

Breaking maize monoculture by introducing soybeans and oat cover crop into the rotation in Bearn (France)

Problem

For climatic and soil condition reasons, maize monoculture in the Bearn region is the reference system for more than 60 years. However, this system faces technical and regulatory issues. This cropping system can suffer from high weed pressure (such as foxtail, crabgrass, datura, panic, bindweed, etc.) and pest damage (wireworm, corn borer, sesamia, etc.). Moreover, this system must also cope with the evolution of CAP regulations, which require the diversification of crop rotation.



Picture 1 Maize monoculture attacked by wireworms. (Source: ARVALIS)

Solution

To reduce these pressures and face CAP regulations, 8 innovative diversified cropping systems have been evaluated, during the last 3 years, in Bearn. The innovative system based on a 2-year maize-soybean rotation, with an oat cover crop, which has given the most satisfactory results.

Benefits

By adding a legume in the rotation, the amount of nitrogen provided required for a successful crop was 40% lower than in the maize monoculture ($-86 \text{ kg N. ha}^{-1}$), which also decreases operating costs (-79 €. ha^{-1}). The region is also very suitable for soybean and oat cover crop, which reaches good yields (4.7 t. ha^{-1} and 6 t DM. ha^{-1} , respectively). Thanks to the benefits of a more diversified rotation and the implementation of a cover crop, weed and pest cycles are disrupted leading to reduce pressure. This 2-year rotation allows a 5% increase of the direct margin including aids (743 €.ha^{-1}). It is even more attractive when the price of maize is low such as in 2016 or 2017.



Picture 2. Soybean and maize field experiments in Bearn, France as part of DiverIMPACTS activities. (Source: ARVALIS)

Applicability box

Theme

Rotation, Multiple cropping

Application time

All the year

Best in

Maize monoculture

Agronomic conditions of Bearn (southwest of France)

Climate : Warm oceanic

Average T°C in winter : 5°C

Average T°C in summer : 20°C

Precipitation/year : 1100 mm

Soil of the region :

25% clay - 70% silt - 5% sand

Organic matter : 4%



Practical recommendations

- Sow soybean at the same time as maize (around April 20th).
- Prefer a sowing spacing of 40 cm for soybean to facilitate the closing of the row by the cover and thus reduce weed growth.
- Except in the deep and black soils, irrigation is essential for the development of a competitive soybean.
- Weeding is a sensitive issue in soybean cultivation: the weeds are the same as for maize. The placement of cover crops in the rotation can slow down weed development. However, it is advisable to operate (chemical or weed harrow) at pre-emergence and to catch up in post-emergence with products adapted to weed species observed or using a weeder very well adapted to soybeans weeding.

Further information

Article

- ALIAGA et al., 2019. *Soja et couvert d'avoine, un pari gagnant*. Perspectives agricoles n° 471, November 2019, p.34-37 (FRENCH).

Video

- [Building together tomorrow's crops systems \(ENGLISH SUBTITLES\)](#)
- [ARVALIS - Institut du végétal : Research & Development to arable farmers \(ENGLISH SUBTITLES\)](#)

Weblinks

- [Syppre Bearn \(FRENCH\)](#)
- [ARVALIS - Institut du végétal \(ENGLISH\)](#)
- [Terres Inovia \(ENGLISH\)](#)
- [ITB \(ENGLISH\)](#)

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 is derived from Syppre experimental platform set up in 2015 in Bearn (Southern 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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