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Use of agronomical techniques to manage rape winter stem weevil and cabbage stem flea beetle populations in winter oilseed rape.

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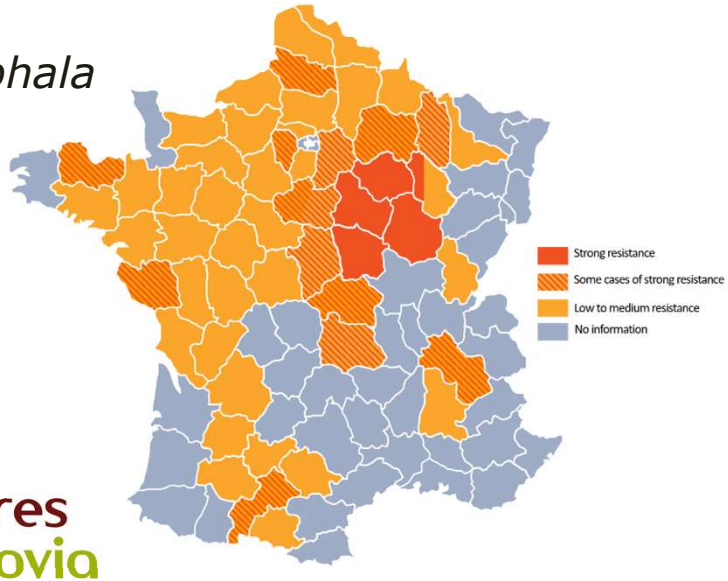
Context

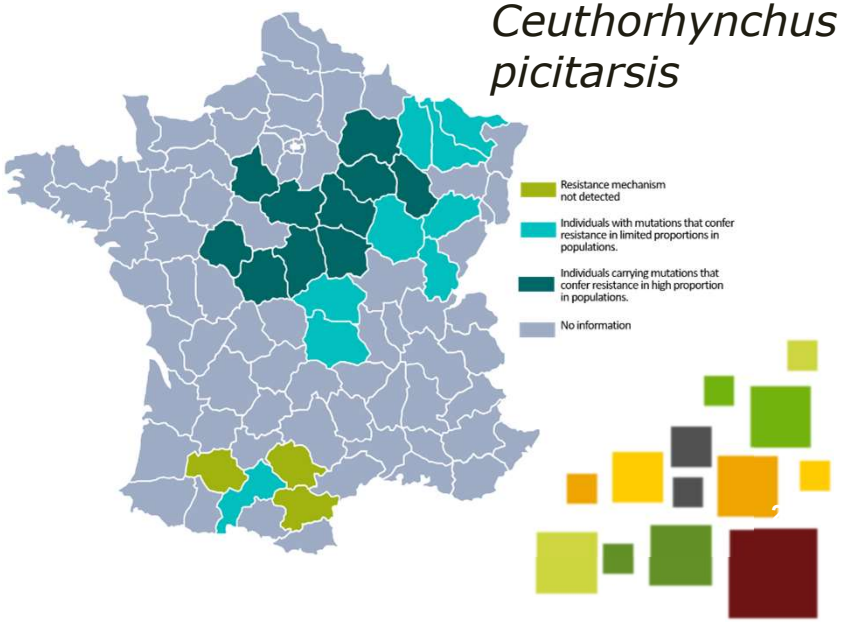
- **High pressure of the general public to develop a less pesticides dependant agriculture**
- **A difficult technical context**:
  - Several insect species are resistant to insecticides (poster **387**)
  - The number of insecticides molecules is decreasing (difficulties to alternate)
  - Lack of efficient alternative solutions to manage insect pests

However, previous studies have shown the value of agronomic techniques to reduce flea beetle and rape winter stem weevil harmfulness.

Psylliodes chrysocephala



Ceuthorhynchus picitarsis



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A combination of techniques

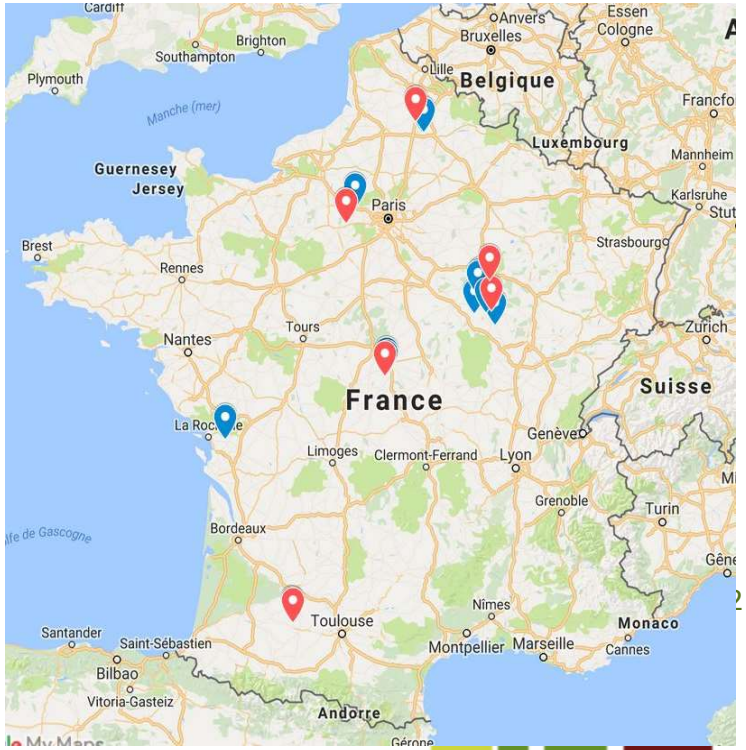
WOSR + faba bean © Terres Inovia

WOSR + lentil + fenugreek + grass pea © Greenotec

WOSR + lentil + fenugreek + berseem clover © S.Cadoux

Modality	Companion plants	Fertilization just before sowing (30kg/ha)	Insecticides against flea beetle larvae and rape winter stem weevil
OSR			
OSR-F		X	
OSR-FB-F	X	X	
OSR-FB-F-T	X	X	X
OSR-FB	X		
OSR-LFBc	X		
OSR-LFGp	X		
OSR-T			X

Trials 2016-2017
Trials 2017-2018



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Fertilization in spring was adjusted for each modality. Fertilization was reduced (-30kg/ha) for modalities with frost sensitive legume crops.

Mixing OSR with legume crops is interesting to reduce flea beetle larval infestions when they are well developed (>200g/m²).

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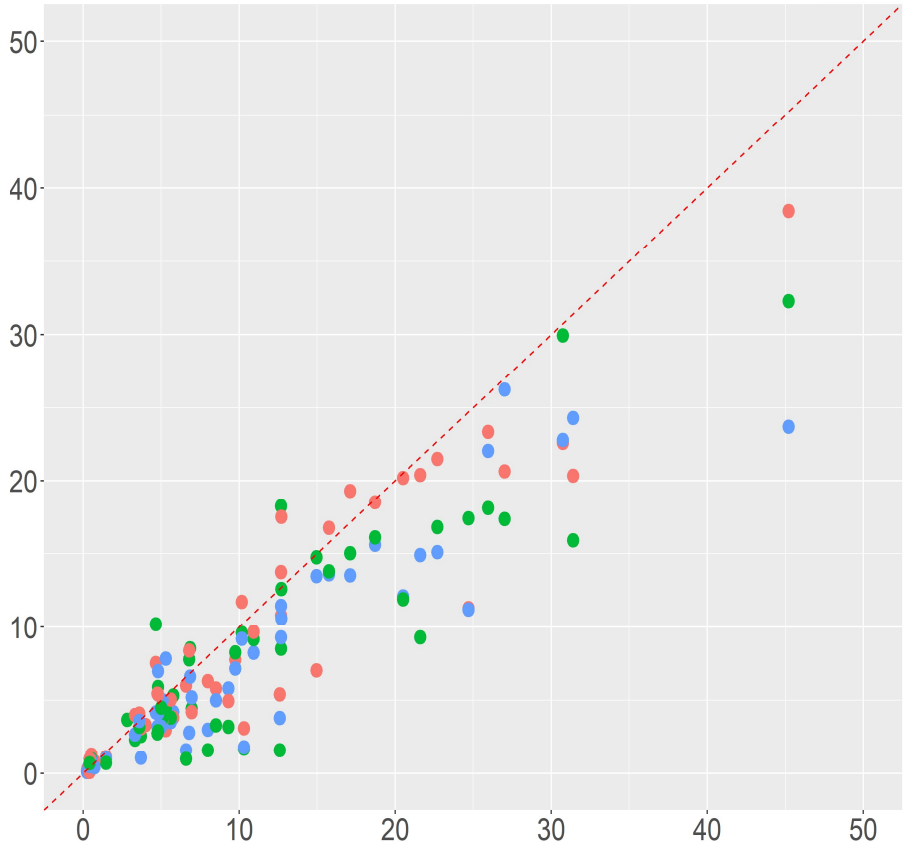
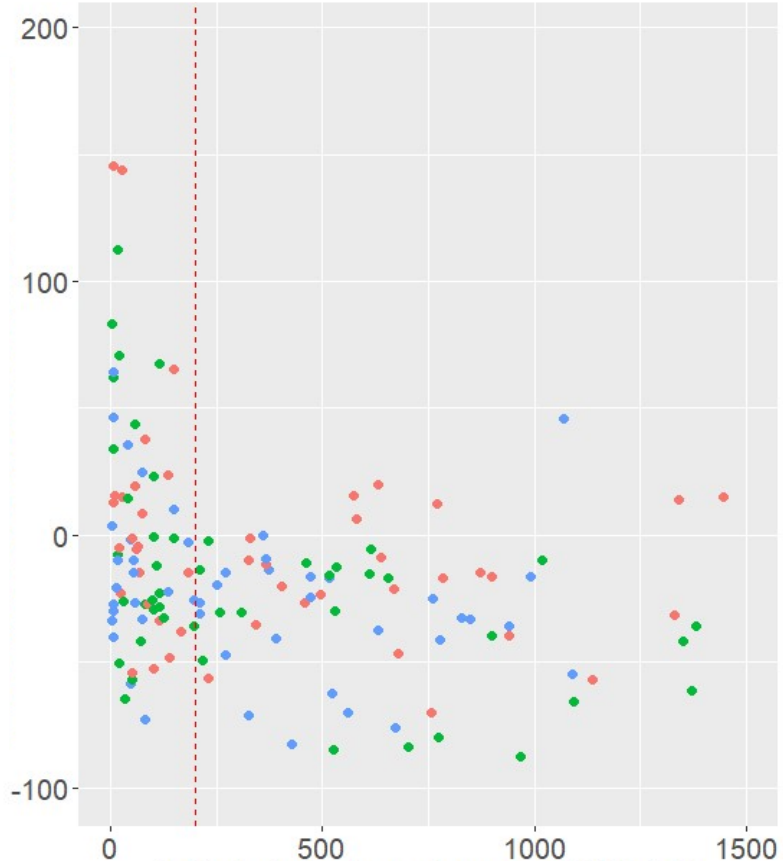
Number of larvae per plant at the end of winter in WOSR+legume crops



Variation in the number of larvae at the end of winter in the modalities with legume crops compared to WOSR implanted alone (%).



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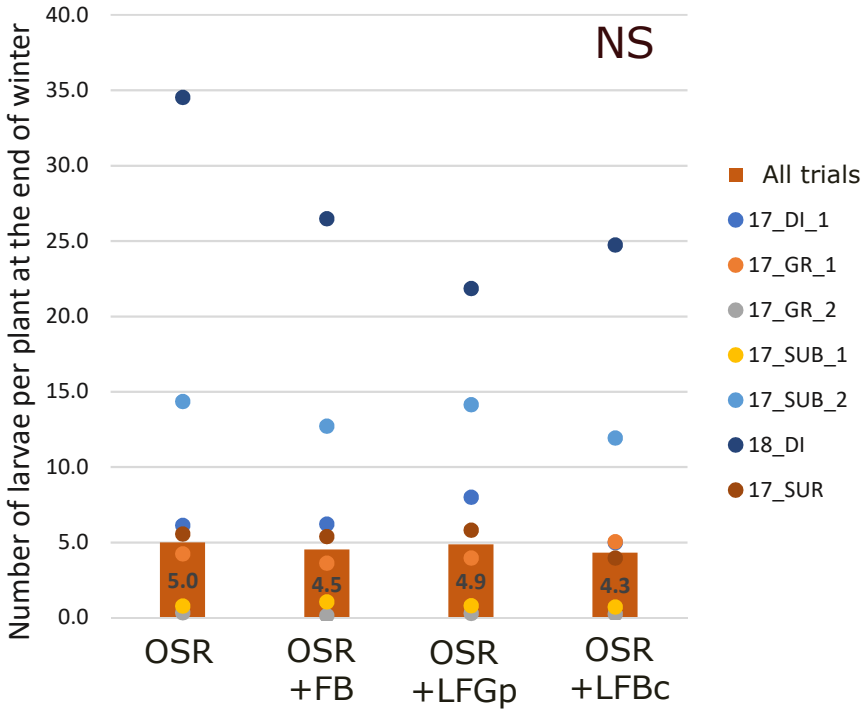
- WOSR + faba bean
- WOSR + + lentil + fenugreek + grass pea
- WOSR + lentil + fenugreek + berseem clover

Mixing OSR with legume crops is interesting to reduce flea beetle larvae infestions when they are well developed

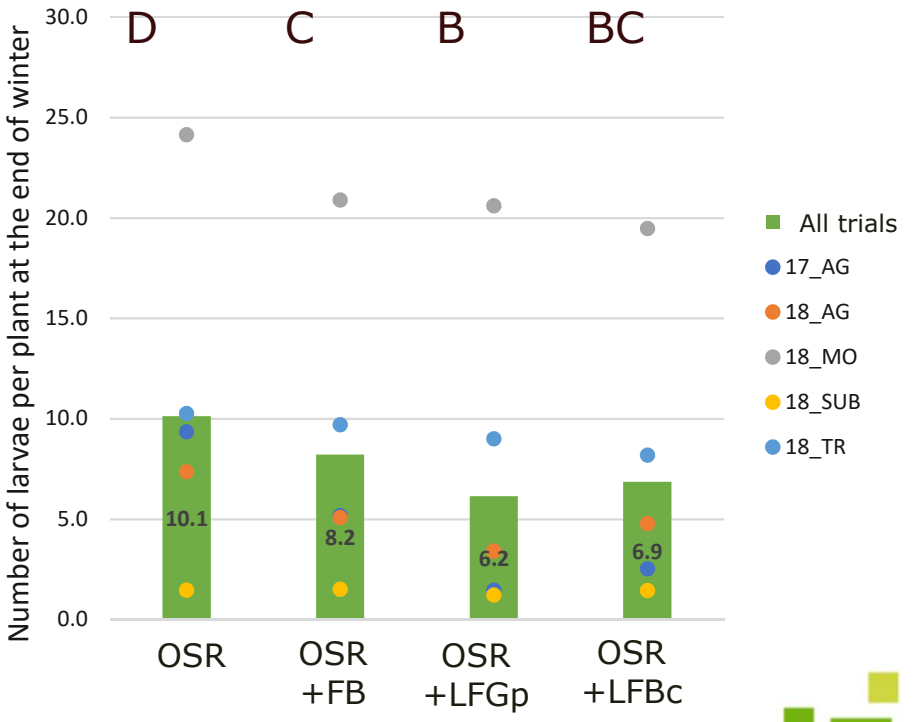
(Tukey, 5%)

Trials with legume crop biomass before winter <200g/m2



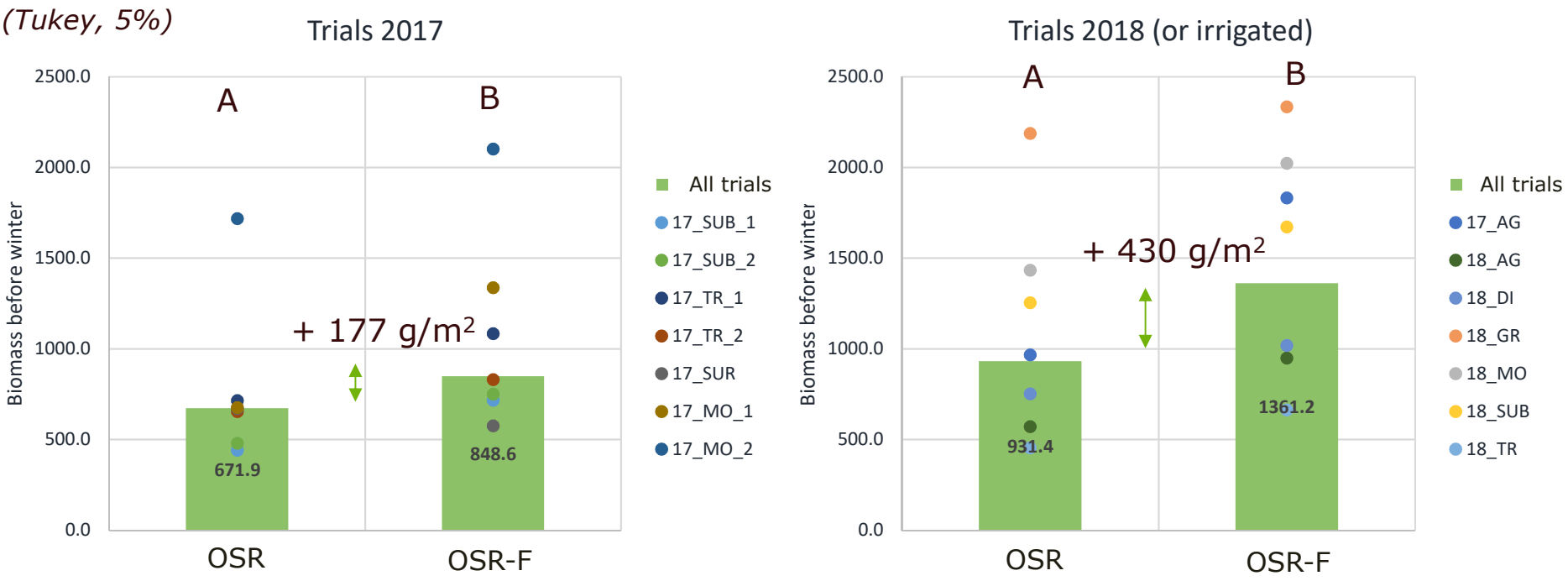
(Tukey, 5%)

Trials with legume crop biomass before winter > 200g/m2



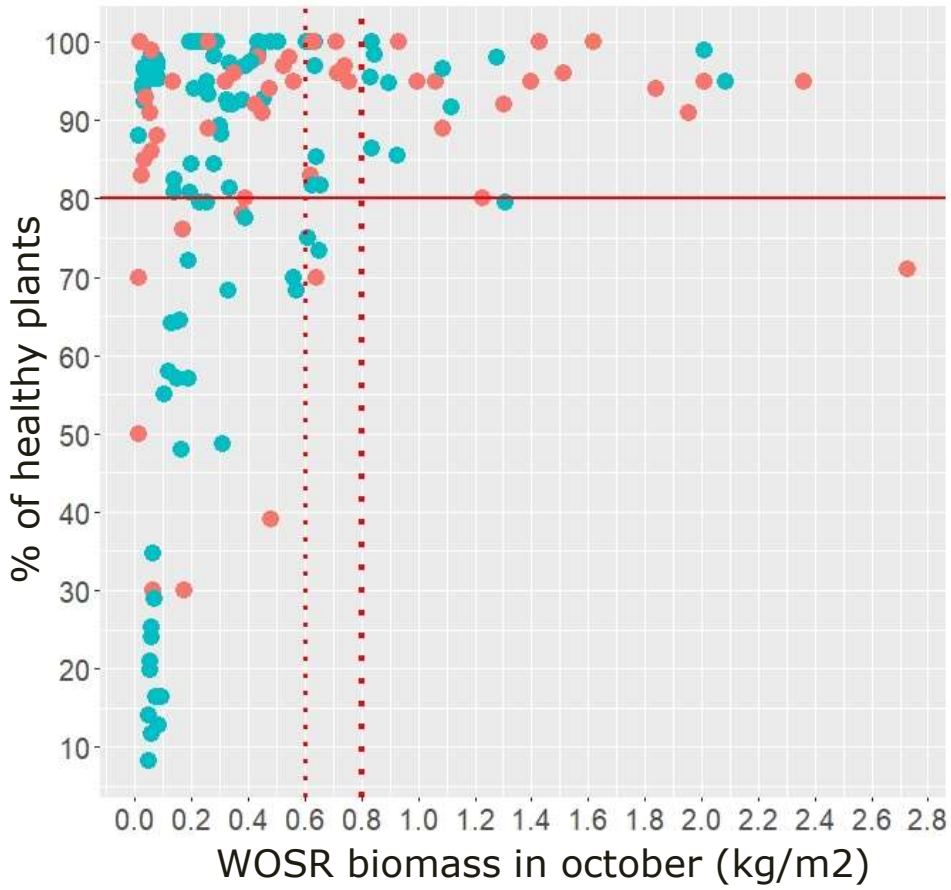
Fertilization at sowing promotes WOSR growth

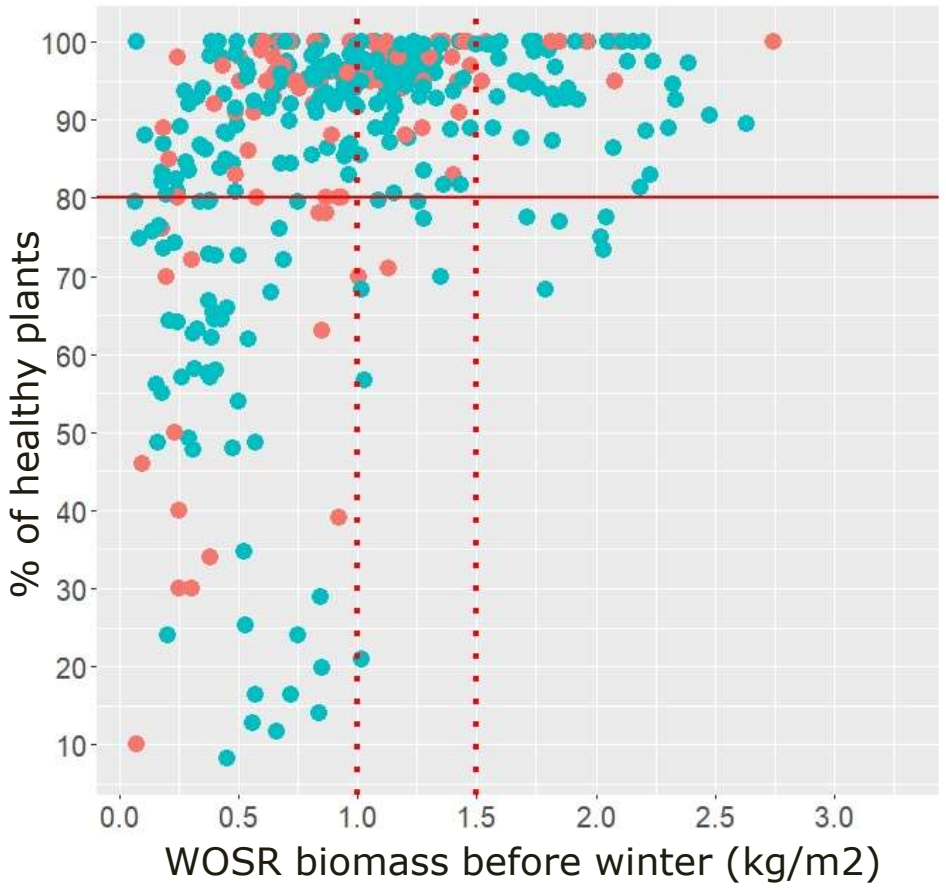
(Tukey, 5%)



A % of apparently healthy plants optimized with a biomass >800 g in October and > 1.5 kg/m2 before winter

(Untreated plot)





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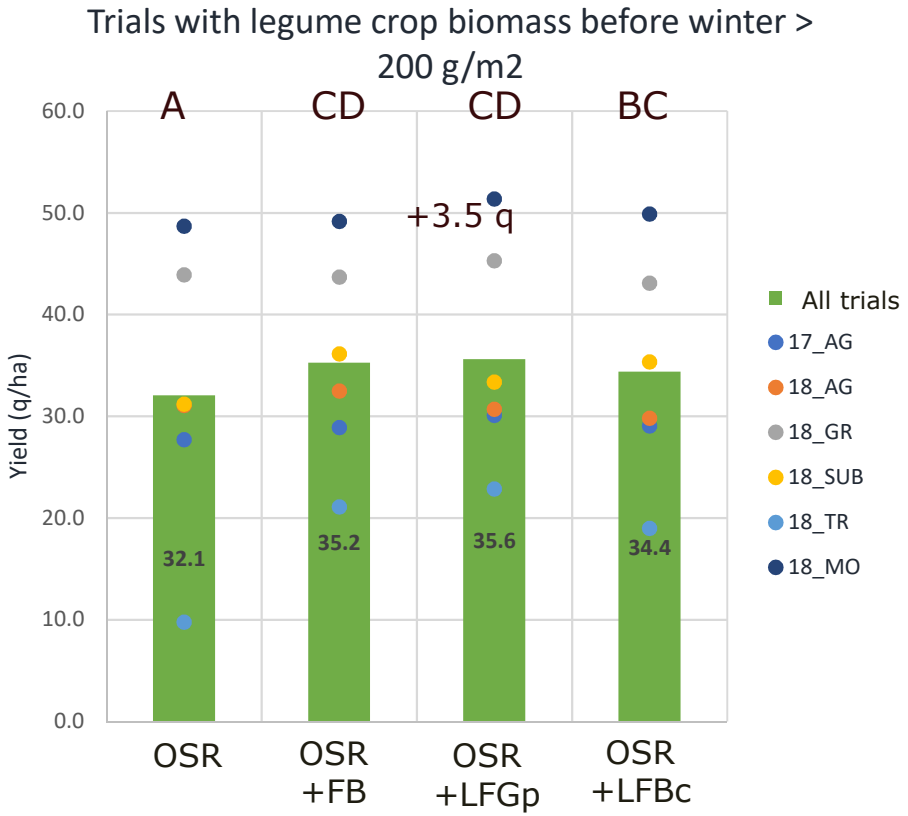
● Fields
● Trials

Well-established legume crops improve WOSR performance

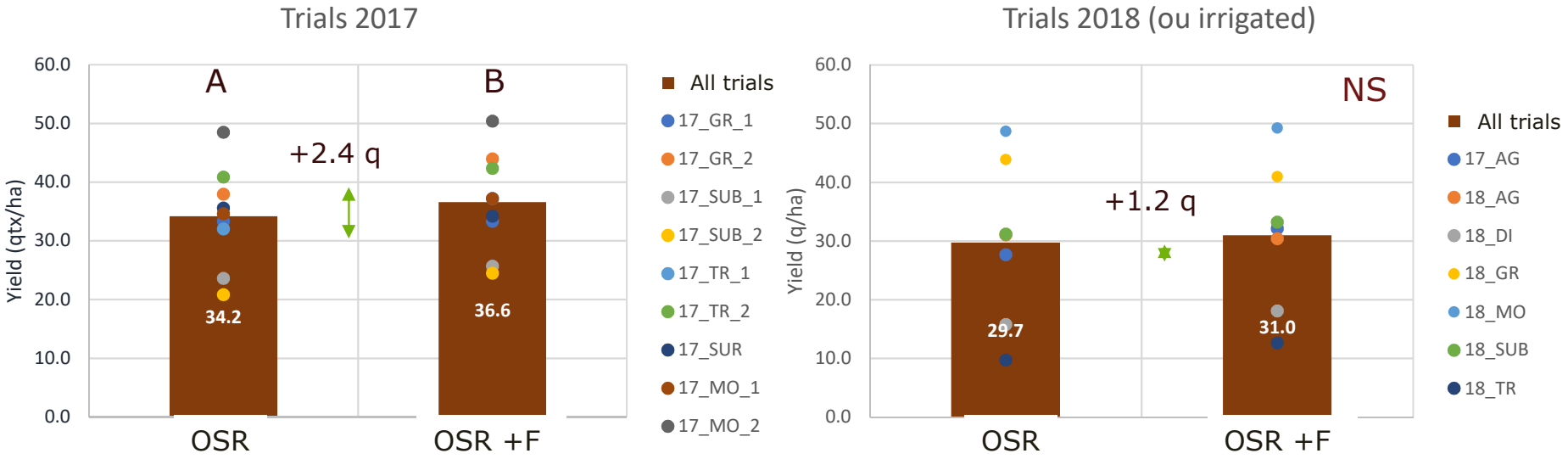
(Tukey, 5%)



- Yields are significantly higher regardless of the legume cover tested.
- Up to +3.5 q/ha observed on the average of the trials where legumes are well developed.

Fertilization before sowing can increase the yield

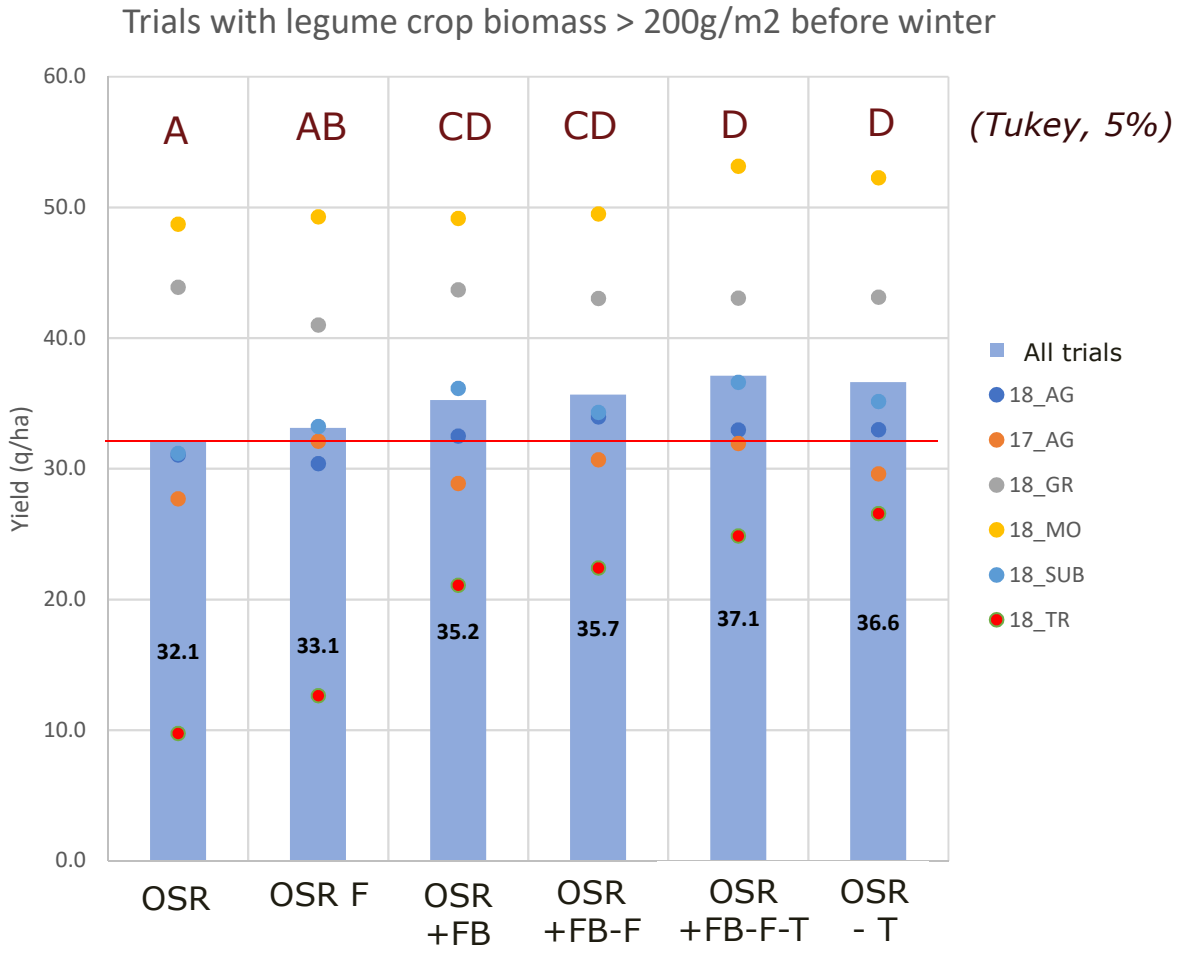
(Tukey, 5%)



- In 2017, there is a significant effect of the fertilization on the yield but no effect in 2018 even if the biomass increase was higher.

- Hypotheses:
  - A higher insect harmfulness in 2018
  - Later spring recovery
  - ….

The addition of all the techniques secure the yield



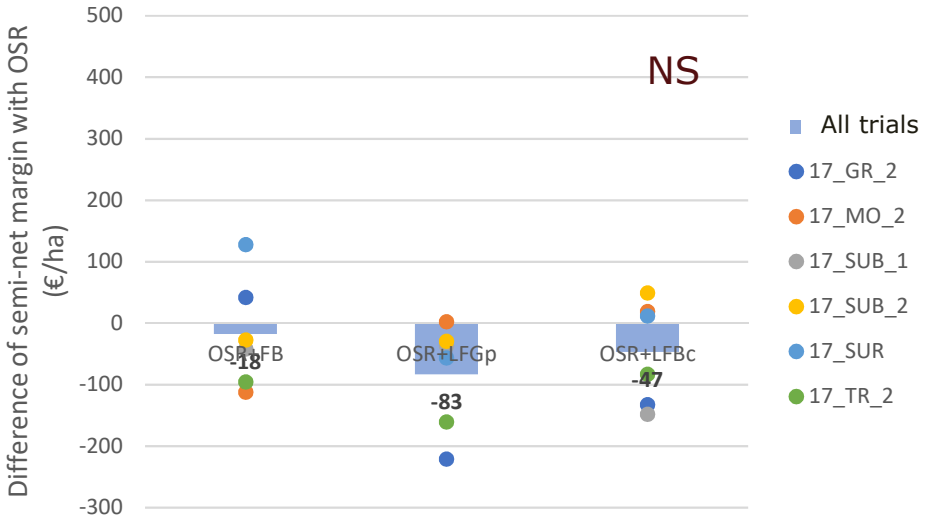
Economic analysis : hypotheses.

- Was only taken account variable costs between modalities:
  - Insecticides : insecticide price + cost of the passage (9€/ha).
  - Fertilization: 1€/kg/ha + cost of the passage (3.99€/ha).
  - Sowing:
    - Faba bean seeds (20€/ha) + sowing cost 18€90.
    - Semences LFGp (60€/ha) et LFBc (60€/ha) + sowing cost 13€/ha.

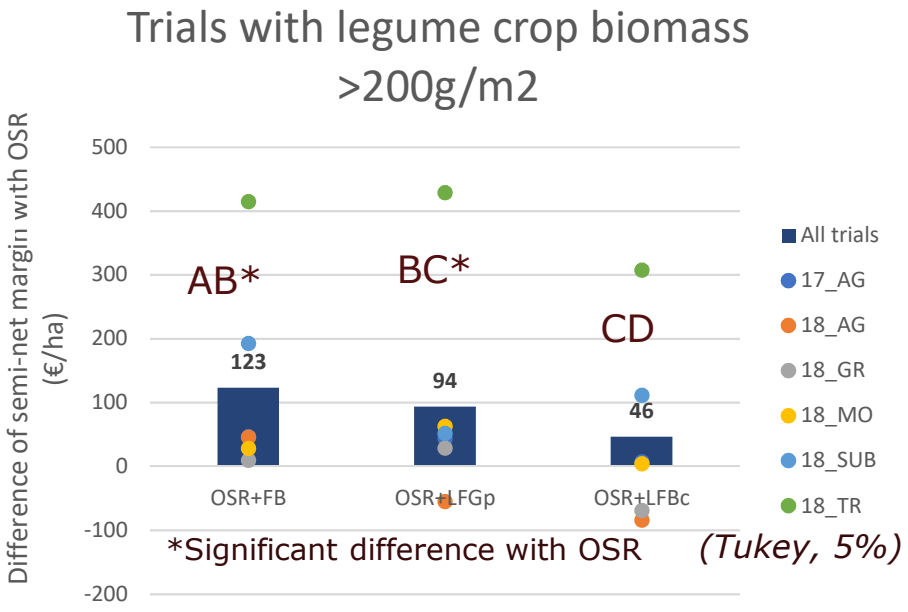
- Formula:
  - Difference of semi-net margin = Partial margin in plot X - Partial margin in modality OSR.

Well established legume crop help to increase the field margin (comparison with the control OSR).

(Tukey, 5%)



(Tukey, 5%)



Fertilization is reduced (-30kg/ha) in OSR modalities with frost sensitive legume crops.

Well established legume crop help to increase the field margin (comparison with the control OSR).

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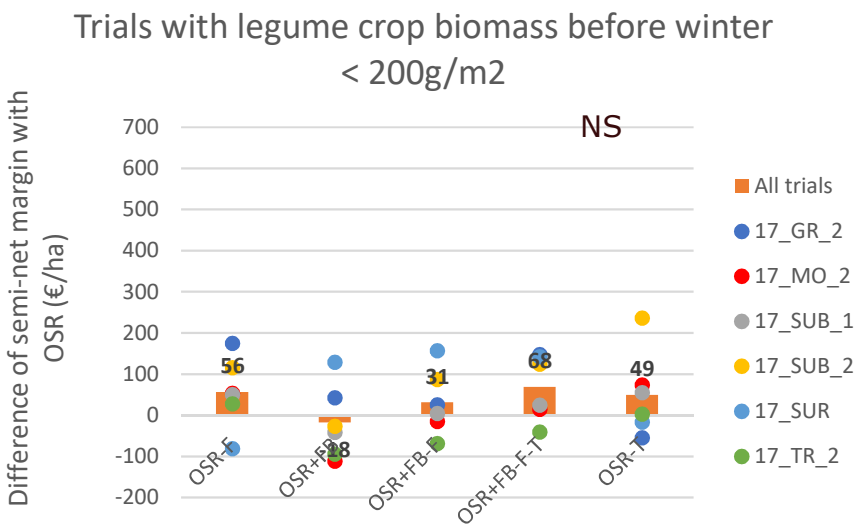
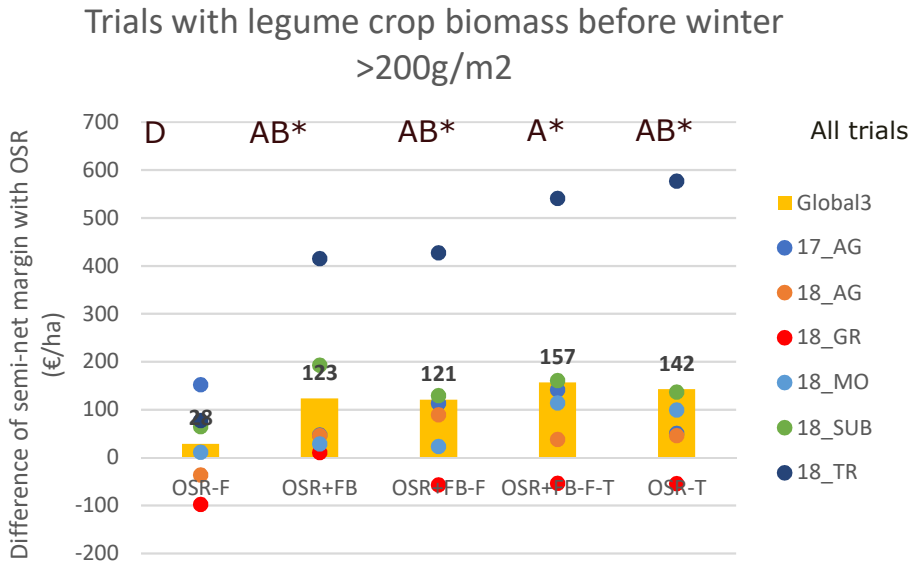
(Tukey, 5%)



(Tukey, 5%)



- In 2017, no significant differences on the margins is seen between modalities.
- En 2017 et 2018, margin is higher than the control when at least one technique is used.
- Fertilization impact is higher in 2018.
- Techniques addition is safer.

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*Different from the control OSR

Establishment quality is the key to face autumn pests harmfulness.

- **Well established legume crops mixed with OSR:**
  - Help to reduce larval infestations by cabbage stem flea beetles.
  - Help to reduce the rape winter stem weevil harmfulness (not shown).
  - Have an impact on WOSR growth (other studies).

- **Fertilization before sowing :**
  - Increase WOSR growth in the autumn.
  - Have no effect on the number of cabbage stem flea beetles per plant (not shown).
  - A big WOSR is not enough to reduce insect harmfulness : it is the growth dynamic that seems important.

- **The addition of several techniques is the best way to secure yield without negative incidence on the margin.**

In good establishment conditions, agronomical techniques are in these trials as effective as insecticide treatments.

Thank you to all Terres Inovia colleagues

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And thank you for your attention!