



Session 2 - Pulses production : Pest and weed management

Workshop on « Plant Proteins - Agronomic practices and environmental benefits », Bucharest, 11-13 June 2018

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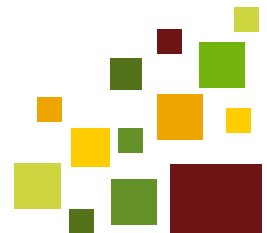
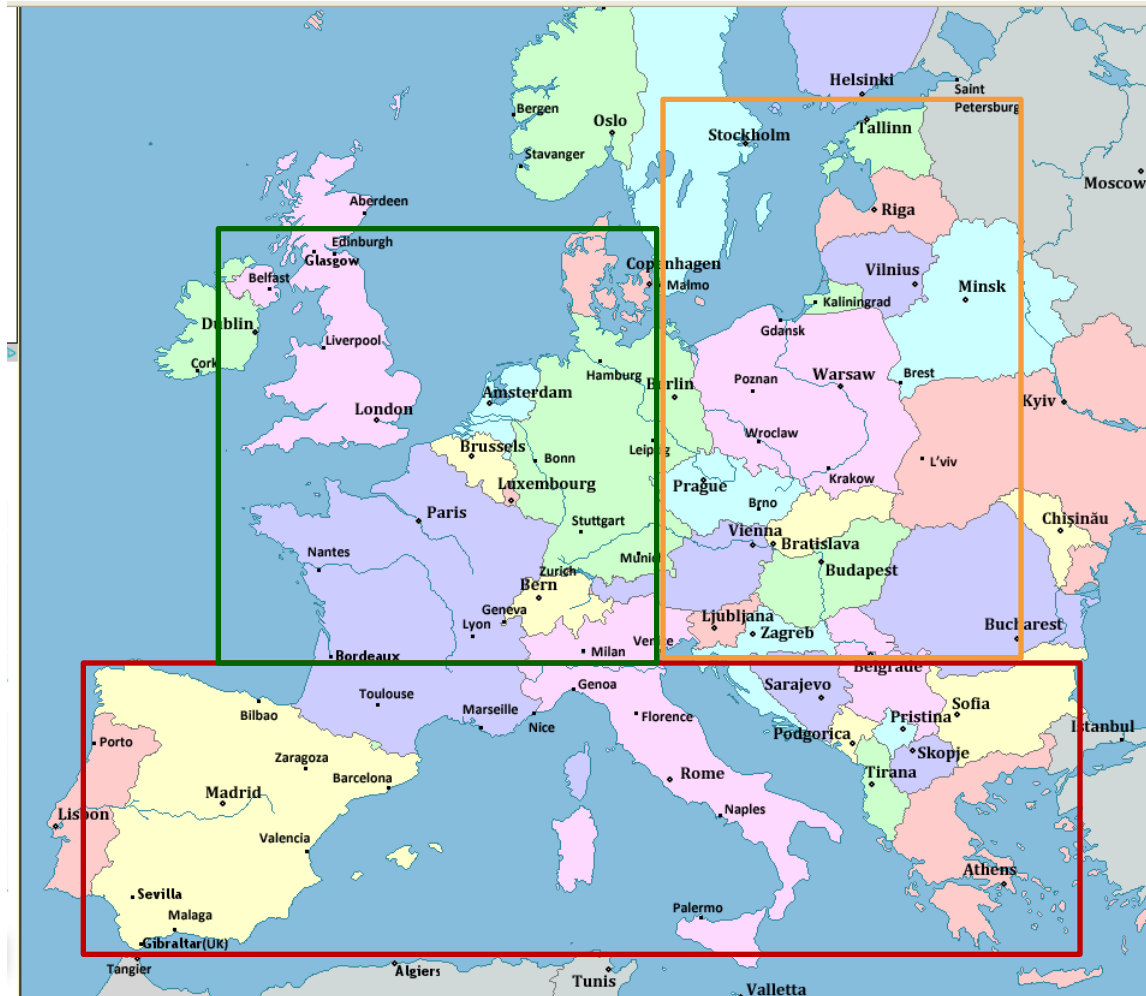


Map of Europe can be divided into three climatic zones

Maritime
Zone

Continental
Zone

Mediterranean
Zone



Summary of suitability of species within climatic zones based upon Legato trial series 2015-2016

	Mediterranean	Continental	Maritime
Spring Peas	***	***	***
Winter Peas	***		**
Spring Faba Beans		***	***
Winter Faba Beans	**		***
Chickpeas	**		
Grass Pea	**	*	
Spring white Lupin	*	**	*
White winter Lupin	*		**

Legend

- * Can be grown but not ideally adapted for the climatic zone.
- ** Varieties are adapted for this zone but some problems may arise in certain years.
- *** Varieties are adapted for this zone and will perform well in most years.

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Main pests for pulses

- Pulses have in common many diseases and insects which have the same impact on yield or quality of the seeds
- Chemical products to protect plants against these diseases and insects are generally the same. When one is forbidden it concerns all the pulses and usually there are no alternative solutions available
- Researched solutions for one species can be useful for another one but not always

Main pests for pulses

- Main diseases :
 - Aphanomyces (pea, lentils)
 - Acochyta blight (pea)
 - Botrytis (faba bean)
 - Rust (faba bean)
- Main insects :
 - Aphids (pea and faba bean)
 - Bruchids (pea, lentils, faba bean)

Aphanomyces

- This disease can drive to important **losses (> 20 q/ha)**. It is due to a soil pathogen (*Aphanomyces euteiches*) which attacks roots (brown at the beginning and becoming dry)
- All pulses do not have the same sensitivity to the pathogen :
 - Attacks on **spring pea or lentils** may be very important (+++)
 - Winter pea (sown in autumn) escape partly this disease due to its earlier cycle
 - Faba bean is not attacked by the pathogen



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Aphanomyces

3 levers :

- **Chemical control** : does not exist – seed treatments are tested
- **Genetical control** : a research project is conducted in France on pea to integrate in the same variety different QTL identified to bring tolerance to the disease
- **Agronomic control** : A test (based on soil analysis) can help to avoid infested fields. Another way explored is to propose a grid to farmers (based on the history of the plot and the type of soil) to help the farmer to take the decision to cultivate pea or not

Ascochyta blight

- The most frequent and the most harmful air fungal disease (**losses > 20 q/ha**)
- On spring pea and **winter pea** (++)
- Due to a **parasitic complex**: 3 pathogenic agents which could be present alone or simultaneously
- *Dydymella pinodes* : The most frequent and the most harmful attacks
- Attacks at the level of the bottoms of stems
- Punctuations evolving in irregular necrosis on leaves and pods



Sources : INRA/TERRES UNIVIA

Ascochyta blight

3 levers :

- **Chemical control** (chlorothalonil) : 1 or 2 treatment(s) for spring pea ; 2 to 3 treatments for winter pea
- **Genetical control** : choice of variety resistant to lodging
- **Agronomic control** : decrease the plant density to have architecture airier

Botrytis

- This disease (*Botrytis fabae*) is very frequent on winter faba bean. It can provock flower abortions and drive to important losses.
- Chemical treatments may be applied at 6-8 leaves for winter faba bean and at beginning of flowering for spring faba bean



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Rust

- This disease (*Uromyces fabae*) is quite frequent and can drive to important losses in winter and spring faba bean. It develops at the end of the cycle.
- Chemical treatments may be applied at the beginning of the disease



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Aphids on pea

(*Acyrtosiphon pisum*)

- Green or pink aphid, brilliant, large-sized aspect (3 in 6 mm).
- Damages until **30 q/ha + decrease of 1000-seed weight**
- Observation from 10 leaves - beginning of flowering to Final Stage in Seed Abortion
- Threshold: **10 aphids per stem**
- Early attacks may be very harmful. The insect must be regularly watched during flowering period



Source Bayer



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Aphids

2 levers :

- **Chemical control** : 1 treatment at beginning of flowering for spring and winter pea (a second one if necessary in warm years)
- **Genetical control** : research work is actually conducted in France on pea to find varieties with resistance to aphids

Aphids on faba bean

- Black aphids attack faba bean from beginning of flowering to the end of flowering + 15 days
- Treatments may be applied before the beginning of flowering if aphids are observed on more than 20% of plants
- During flowering, treatments may be applied when 10 % of the plants have more than many times 10 aphids



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Inovia

Bruchids

- Small beetle, larvas of which feed on seeds of pea (or faba bean or lentils) in pods during their growth
- Black thighbones for pea (red-haired for the faba bruchid)
- Observation from stage young pods until the end of flowering + 10 days
- 2 conditions necessary:
 - Presence of pods > 2 cm
 - 2 consecutive days with $T_{max} > 20^{\circ}\text{C}$



Source INRA

Bruchids

5 levers identified:

- **Chemical control** : 1 treatment during fowering (no effective product) or during the storage (eliminate them only at the exit of the seeds => a second treatment can be necessary)
- **Thermal control** : during the storage
- **Genetic control**: for faba bean in France, identification or resistance in genetic ressources
- **Alternative solution**: for faba bean in France, identification of volatil organic compounds
- **Agronomic solution**: Sowing dates in UK

Weed management

- Legume crops are generally sensitive to concurrence with growth of weeds. Different strategies exist to control weeds:
 - Chemical control
 - Mechanical control
 - Mixed control (chemical and mechanical)

It depends on the species

Chemical control

– Winter pea:

- Before and after emergence (with difficult weeds to destroy)
- Only after emergence (general case, economic)

– Spring pea:

- Before emergence (necessary but not enough)
- After emergence (if few weeds)
- Before and after emergence (general case, allow to control different types of weeds)

– Winter faba bean:

- After emergence (low pression of weeds in winter)

– Spring faba bean:

- Before emergence (general case) + after emergence if necessary

– Lentils:

- Before emergence and after emergence (at 3-4 leaves)

– Chickpea:

- Before emergence



Mechanical control

– Faba bean:

- Before sowing to emergence
 - From 2 leaves to beginning of flowering (longer period than for other crops)
- => this crop is developed in organic systems

– Pea:

- Before and during emergence
- After emergence until 5 leaves (before development of tendrils to avoid plant damages)

– Lentils:

- From sowing to emergence or at 3-4 leaves

=> Mechanical weed management is difficult for pea and lentils => association with cereals is the solution in organic systems

Mixed weed management (chemical and mechanical)

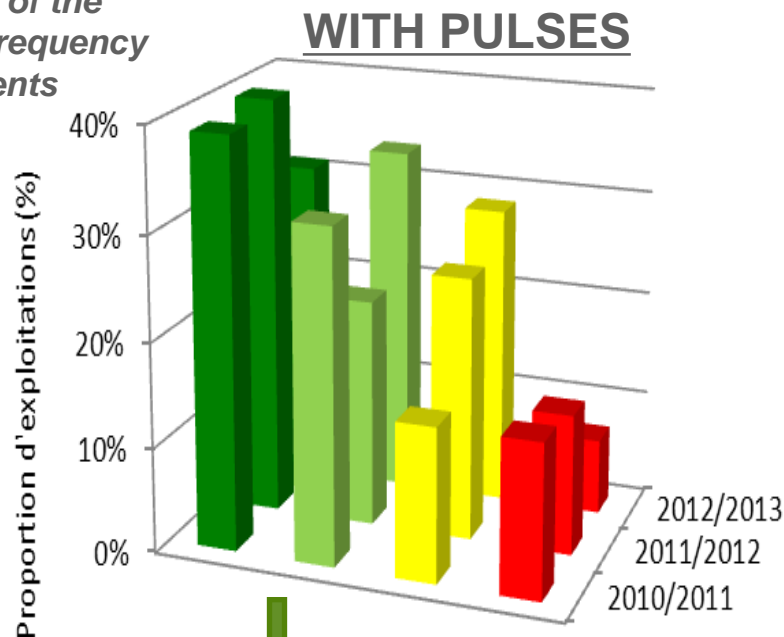
- Mixed weed management is possible for faba bean => it allows to reduce the use of chemical products in conventional systems
- Use of chemical products (Challenge 1,5l/ha + Nirvana, 2 l/ha) before emergence can be completed by one or two passages of chain harrows from 2 to 7 leaves). It can give a good efficacy (around 100 %)

Chain harrows in spring faba bean
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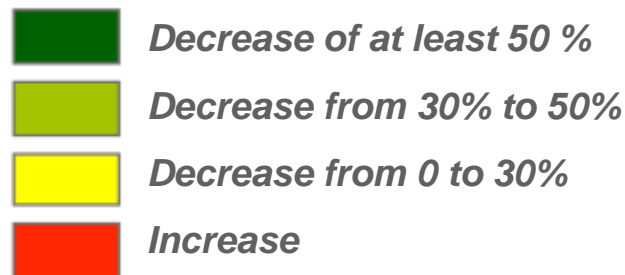
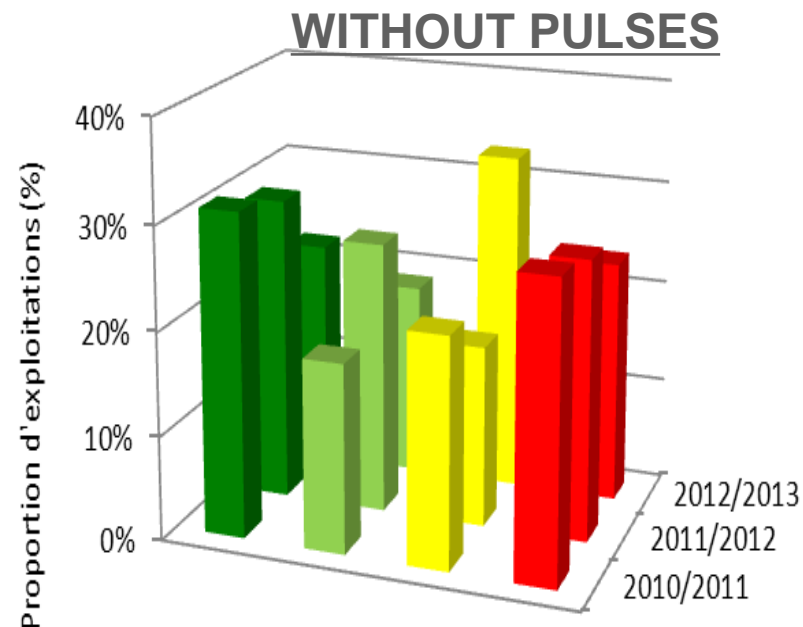
Interest of the introduction of pulses in rotations : diminution of the index of frequency of treatments

Proportion of systems per level of reduction of the index of frequency of treatments



A largest number of cases which are situated in classes with strong reduction of the index of frequency of treatments

Study UNIP-InVivo on the data of a farm network DEPHY – 9 à 12 areas – 3 years



Conclusion

- Legume crops : a great diversity of species more or less adapted to the different European climatic zones
- Weed management is often difficult and many pest have to be controled for all the species of legume crops => important to find solutions
- Legume crops can help to decrease the index of frequency of treatments in rotations