Integrated Weed Management: A combination of efficient tools

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What are the current challenges in weed control?

- **Technical issues**: few new actives, increase of resistant weeds populations (especially grassweeds in cereals and now, broadleaves weeds) => few options left in cereals

- **Regulatory issues**: withdrawals of actives, restrictions of use (drainage, runoff), etc... => sustainable management of current actives (optimisation of application techniques, positioning, etc...)

- **Environmental issues**: Detection of herbicides in surface and ground water => need to adapt agricultural practices (timing of application, IWM), landscape vulnerability, landscape management

Pressure on herbicides, while having technical problems to solve!

**How to do?**
The current situation

A drop in efficacy, in end of winter – spring, with ALS inhibitors against grassweeds

=> Weed control is seriously compromised
What we know

The combination of methods, including herbicides, is necessary, which are:

- Preventive methods:
  - Rotation
  - Ploughing / direct seeding
  - Stale seedbed
  - Sowing date
  - Competitive crops
  - Etc....

- Optimisation of herbicides (timing, adjuvants) => Still aiming 100% efficacy
Rotation is a key factor in disrupting the growing cycle of weeds => Prevent selection of flora towards increased abundance of problem species

Effect of soil tillage on blackgrass and rye grass (OsR/WW/WW) - Long term trial in Epies from 2006 to 2014

Infestation / 8

OSR/WW/WW : oilseed rape / winter wheat/winter wheat
OSR/WW/SP/WW : oilseed rape / winter wheat/spring peas/winter wheat
Very effective in reducing weed density and hence it is an important preventive method but... it is time and fuel consuming
Soil tillage : false seed bed technique

Objective: stimulate as much as possible the emergence of weeds prior to sowing
⇒ During August-September for ryegrass
⇒ Mid-September for blackgrass

If conditions are right (soil moisture and tools), a flush of germination can occur prior to sowing and reduce emergence in crop.
Delayed drilling

A modification of crop sowing date can reduce weed emergence – late sowing date, after weed (single flush emergence) emergence allows destruction of weed while implanting crop

Effect of sowing date on blackgrass and ryegrass (Osr/WW/SP/WW) - Long term trial in Epieds from 2006 to 2014

Limited effect – ONLY on single flush emergence weeds (blackgrass here).
IWM: a combination of methods

Effect of the combination of rotation + ploughing + delayed drilling on weeds
In Epieds (France – long term trial from 2006 to 2014)

- The combination of 3 preventive methods (rotation, ploughing, delayed drilling) reduces by 8 the average weed density
- limited effect of delayed drilling in that trial when combined with 2 preventive methods
- but more broadleaves weeds (due to spring peas)
Economics consequences and impact on herbicides
Total working time (h/ha)*

No till system + short rotation: -2 h/ha

* : X 2.205 in ac.
Fuel consumption (L/ha)

IWM (rotation + ploughing + delayed drilling): + 37 litres/ha

- OSR / WW / SP / WW – delayed drilling - ploughing
- OSR / WW / WW – No till
Herbicides’ Treatment Frequency Index (TFI) /ha

Short cropping rotation and no till => dominance of grassweeds => reliance on effective herbicides

TFI: ratio btw the applied amount of herbicide / legal dose of herbicide
Mechanization’ expenses (in full) and herbicide’ expenses (hatch) in € / ha

Similar « full expenses » between short cropping system in NT and IWM system
Herbicides compensation expenses by mechanization

OSR / WW / SP / WW – delayed drilling - ploughing
OSR / WW / WW – No till
Margin without direct aid (€ / ha) and yield of wheat 2007-2010-2014 (q / ha)

Despite equivalent charges, better yield in wheat provides better margin.

- OSR / WW / SP / WW – delayed drilling - ploughing
- OSR / WW / WW – No till
Consequences and farmers’ expectations

2014 survey (575 farmers)

Are you willing to change your practices?
- Yes: 29%
- No: 71%

In order to control weeds, what will you change in practices?
- Change in crop rotation: 28%
- Intensive ploughing: 14%
- Repeated false seedbed: 24%
- Delayed drilling: 16%
- Other: 18%

Why do you not change?
- Agronomical constraints: 39%
- Logistics constraints: 11%
- Working time constraints: 27%
- Economic constraints: 23%
In conclusion

Methods are **known**! but not implemented!

- Crop rotation (e.g. spring and winter crops) acts as a major factor in disrupting the growing cycle of weeds

- Soil tillage (e.g. ploughing) is an effective preventive method, especially against grassweeds

- Etc...

The problem is therefore the acceptance of the **variability of response** of these methods (because it does not always work !) and the **economical impact**.

These methods are based on **constancy and perseverance**.