Sustainability of three winter cereals based cropping systems (FR)

Clotilde Toque-Rouillon, Jean-François Garnier, Lionel Jouy, Patrick Retaureau, Gabriele Fortino, Valérie Leveau

SUSTAINABILITY OF THREE WINTER CEREALS BASED CROPPING SYSTEMS (FR)

Toque-Rouillon Clotilde (1), Garnier Jean-François (1), Jouy Lionel (1), Retaureau Patrick (1), Fortino Gabriele (2), Leveau Valérie (1)

(1) ARVALIS-Institut du végétal, Département Recherche et Développement - 91720 BOIGNEVILLE (FR)
(2) INRA, UAR 1240 Eco-Innov, BP 01 - 78850 THIVERVAL-GRIGNON (FR)

Description of the 3 Systems :

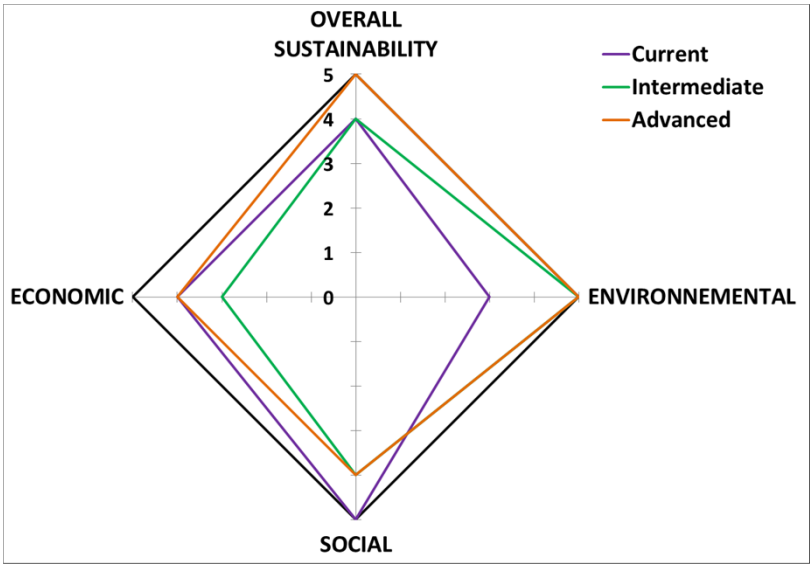
Description			Crop Rotations	Main IPM Tools
AS	**Advanced System**	Organic system	AA(x2) – WSW – *legumes* – S Flax – WFP - WSW	Crop sequence Plough, Stubble cultivation Tolerant cultivars, Alfa-alfa management Mechanical weeding, Delayed sowing dates
IS	**Intermediate System**	Integrated system	SF – WHW – *mustards+legumes* – SB- WSW	Crop sequence Stubble cultivation, Plough if necessary Tolerant cultivars, Delayed sowing dates, Low nitrogen levels Mechanical weeding
CS	**Current System**	Conventional system	WORS – WSW – *mustard* – SB – WHW	Stubble cultivation, Plough if necessary Productive cultivars septioria-tolerant Fertilisation and crop protection to maximize gross margin

* WSW = Winter Soft Wheat ; AA = Alfa-Alfa ; S Flax = Spring Flax ; WFP = Winter Faba Pea ; SF = Sun Flower ; WHW = Winter Hard Wheat ; SB : Spring Barley ; WORS : Winter Oil RapeSeed

The Context :

- **Site :** Boigneville (FR)
- **Soil :** Clayeley-silty soil over chalk
- **Climate :** degraded oceanic
- **Annual rainfall :** 600 mm
- **Field capacity :** 170 mm
- **Economic context :** arable crops systems without livestock
- **Pests :** insects and slugs at a minimal level, disease impact about 1 to 2 tons/year

Assesment with DEXI-PM Model :



Example of some Criteria :

SYSTERRE

Average/hectare for the cropping system	Average 2008 – 2010			Year 2012		
	AS	IS	CS	AS	IS	CS*
TFI – total (ref 5.9)	0	1.6	3.1	0	2.0	4.6
TFI – herbicides (ref 1.7)	0	1	1.7	0	1.4	2.0
Quality of the weed control (/10)	5.5	7.1	8.2	5	7.3	8.5
Mineral N (kg/ha)	0	80	180	0	120	120
WSW yield (t/ha)	3.4	5.9	8.0	3.0	7.3	8.6
Gross margin (€/ha)	1275	767	956	1445	1090	1180
Net margin (€/ha)	536	168	370	610	430	730
Fuel consumption (L/ha)	74	95	87	79	81	81
Tractor time (h/ha)	3.5	4.0	3.7	3.6	3.5	3.4

* Winter Oil RapeSeed replaced by Spring Peas

First Conclusions :

✓ **Currently :**
- Succeeded in implementing the IPM solutions
- Positive impact on the use of pesticides, but depending on the pressure of the year
- Close link between pesticides use and productivity

✓ **In the future :**
- Optimising weed control
- Improve quality of the products
- Assess the vulnerability of the results to the context
- Assess the risk of pesticides transfert into groundwater
- Assess the risk of ecotoxicity

The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/ 2007-2013) under the grant agreement n°265865- PURE