

Intercropping legumes with rapeseed to reduce nitrogen inputs and pesticide use and improve profitability in a 9-year diversified cropping system in Berry, France

Problem

Rotations in the Berry region are dominated by a 3-year cropping system (rapeseed - wheat - barley) which requires relatively high levels of nitrogen (N) inputs and pesticides, especially herbicides to control weeds such as bedstraw, vulpine, etc., some of which are becoming resistant. 10-year projections of this system show that weed pressure could raise the herbicides Treatment Frequency Index (TFI) from 2.9 to 4.0 and degrade yields by 8% and profitability by 63%.

Solution

A 9-year cropping system is proposed to provide more ecosystem services and reduce the use of mineral N inputs and pesticides. In this system, intercropping rapeseed with legumes (Picture 1 and Figure 1) such as Alexandria clover, faba beans, and fenugreek, improved yields and reduced usage of mineral N inputs and pesticides.



Picture 1: Rapeseed intercropped with legumes (source: Terres Inovia)

Benefits

Mean results from the first 3 years of a trial intercropping rapeseed with legumes after durum wheat resulted in (i) an increase in rapeseed biomass at the beginning of winter compared to rapeseed alone (+0.7 kg.m⁻²); (ii) higher rapeseed yields (3.3 t.ha⁻¹ vs 2.8 t.ha⁻¹); (iii) a TFI reduction (3.0 vs 6.1) due to lower insecticide usage (only occasional flea beetle control) and herbicide usage, as the legumes

Applicability box

Theme

Intercropping, Ecosystem Services, Assessment, Cropping system

Agronomic conditions

Agronomic conditions of Berry (Center region of France)

Climate : Degraded oceanic

Average T°C in winter : 5°C

Average T°C in summer : 20°C

Precipitation/year : 700-750mm

Soil of the region :

60% (clayey silts)

40% (sandy silts)



Application time

Winter crops

Required time

Sow rapeseed and associated legumes around mid-August

Period of impact

Current and following crops, improved soil quality over the years

Best in

Alternative to relatively short rotations with low-nitrogen availability in soil

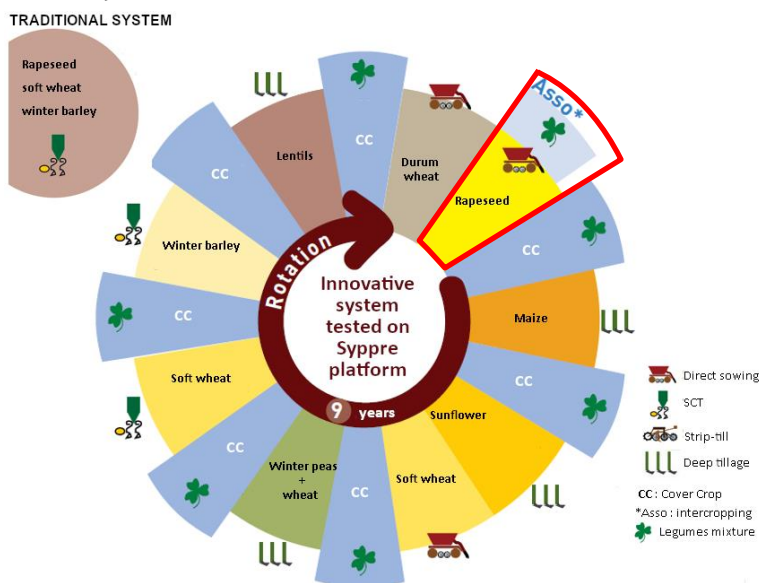


Figure 1: 9-year diversified cropping system. Rapeseed intercropped with legumes is displayed in the red box (source: Syppre)

smother weeds. As a result, the direct margin increased by 60.9% (674 €.ha⁻¹ vs 419 €.ha⁻¹).

Practical recommendation

- Legumes: ensure good emergence before end of August to make them more sensitive to frost in winter
- Rapeseed: good biomass at the start of winter enables a good N absorption & limits susceptibility to pests
- Weed: avoid products that may cause phytotoxicity & enhance soil cover with legumes
- Pest: legumes help to reduce the prevalence of insects in the autumn and therefore insecticide usage can be decreased in some situations.
- Nitrogen: benefits of legumes to rapeseed in spring can allow for a reduction in the use of N of 30 kg.ha⁻¹

Further information

Video

- **Building together tomorrow's crops systems (ENGLISH SUBTITLES)**
<https://www.english.arvalisinstitutduvegetal.fr/view-3095-arvsonvideo.html?region=>

Further readings

- SAUZET et al., 2019. Diversifier les cultures et accroître la fertilité des sols. Perspectives agricoles n° 471, November 2019, p.37-41 (FRENCH)

Weblinks

- Syppre Berry : <https://syppre.fr/sols-argilo-calcaires-du-berry/>

Use the comment section on the [DiverIMPACTS discussion forum](#) to share your experiences with other farmers, advisors and scientists! If you have any questions concerning the method, please contact the author of the practice abstract by e-mail.



About this practice abstract and DiverIMPACTS

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This practice abstract was elaborated in the DiverIMPACTS project, based on the EIP AGRI practice abstract format. It was tested in the Syppre experimental platform set up in 2015 in Berry, France.

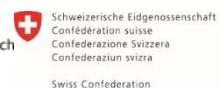
DiverIMPACTS: The project is running from June 2017 to May 2022. The overall goal of DiverIMPACTS - Diversification through Rotation, Intercropping, Multiple Cropping, Promoted with Actors and value-Chains towards Sustainability - is to achieve the full potential of diversification of cropping systems for improved productivity, delivery of ecosystem services and resource-efficient and sustainable value chains.

Project website: www.diverimpacts.net

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