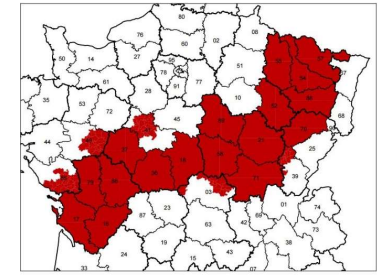


Diversification in shallow soils: Learning from combining on-station experiment and on-farm support

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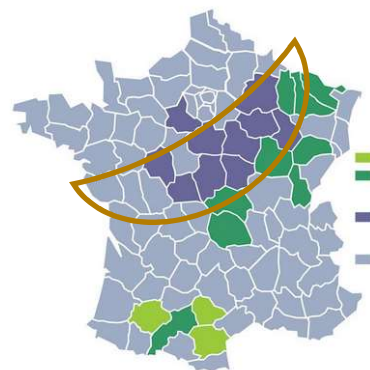
Context of intermediate zone



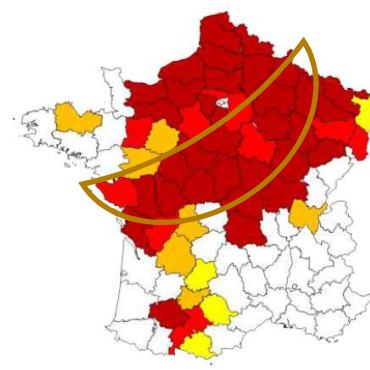
- Shallow / stony clay-limestone soils
- Dominated by winter rapeseed-wheat-barley rotations and reduced tillage
- Main weaknesses :
 - ☹ high risk of crop water stress
 - ☹ Yield stagnation
 - ☹ Low weed and pest control / high TFI



Pest resistances in France



Rape winter stem weevil



black-grass



Aim

- What strengths and weaknesses of cropping system diversification to control pests and achieve multi-performance in low-potential environments?
- What advantages of an approach combining on-station experiment and on-farm support?



Approach: two interacting devices

1 group of farmers + local partners



1 experimental platform



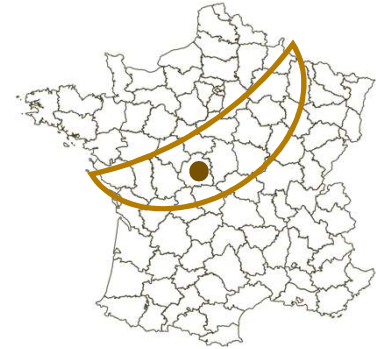
Cross-visits, sharing of ideas, knowledge and experiences

**Facilitates the group
Supports farmers in
designing, testing,
evaluating innovations**

Drives the experiment



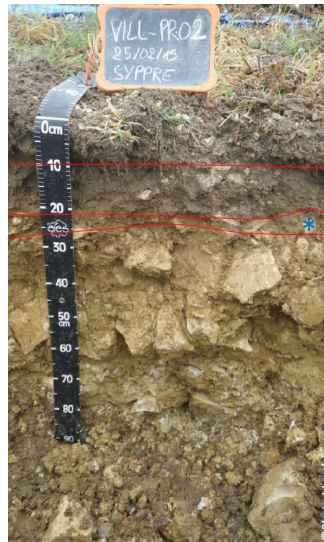
Performance calculations



1 group of farmers + local partners

12 farmers x 10 years
Survey and definition of
2 typical systems:

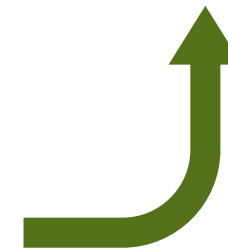
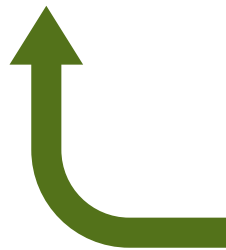
- Before support
- Current



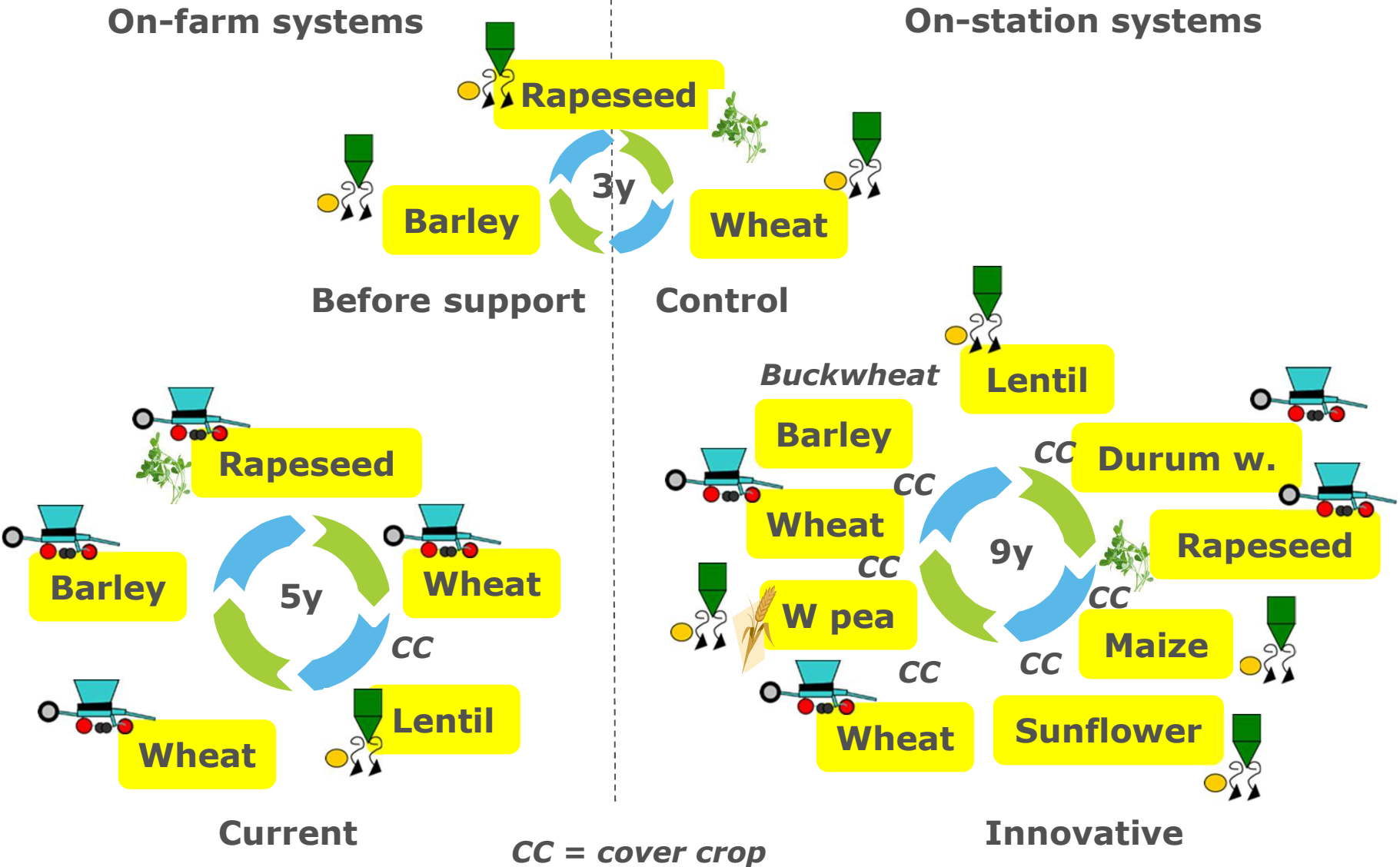
1 experimental platform

Split-plot design with all crops
each year x 3 replicates
2 years x 2 systems:

- Control
- Innovative



Results: systems implemented



Results: performances

	Typical On-farm systems		On-station systems			
	Before support	Current	2016-2017		2017-2018	
			control	innovative	control	innovative
Gross product (€/ha)	1110	1126 (+1%)	942	955 (+1%)	1094	935 (-14%)
Direct margin (€/ha)	243	397 (+63%)	400	476 (+19%)	504	464 ¹ (-9%)
TFI	7.56	5.85 (-23%)	6.8	3.6 (-47%)	5.3	3.7 (-29%)
Mineral N (kgN/ha)	177	137 (-23%)	174	113 (-35%)	158	104 (-34%)
GHG emissions (kg CO ₂ -eq)	2645	2018 (-24%)	2149	1577 (-27%)	2276	1587 (-30%)

¹In 2017-2018: low yield of sunflower and maize (summer drought) and wheat after pea/wheat intercrop (take-all disease)

Discussion

■ Diversification strategies

- ✓ Possible in shallow soils
- ✓ With lentil and cover crops => 😊 **improves overall performances**, notably profitability thanks to the adaptation of lentil (shallow soils and local industry with high added value)
- ✓ Deeper diversification in space and time =>
 - 😊 Necessary to further increase weed control, multi-performance, thus cropping system sustainability
 - ☹️ **Obstacles to on-farm implementation: complexity to manage, risk with diversification crops not well adapted to pedoclimate, lack of market for more suitable crops (e.g. millet)**



Discussion

■ Approach

- ✓ On-station experiment x on-farm support = cross-fertilization that **stimulates innovation**
- ✓ For farmers:
 - The participation to a on-station experiment **help them explore innovation pathways**
 - **The support** in designing, testing, evaluating innovations **promotes on-farm exploration and secures the step-by-step redesign** (ex. The practice of intercropping rapeseed with legume crops was designed with these farmers)

=> Knowledge transfer is not enough

Thank you for your attention!

