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Crop associations including Milpa and protein crops

How to integrate crop associations into existing cropping systems and farm landscapes to increase farm resilience and efficient use of natural resources while reducing the dependency on external inputs?

European cropping systems are dominated by specialised farms growing simplified crop sequences, frequently based on cereals or grasslands (>60% crop sequences). This simplification, based on a small number of high-input monocultures, has contributed towards environmental degradation and biodiversity losses in agricultural landscapes. Crop associations not only increase crop diversity within a field and provide resources for wider agrobiodiversity, but also improve crop productivity, regulate pests and diseases naturally, increase soil fertility, and reduce pollution through less use of pesticide and fertiliser inputs.

The key findings from the Focus Group on 'Crop associations including Milpa and protein crops', which aimed to overcome the challenges of crop associations and encourage their uptake, included novel ways to:

- Mechanise crop associations by making use of existing equipment, with machinery adaptations as and where needed, and also by tapping into the practical experiences of others engaged in crop mechanisation.
- Adapt breeding and variety testing schemes to assess mixing ability that allow the identification of suitable plant cultivars and varieties.

- Add value to crop association produce, to increase economic viability.
- Introduce crop association practices gradually, using practices that provide 'stepping stones' in the transition from monocrops.
- Seek out existing knowledge from a variety of information sources using systematic search strategies.

Success factors of implementing crop associations included their potential for reducing external inputs, diversifying the farm business, increasing income from subsidies, using land more efficiently, and spreading the workload on the farm throughout the year. Agronomic, economic, and social barriers to uptake included the perceived additional complexity of managing diversified cropping systems, and potentially higher costs and labour, leading to some reluctance to invest effort when returns are uncertain.

"I wasn't aware of so many people working with crop associations. Linking all those initiatives could really create something that uses all of our experiences."

Joshua Finch,
Expert at the EU CAP Network Focus Group
'Crop associations including Milpa and protein crops'

Crop associations including Milpa and protein crops

Ideas for Operational Groups

The experts proposed project ideas that could be advanced through Operational Groups:

- > Mobile trailers can supply equipment for short-term use on farms; equipment for optical sorting, cleaning, and packaging could be tested for different types of mixed products and bag sizes.
- > Integrating perennial cereals into mixtures (e.g. with legumes) to identify the best sowing proportions and management methods (strip crop or intercrop) in different farm situations.
- > Establish methods of creating and maintaining a mulch/litter layer over the soil using annual and perennial ground covers. Test establishing cash crops without soil disturbance.
- > Develop a digital decision tree where farm conditions are inserted, thereby returning results about possible intercropping methods or crops that fulfil local/regional demands and conditions.
- > Test crop varieties for crop association performance by extending official testing schemes and outsourcing trials to better distribute the additional workload.

Knowledge gaps and research needs

In addition to those below, more gaps and needs relevant to crop associations are listed in the final report.

- > To address the lack of standard advice on crop associations, guidelines need to be developed. Basic principles of each crop association type, with examples of how these basic principles are applied for specific crop combinations and pedo-climatic or market contexts.
- > Applied research to develop innovative pathways for making equipment accessible and affordable. Adaptations to existing machinery, hiring equipment, sharing equipment, or looking at new technologies that create efficiencies.
- > Guidelines on selecting crop varieties suited to crop associations. Varietal traits that lead to better crop association performance, along with a better understanding of how these traits support the mechanisms underpinning crop association outcomes.
- > Market research for crop association produce. Examine social and economic factors affecting the attractiveness and value of crop association products to processors, retailers and consumers, particularly their 'ecosystem service' credentials.

- > Novel research approaches that regularly bring together different actors, consolidating and transferring their knowledge, expanding the knowledge base, accessing a greater breadth of resources and translating results into practice.

More information

- > [Focus Group webpage](#)
- > [EU CAP Network Focus Group "Crop associations including Milpa and protein crops" final report](#)
- > [Mini Paper 1: Cultivar testing as a key to boost uptake of crop associations in breeding and farming.](#)
- > [Mini Paper 2: A value chain perspective on crop associations.](#)
- > [Mini Paper 3: Integrating crop associations into farming systems.](#)
- > [Mini Paper 4: Crop association practices: where and how to find them?](#)

Inspirational ideas

- > [Mixed crops, maize and black-eyed peas in Portugal](#)
- > [Cultivation soybeans without land competition through mixed cultivation wheat and fodder](#)

Feedback and questions:

Support Facility Innovation & knowledge exchange | EIP-AGRI
 Koning Albert II laan 15 - 1210 Brussels - BELGIUM
 Tel +32 2 543 72 81
innovation-knowledge@eucapnetwork.eu
<https://eu-cap-network.ec.europa.eu>

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