



# Advanced system in wheat

## Combination of agronomical levers

WP 2

“Wheat-based cropping system”

ARVALIS  
Institut du végétal

FRANCE

# Background

- In PURE, in wheat-based cropping systems three were compared : current, intermediate, advanced
- The Advanced system is led without pesticide at all, and no fertilizer.
- The rules are extreme beyond the organic ones.
- But the learning on weeds control is useful for building our advices for farmers.



# Background(2)

ON Station Experiment  
Boigneville (FR)

ARVALIS  
Institut du végétal



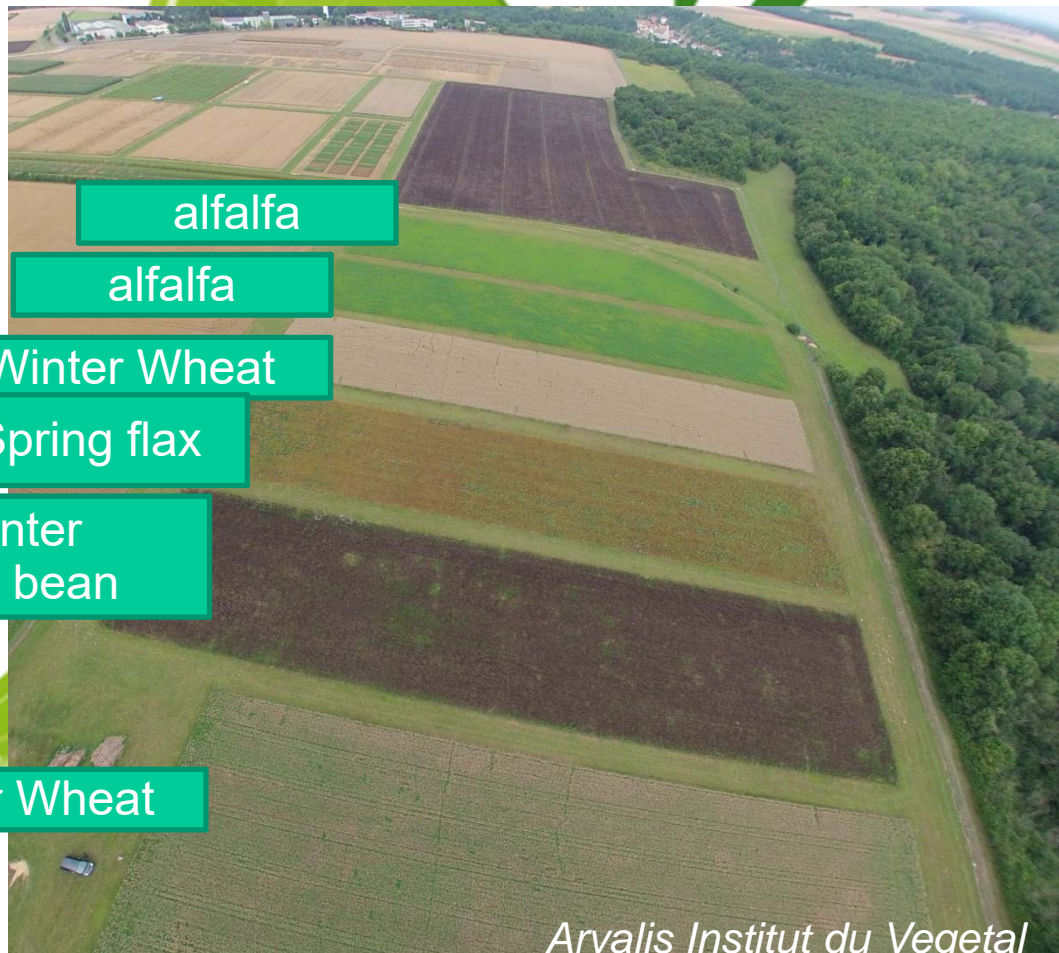
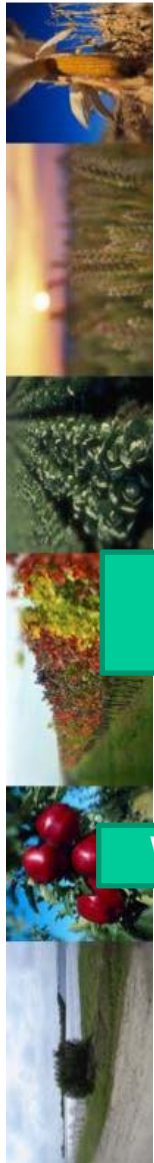
- In the system, agronomical levers can control weeds in the plots without extra time of work on the year.
- Nevertheless, there are some shadows : perennials have been selected in this system (*Cirsium arvense* or *Rumex crispus*). **Manual weeding is tested against young Rumex, “ecimeuse” against thisles**
- More over yields are above the conventional ones.





# First tool : The crop rotation

## 2 winter wheats in a 6 year-rotation



The **alfalfa** is efficient to control annual weeds and **also tend to reduce *Cirsium arvense* but not totally**

*Rumex* have to be controlled in the crops (manually, or with specific materials)

Grasses are controlled with the crop sequence and with mechanical control in the crops and in the intercrops

## Second tool : delay in sowing period for winter wheat and faba beans

**Sowing dates** are delayed by 2 weeks maximum for winter wheat.

A compromise between climatic and soil conditions, yield potential for the crop and avoidance of weed development.

Before sowing we make a **false seed-bed**

We **always plough** before sowing ; in our experiment, this tool is still needed.



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## Second tool : delay in sowing period for winter wheat and faba beans

In winter, winter wheat develops slowly but so do the weeds...

We increase the seed density to compensate plant loss in spring due to mechanical weeding. And also compensate reduced tillering due to delayed date of sowing

In 2013/2014 : the warm weather make weeds develop very early.

We adapted the decision : we hoed as soon as we could have done



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# Third Tool : Mechanical weeding on Winter Wheats

On Winter Wheat wWe use both hoe and harrow 1 to 4 times in a year.

We combine the two tolls :

-First the hoe **make** get a fine-textured s TC1

Then we pass with harrow to break small clods.

The hoe and the harrow are also used on the flax and the faba bean



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Winter Wheat at Tillering stage – date :

We pass fo the first tittle with the Hoe – soil should be  
Hoe of 3 m guided with camera – x km/h, x /ha

The wheat should be sown with gps to make guided hoeing possible



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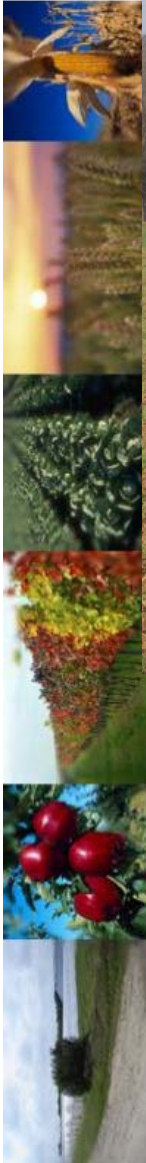
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**TC1**

**a corriger?**

TOQUE Clotilde; 12-02-2015





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We increase sowing density of 15% to compensate plant loss

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Winter Wheat at Tillering stage –  
date : 4 to 8 years after the hoe,  
we pass with harrow : to break  
les mottes et détruire les  
adventivces au stade fil  
Cette technique favorse de  
nouvelles germinations : il est  
important de rintervenir tant que



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# Third Tool : Mechanical weeding



Adjustement of the finger of the harrow - agressivity depend on the orientation of the finger



The IPM tool needs to respect right weather conditions and to adjust the material as soon as needed .







Mechanical weeding is efficient on dicots at “white wire stage”  
On developed weeds, results are worse because (here : *Galium aparine*) the plant remains on slods of soil





# At harvest time...



Weeds are generally well controlled in the wheat in the advanced system  
We have remaining *Galium aparine* most of the time.