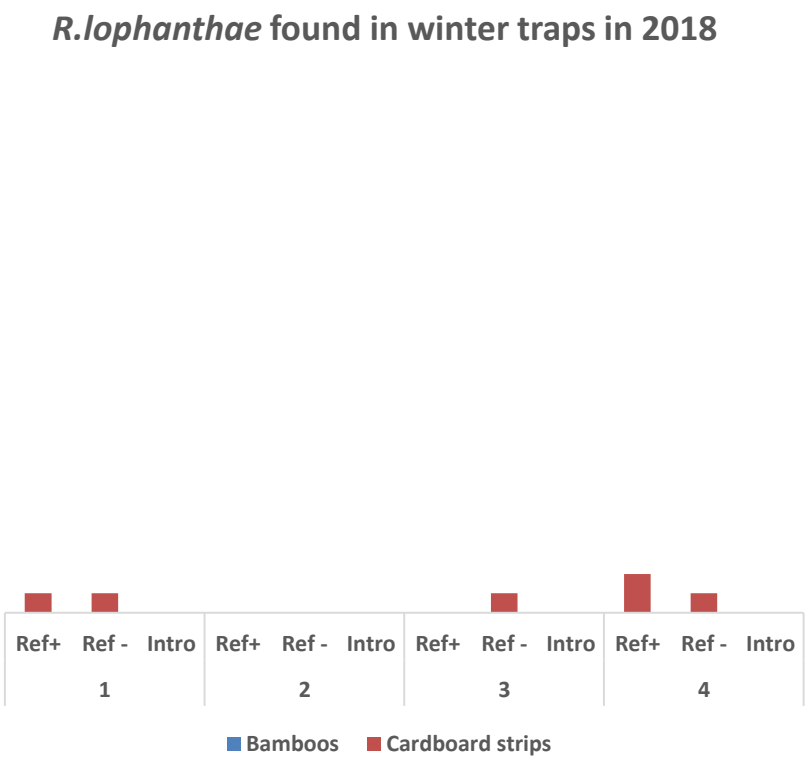
$$\text{Density} = \frac{\text{Nb of live white scales}}{\pi \, D \, L}$$



Rhyzobius lophanthae

Monitoring of the overwintering of *R. lophanthae*





- Cardboard strips -> Seem to be the best trap.
- Very few captured individuals. Seems random.
- No effect of Introduction.

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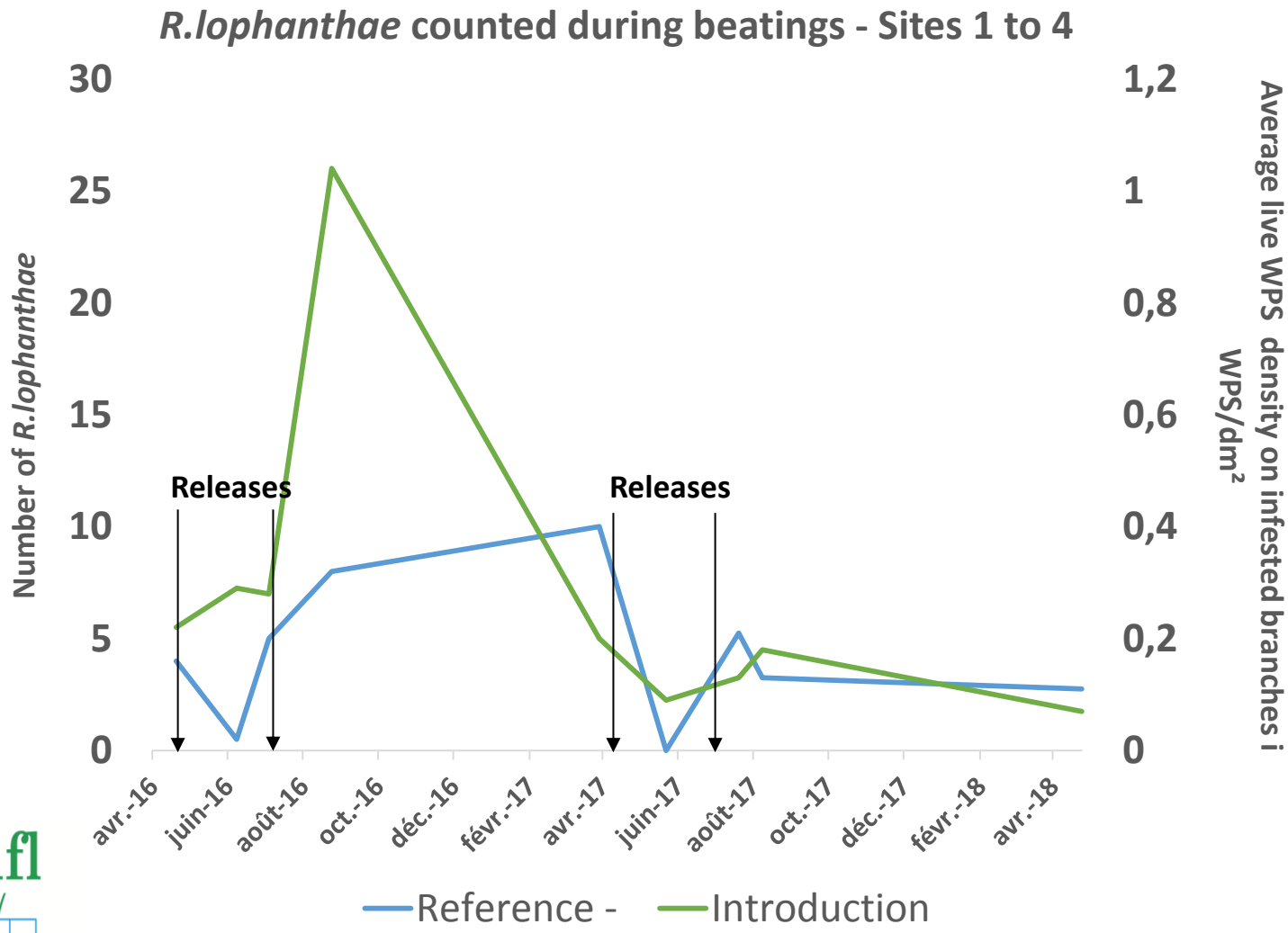
Beatings : number of *R. lophantae*



Peak of presence in the Introduction plots in August 2016.

Few differences except for this period.

Strong decrease passed August 2016.

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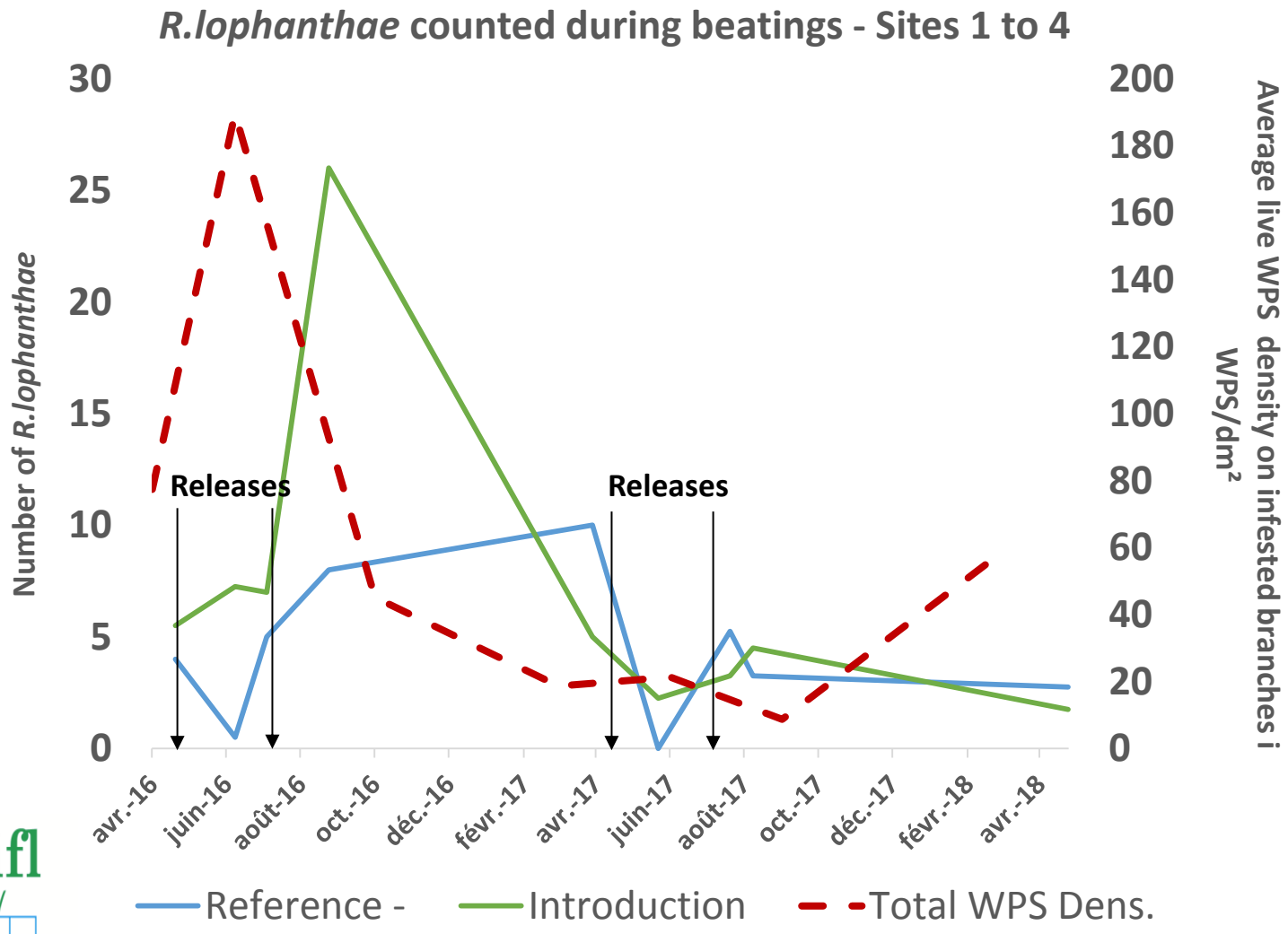
Beatings : number of *R. lophantae* and scale density



Peak of presence in the Introduction plots in August 2016.

Few differences except for this period.

Strong decrease passed August 2016.

Strong correlation between *P.pentagona* and *R.lophanthae* populations.

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Other ladybugs

Several other species of ladybugs found in sites during beatings.

Harmonia axyridis

Propylea quatuordecimpunctata

Coccinella septempunctata

Chilococurus renipustulatus

The asian ladybeetle (Harmonia axyridis), found in important density during summer 2016 could have exerced an antagonistic pressure on *Rhyzobius lophanthae*.

- Competition for the ressource
- Intra-guild predation

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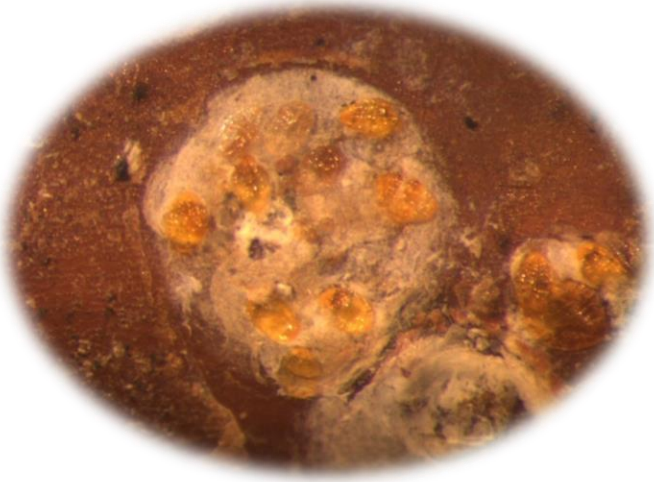
Molecular identification of *R. lophanthae*

Goal : Understand where do the R. lophanthae on the different sites come from

All field individuals are genetically close to the introduced individuals.

↳ The *R. lophantae* picked from Reference plots are also close to the introduced individuals.

↳ No differentiation between released individuals and naturally present.



The White Peach Scale

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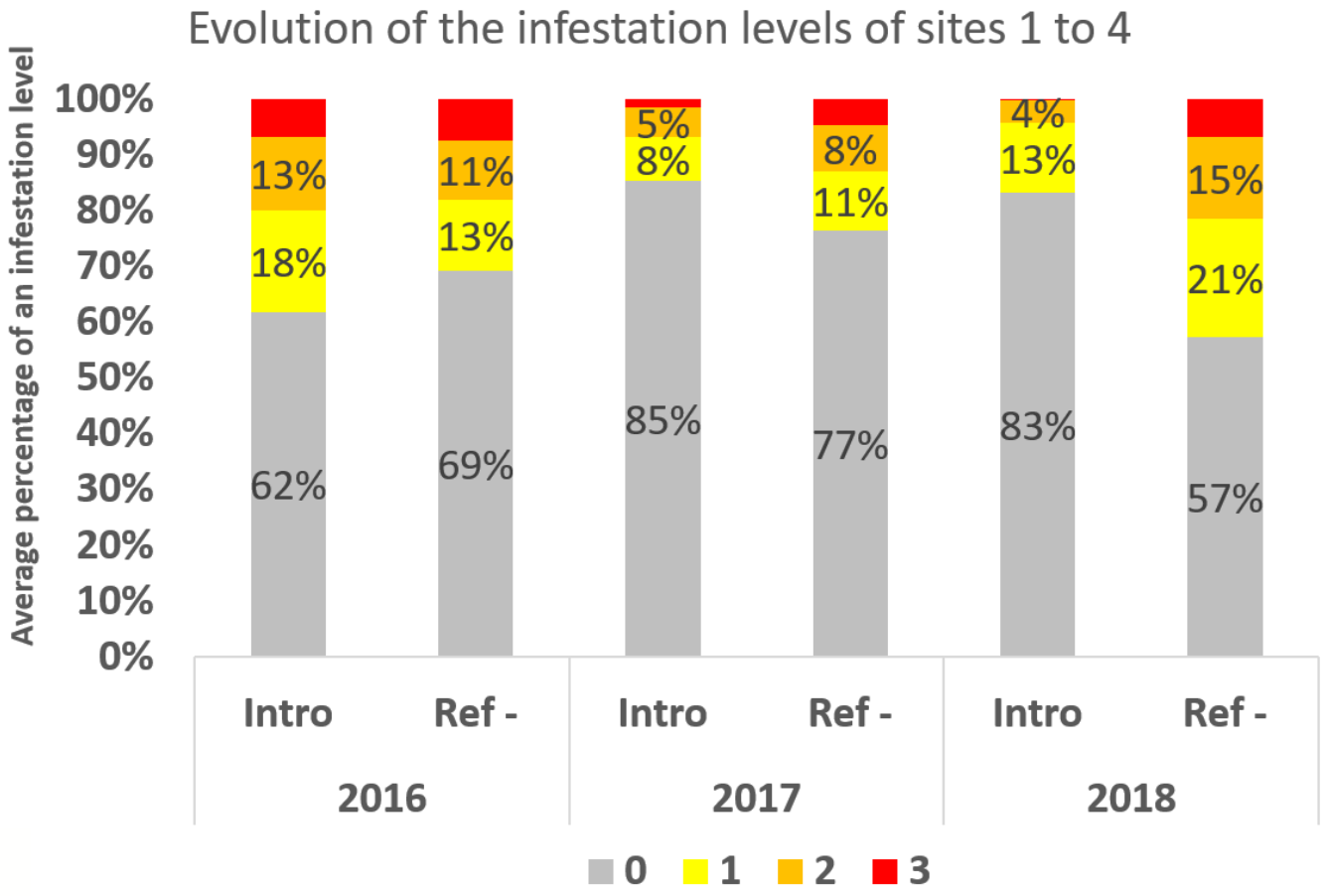
Bushes infestation

0	Healthy bush
1	Early infestation
2	Settled infestation
3	Important infestation

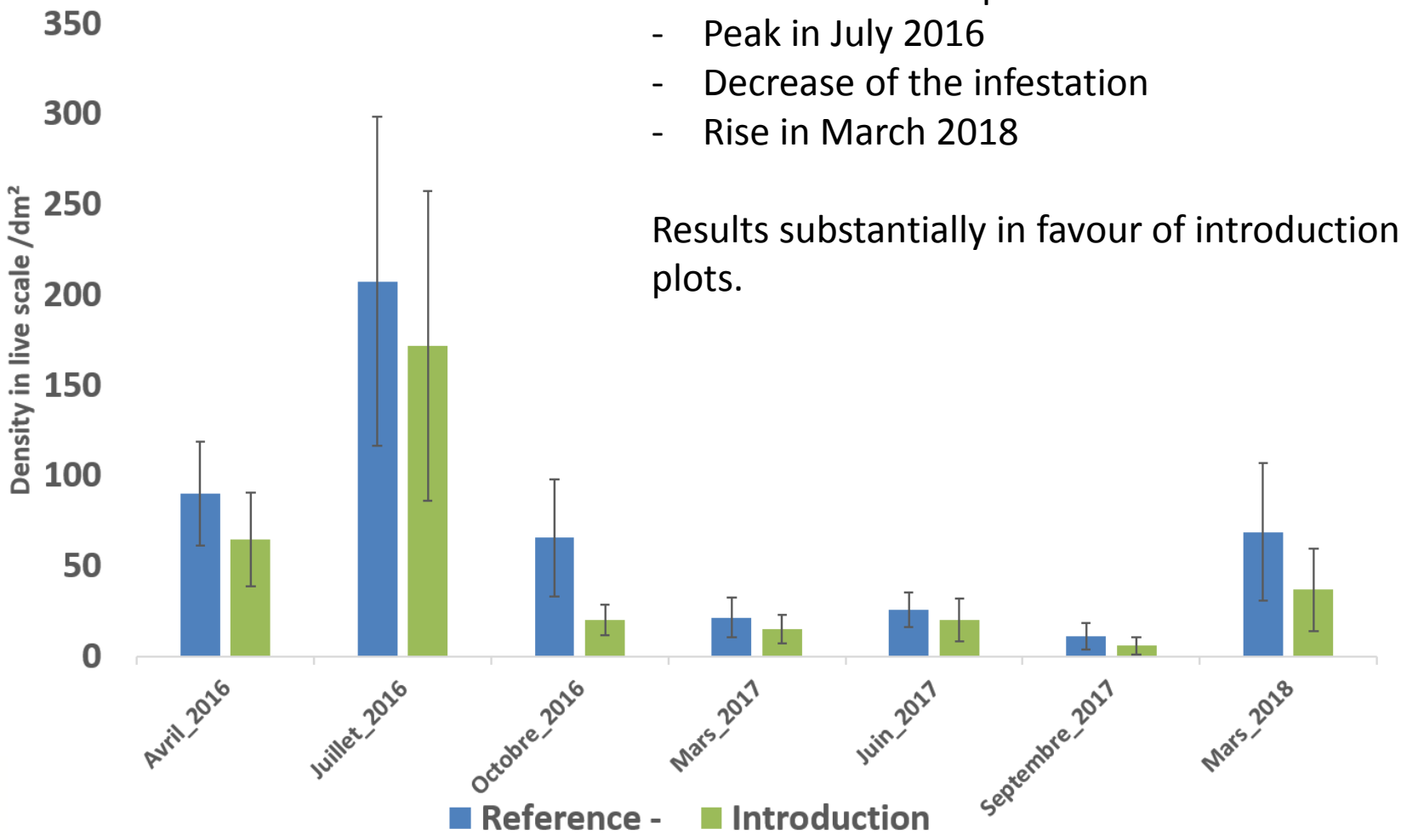


The initial infestation was similar on both modalities.

In 2017 we observe an efficiency of the releases, that is confirmed in 2018.

- **Intro**: no insecticide, releases of *R.lophantae*
- **Ref -** : insecticides but no anti – white-scales

Evolution of density of the white peach scale in scale/dm² on infested branches (sites 1 to 4)



Results confirm the previous observation :

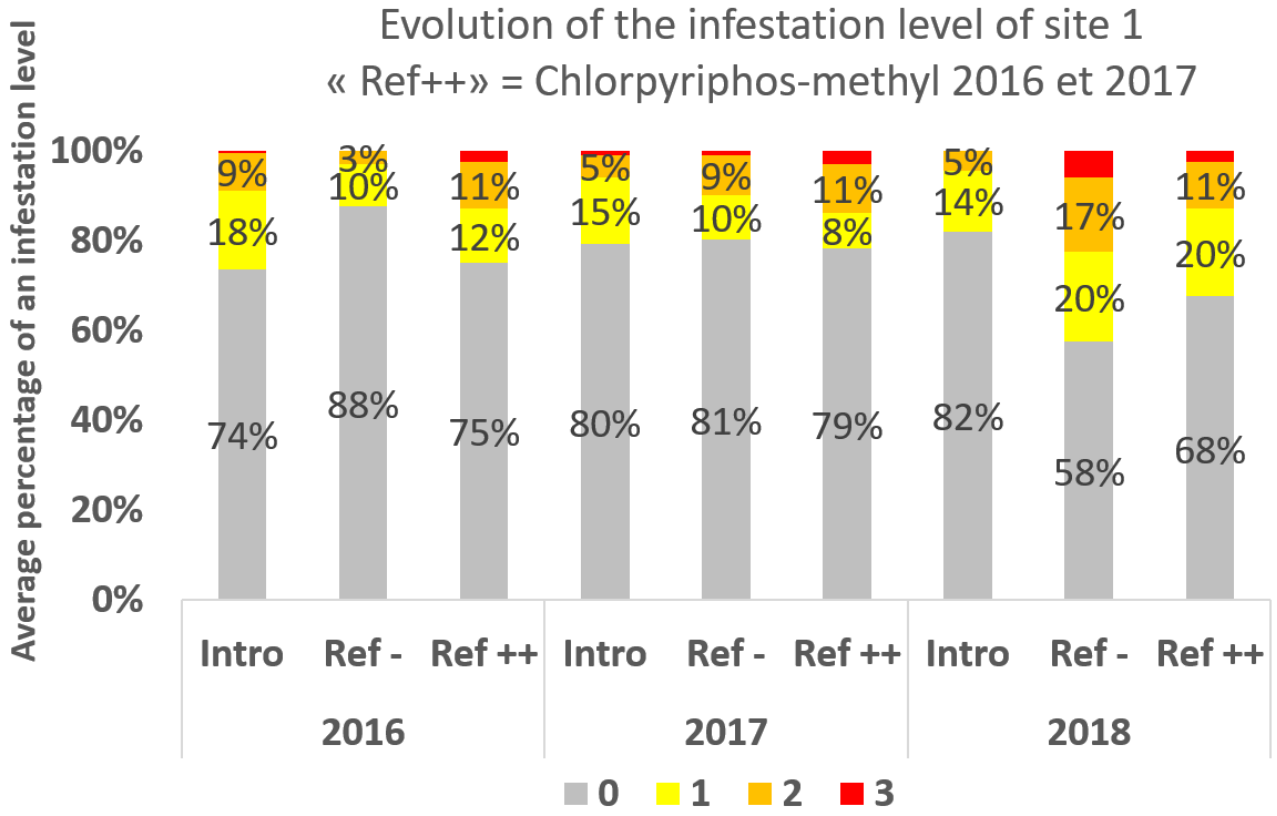
- Peak in July 2016
- Decrease of the infestation
- Rise in March 2018

Results substantially in favour of introduction plots.

- **Intro**: no insecticide, releases of *R,lophantae*
- **Ref -** : insecticides but no anti – white-scales

Bushes infestation

0	Healthy bush
1	Early infestation
2	Settled infestation
3	Important infestation



Similar initial infestations.
No difference in 2017.

In 2018 results in favour of Introduction, and smaller effect of Chlorpyriphos-Methyl.

- **Intro** : no insecticide, releases of *R.lophanthae*
- **Ref -** : insecticides but no anti – white-scales
- **Ref ++** : Chlorpyriphos-Methyl 2016 & 2017

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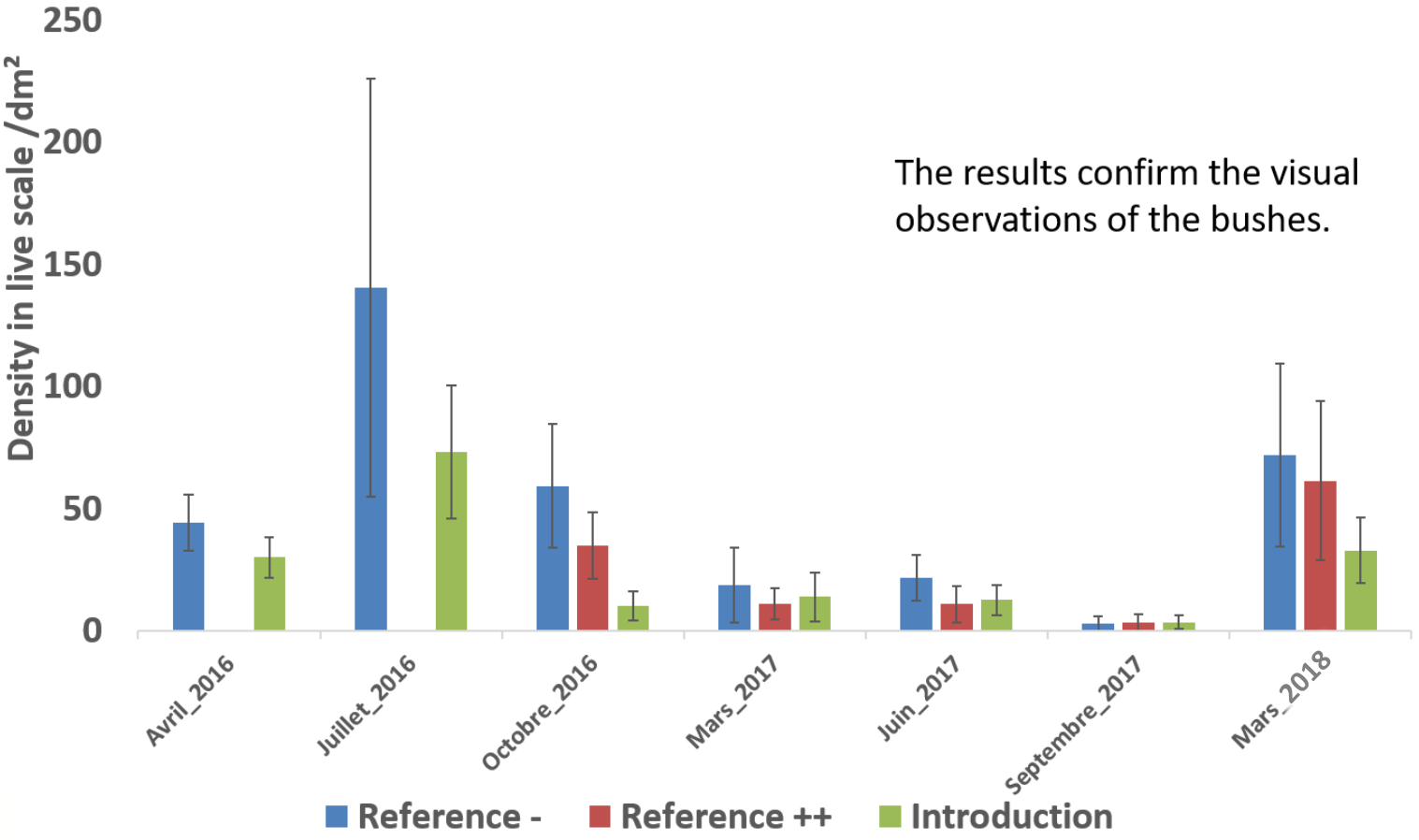
Evolution of density of the white peach scale in scale/dm² on infested branches – Site 1 – Chlorpyriphos-methyl in 2016 and 2017



The results confirm the visual observations of the bushes.

- **Intro** : no insecticide, releases of *R.lophanthae*
- **Ref -** : insecticides but no anti – white-scales
- **Ref ++** : Chlorpyriphos-Methyl 2016 & 2017

Summary on the bushes infestation

- Strong decrease of populations of *R. lophanthae* and *P. pentagona* in late 2016.
- The releases of *R. lophanthae* have a positive effect on white peach scale populations.
- The populations of *R.lophanthae* are similar in Introduction and Reference plots.
- Too low infestation in 2017 to detect the statistic differences between modalities. Increase in the population in early 2018.

Row infested by *P. pentagona*

Heathy row

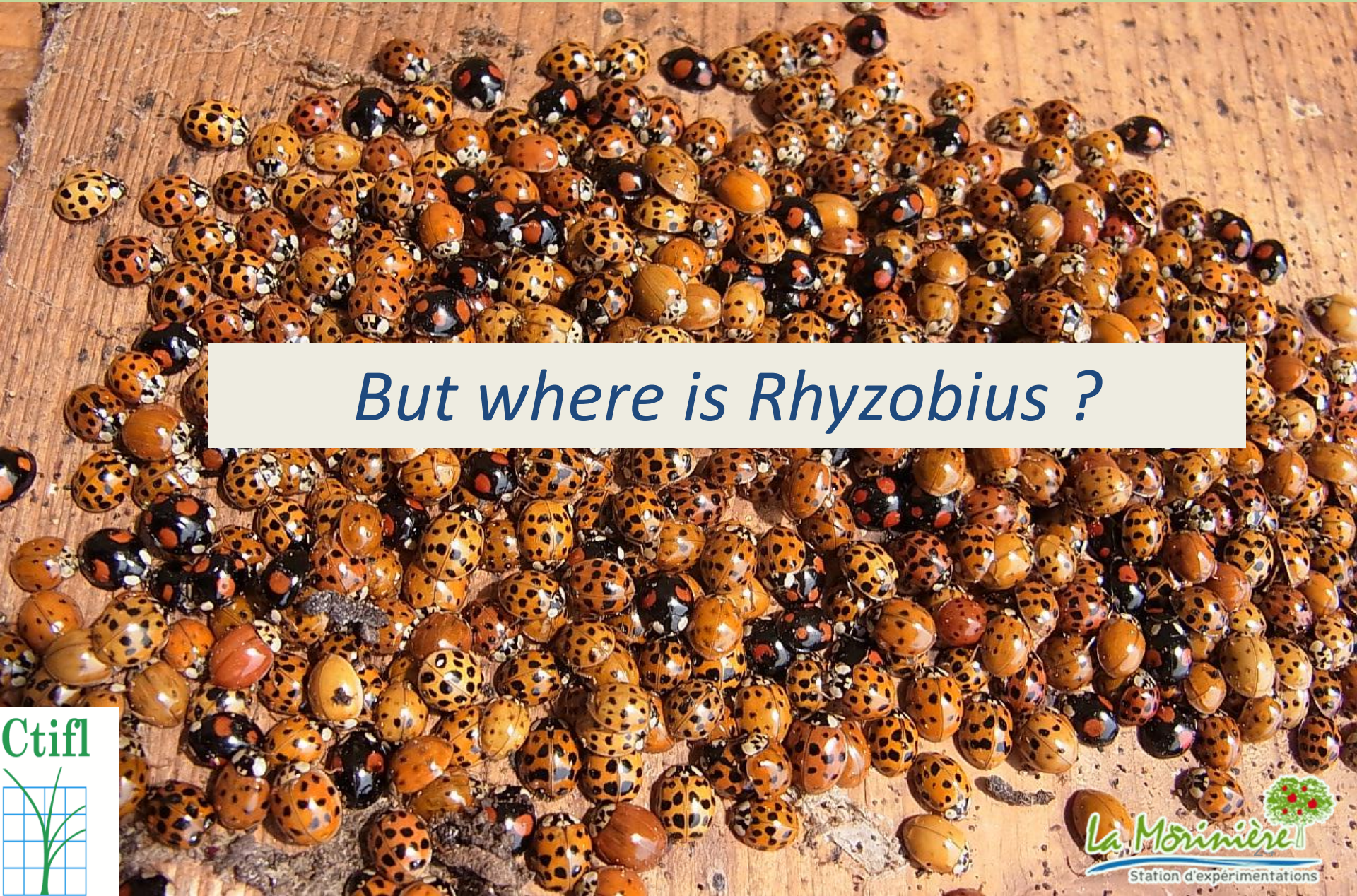
- **Encouraging** results despite the **global decrease** of P.pentagona population.
- The **Rhyzobius** released don't seem to **settle** in the plots.
- In these conditions the **chemical treatments don't seem to impact** the presence of *R.lophanthae*.
- Problems with **aphids** and **midges** in Introduction plots (no insecticide).

Prospects

Changing the **releases strategy** ?

- After second swarming : better weather conditions (post-harvest).
- More intensive releases on the first white scale patches – decreasing price/ha.
- Pre-flowering insecticide treatment.

Thanks for your attention !



But where is Rhyzobius ?

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