



Annex 1

Sustainable innovative practices in the central region of France: a focus on soil structure assessment in the field

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ANNEXE 1 – Material & Method and main results



Innovative arable cropping Berry case study Central France



Valérie



Innovative arable cropping (Berry, central France)



Production area

Historical rapeseed, wheat, barley rotation
Argilo-calcareous (stony) soils
100 to 500 hectares farms

Dynamic started in 2005

- Decreasing/stagnating yields for 20 years
- Agronomic diagnosis 2005-2012 (500 parcels)
Major problems : short rotation & weeds, pests
- A group of farmers "keen to change" & Terres Inovia (Gilles Sauzet)
evolved gradually to **simplified tillage, cover crops and crop diversification**



French technical institute for agricultural research and development on the **production and valorisation of oilseeds and protein crops** : rapeseed, sunflower, soybean, oleaginous linseed, pea, faba bean, lupin, hemp... (financed by farmers through a compulsory tax on harvests)



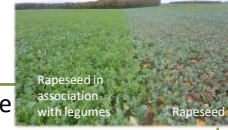


Innovative arable cropping (Berry, central France)

Berry group: 15 farmers, 5 public & private advisors

Test of innovative practices for more productive & sustainable

- ✓ Lengthening of crop rotations (protein crops)
- ✓ Combined crops in no tillage (oilseed rape in legumes cover, winter pea & barley/wheat)
- ✓ Adaptation of soil tilling practices, sowing dates



The most important in success with innovative practices: drilling/seeding
(%germination, rooting, weeds, crop growth at beginning of winter)

→ Need to **better assess soil structural state and risks before choosing the most adapted agricultural practises**

Objective in

To accompany knowledge transfer and appropriation

To help farmers to decide on the most appropriate practice

(soil management eg. no-till, cover crops, crop association, sowing dates, etc)

→ **Create a decision support tool**



Innovative arable cropping (Berry, France)

Meeting 1 issues

Farmers questions

- Oilseed rape associated with which leguminous crops?
- What are the proper seeding techniques for **our region** ?
- How to **succeed drilling/seeding** in a covered soil ?
- Using **strip-till** for **better soil structure**?
- Which **crop** should be added to the rotation to improve its **sustainability** ?
- How to manage **intercropping** ?
- **Cash crop or intercrop** ?
- Would it be beneficial to maintain **permanent soil cover**?
- Can good drilling limit the impact of pests ? Has the intercrop impact on **pest management** ?

1

Refined questions

- What are the effects of agricultural practices such as **direct sowing, cover crops and soil tillage** on the **nitrogen** and **organic matter cycles** and **availability** ? “
- “What does influence (trigger) the end of dormancy (the **germination of the weeds**) ?”
- “How can we evaluate in the field the **properties of the soil** (structure, texture, “health”) ? What are the possible **evaluation methods** ?”
- “How can we **best drill (sow)** a crop through a soil cover (soil covered by a crop or crop residue) ?”
- “What are the practical impacts of the use of existing **alternative** plant controls and protections ?”



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Trial topics

20 stakeholders

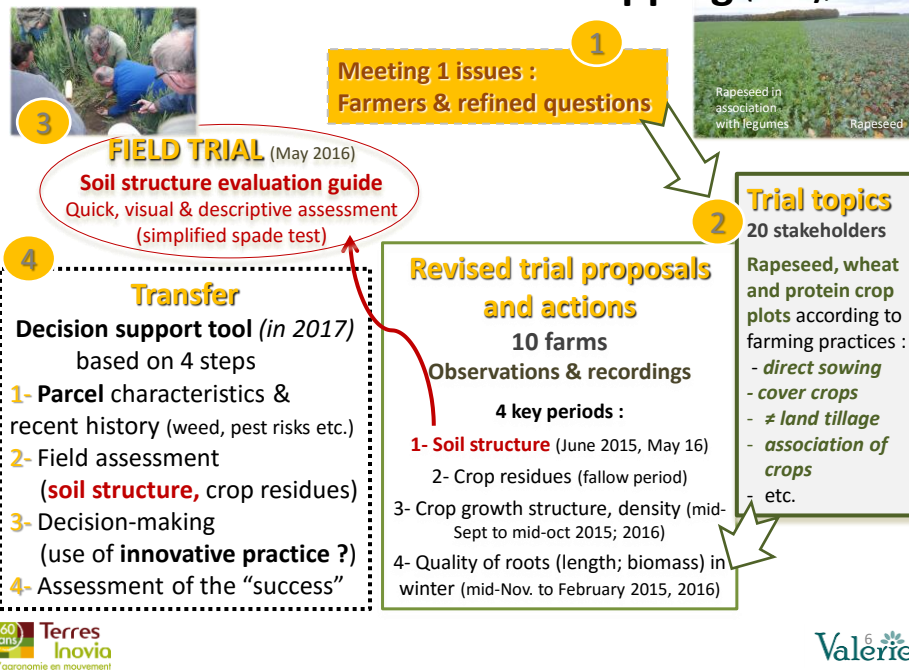
Oilseed rape, wheat & protein crop plots according to farming practices :

- **direct sowing**
- **cover crops**
- **≠ land tillage**
- **association of crops**
- etc.

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Innovative arable cropping (Berry, France)



Innovative arable cropping (Berry, central France)

Results 2016

10 farms

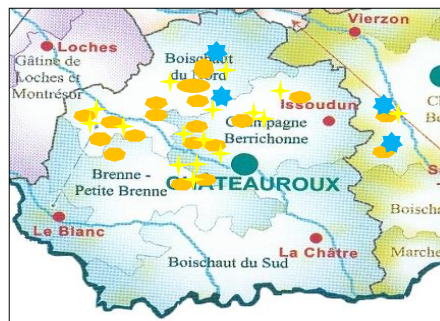
Crops of this study

- Oilseed rape : 19 parcels
- Wheat: 16 parcels
- Protein crops : 7 parcels (pea, faba bean)

Methods

Comparison in the same parcel

- Conventional practice
- Innovative practice



- Rapeseed
- ★ Cereals
- ★ Protein crops

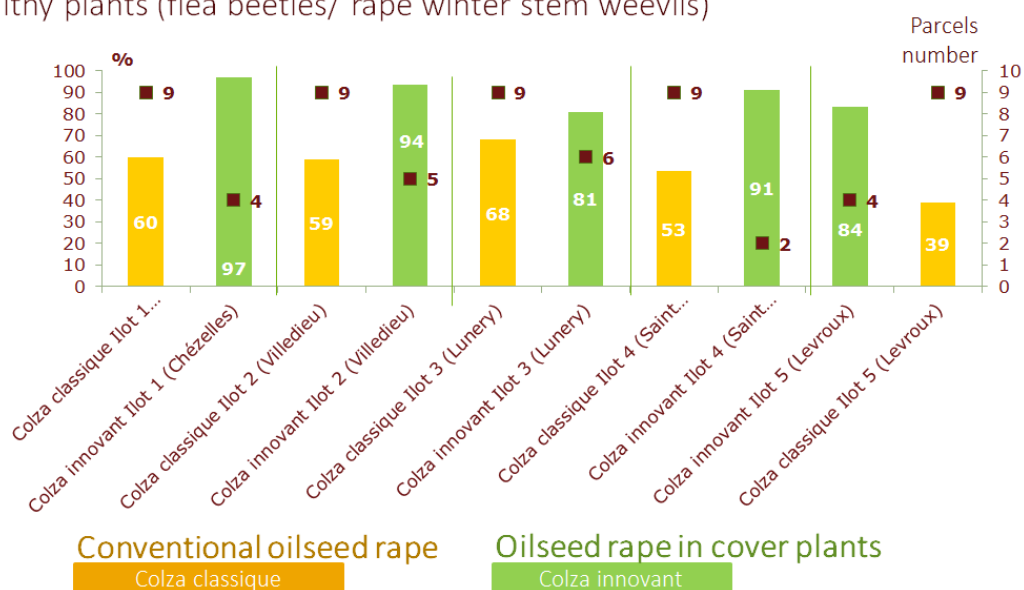
List of the compared practices in 10 farms of the Berry farmers groups (2016)

Oilseed rape			ON	Wheat	ON	Protein crops
Farmers names	Soil type	Compared practices		Compared practices		
Agri BM	ACS	in association /monoculture		in assoc. /mono.	ON	
Agri MT	LS	in association /mono		in assoc. /mono.		Spring pea
Agri CJ	LS	in association	ON	in assoc. /mono.	ON	
	LS	Strip till/SD		in assoc. /mono.	ON	
Agri DS	ACM	in association /mono	ON	in assoc. /monocult.	ON	
	ACM	Tines tool/no till				
Agri GT		in association	ON	Lin ass./mono		
Agri PA	LA	in association /monoc. & till/no till		in assoc. /monocult.	ON	Winter pea Spring pea (no till/till) Faba bean (notill/till)
	ACS	N status		in assoc. /mono till/no till	ON	
Agri SJ	ACS	in assoc. /monocult. till/no till, N status		in assoc. /monocult., SCV	ON	Winter pea Winter pea
	LA	in assoc. /monocult.	ON	in assoc. /mono.	ON	
Agri GB	ACS	in assoc. /monocult. till/no till		in assoc. /mono SCV	ON	
Agri JM	ACS	Previous	ON	Durum wheat	ON	
	LA					
Agri RJ	ACM	in assoc. /monocult.	ON	in assoc. /monocult.	ON	Winter Faba bean
	ACM	in assoc. /monocult.	ON			

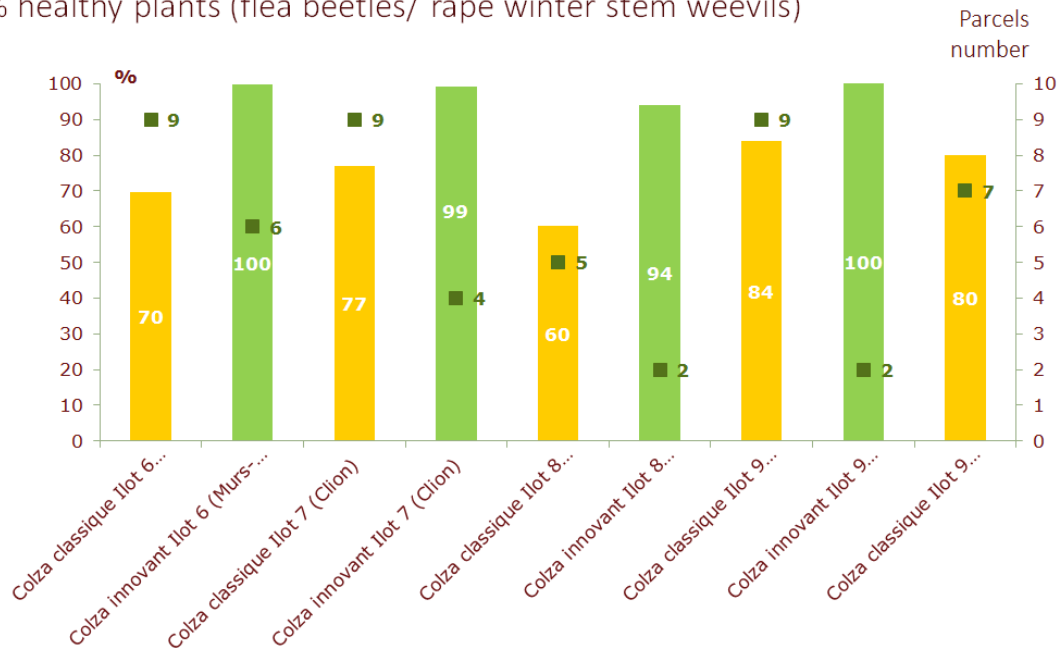
ON : strip in parcel without fertilisation

Perturbation of insect pests Comparison between conventional and innovative oilseed rape

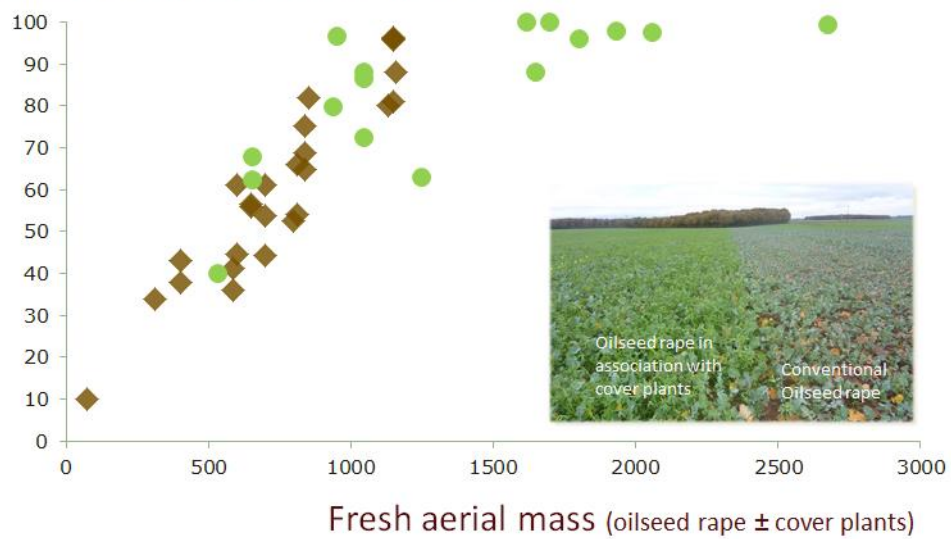
% healthy plants (flea beetles/ rape winter stem weevils)



% healthy plants (flea beetles/ rape winter stem weevils)

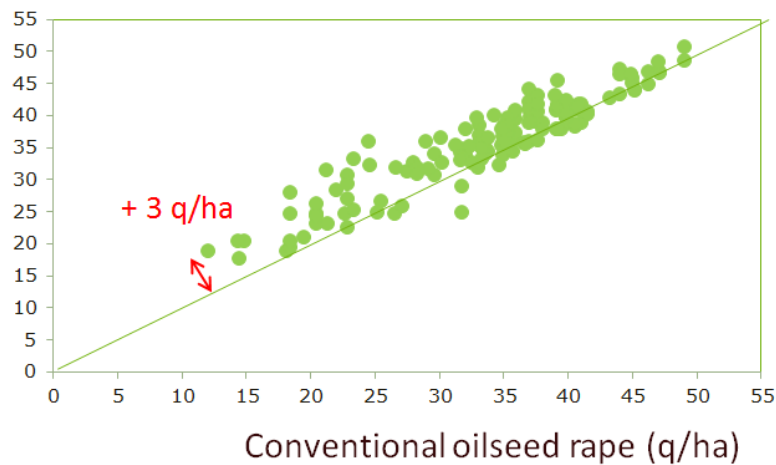


% healthy plants
(flea beetles/ rape winter stem weevils)



Oilseed rape in cover plants
Conventional oilseed rape

Oilseed rape in cover plants (q/ha)

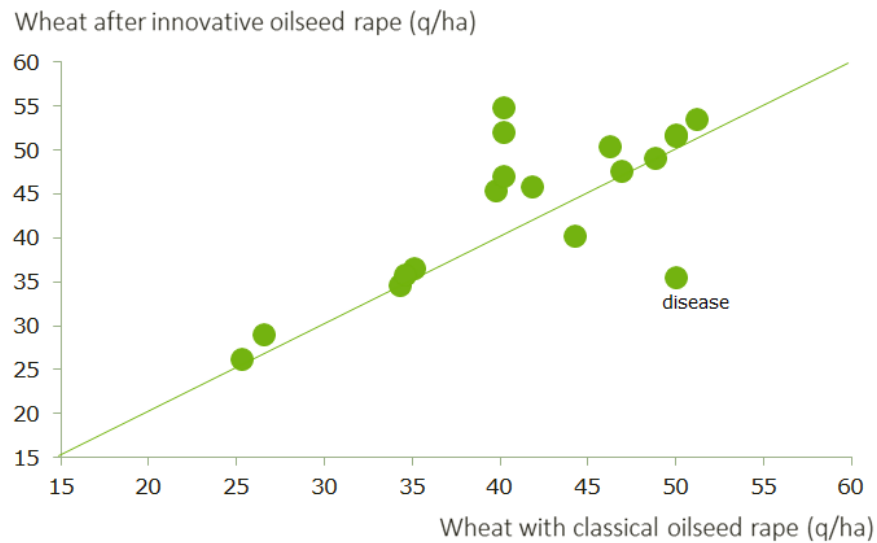


Impact of innovative oilseed rape on the following wheat (in association or not)

Farmer names	Parcels	Soil type	Crop	Previous crop
Agri BM	P1	ACM	wheat	Inn OSR (Inn. Oil Seed Rape)
	P1	ACM	wheat	Inn OSR. + IC GFL
Agri MT	P1	LS	wheat	Inn OSR
	Grangis	LS	wheat	Inn OSR
Agri CJ	G Ecoltière	LS	wheat	Inn OSR
	G Ecoltière	LS	wheat in association Destruction in may	Inn OSR
	G Ecoltière	LS	wheat in association Destruction in April	Inn OSR
	G Ecoltière	LS	wheat in association Destruction in December	Inn OSR
	G Ecoltière	LS	wheat associated to mycorrhizae	Inn OSR
Agri DS	Clion	ACM	wheat	OSR
	Clion	ACM	wheat	Inn OSR +IC faba beans.
Agri PA	P1	ACS	wheat	OSR
	P1	ACS	wheat	Inn OSR
	Hangar	ACS	wheat	Faba beans
	Lhépinrière	SL	wheat	OSR
	Lhépinrière	SL	wheat	Inn OSR
Agri SJ	Parc	ACP	wheat	Inn OSR
	Parc	ACP	wheat	Inn OSR+ SCV Tb
Agri GB	Les Galvaux	ACS	wheat	Inn OSR + mulch based (alfalfa)
	Les Galvaux	ACS	wheat	Inn OSR
Agri GT	Sougé	ACP	wheat	Lin + faba beans
	Sougé	ACP	wheat	Lin
Agri JM		ACM	Durum wheat	
Agri RJ		ACM	wheat	Inn OSR + IC faba beans
		ACM	wheat in association	Inn OSR + IC faba beans

Inn OSR: Innovative oil seed Rape (i.e. oilseed rape in cover crop)

Comparison of wheat yield after conventional or innovative oilseed rape

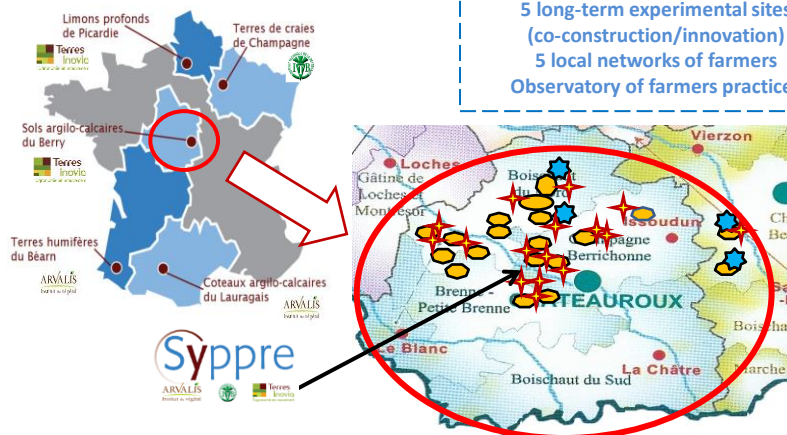


Innovative arable cropping (Berry, central France)

and next....

SYPPRE Project (2015 to >2030)

5 long-term experimental sites
(co-construction/innovation)
5 local networks of farmers
Observatory of farmers practices



10 farms

3 farmers in the SYPPRE steering group

● Rapeseed

★ Cereals

★ Protein crops