

Rooted in diversification: intercropping for the EU's protein strategy



INTERCROP
VALUES

Introduction

Protein independence is a strategic priority for the European Union. Today, the EU imports 26% of the protein its population needs.^[1] The livestock sector is dependent on imports of plant-based proteins for animal feed; a quarter of feed protein is non-EU origin.^[2] Increasing EU production of plant proteins, and thus reducing reliance on imports, is critical to guarantee EU food security, food sovereignty, and **strategic autonomy**. For that, the EU must step up the domestic production of protein-rich crops and diversify protein sources for food and feed.^[3] As has happened repeatedly since World War II, the current war in the Middle East is a stark reminder of the urgent need to reduce dependence on synthetic nitrogen fertilisers produced using fossil fuels to ensure Europe's protein self-sufficiency. It is essential to produce protein through symbiotic nitrogen (N) fixation (free N from air), by boosting legume production in Europe, both as classical sole crops and, above all, in intercropping systems, thereby minimising the need for synthetic nitrogen fertilisers.



Recommendations

- In the post-2027 **CAP**, coupled income support and agri-environmental and climate actions should fund intercropping.
- Farmers should receive higher financing for mixed cropping than cultivating sole protein crops to incentivise the practice.
- The new **CMO** regulation should prioritise funding for goods produced organically or by agroecological practices such as intercropping. The new marketing standards could empower consumers to choose goods from diversified systems.
- Promotion** policies can fund promotional programmes for the organic legume sector.
- The EU **protein diversification strategy** must centre around sustainable production practices of plant proteins and develop value chains and markets around species mixtures.
- The **livestock strategy** should reference intercropping with legumes as a priority method for feed production.

Protein diversification, at farm and dietary levels alike, has been a hot topic in political discourse, with discussions on a future EU protein strategy or plant-based action plan. However, to align with the agroecological transition of EU food and farming systems, a protein diversification strategy must be based on sustainable production methods, rooted in sustainable practices, such as intercropping, and low-input systems, such as organic agriculture.

To ensure that intercropping is a key component of the EU's protein diversification and food policy, this brief provides recommendations targeted at agricultural policies at EU and national levels. In doing so, it highlights how public policy can reward and incentivise producers for public goods.

The case for intercropping

Intercropping a mixture of species in the same field creates spatial diversification and increases land productivity. In addition to various benefits for agroecosystems—including reduced nitrate leaching, improved soil health, enhanced water use efficiency and photosynthesis, and increased on-farm biodiversity—species mixtures can have a positive economic impact too and provide more economical stability for farmers over time.

Intercropping, also called mixed cropping or species mixtures, is an agroecological practice that can improve the sustainability of plant protein production and contribute to productive, diversified, robust, profitable cropping systems. Cereal-legume intercropping reduces the greenhouse gas emissions and the need for synthetic N fertilisers in arable systems, while producing protein-rich grain legumes or pulses and cereals for food and forage for feed. It is estimated that intercropping grain legumes with cereals could **diminish global N fertiliser production and use** by 26%. This reduction will in turn reduce CO₂ and N₂O emissions and the combined area required for producing cereals and grain legumes, leaving space for ecosystem services.^[4]

Knowledge-intensive management and diversification strategies—organic and agroecological practices such as intercropping—optimise land use efficiency (as measured by a higher land equivalent ratio, i.e., more production per unit land area) and leverage ecosystem services without increasing the use of external inputs.^[5]

Over time, **yield stability** of grain legume–cereal intercrops proves to be greater than grain legume sole crops (variation coefficient 22.1 vs 31.7^[6]), as different crop responses to abiotic stresses compensate for the risks inherent in sole cropping.^[7] Moreover, intercropping can **increase cereal grain protein** concentration as compared to the respective sole crops (11.1% versus 9.8% in organic farming), particularly in low-input systems. As legumes fulfil their N requirements by fixing N from the air, competition for soil mineral N between the two crops is low, allowing the cereal to access more soil mineral N.^[8] At the same time, intercropped legumes maintain high protein levels while enriching grain amino acid compositions—depending on the cereal genotype—across treatments, seasons, and mixtures.^[9]

Growing legumes in diversified systems brings clear benefits for low-input or organic systems that minimise the use of external inputs.^[10] Nevertheless, intercropping, while knowledge- and management-intensive, is a versatile opportunity for innovation for any farmer seeking to diversify income streams and strengthen farm resilience and autonomy. Intercropping is one important building block of the agroecological transition. A well-developed, coherent protein strategy can incentivise and diversify plant protein production growing legumes together with cereals or non-legume species. This could boost rural economies, develop markets and demand through consumer education and value chain synergies for varied diets, and improve public nutrition and health through public procurement schemes.^[11] In the current geopolitical context with rising energy prices, food production must minimise dependence on synthetic N fertilisers, which are energy-intensive and import dependent.



Policy recommendations

1 Common Agricultural Policy 2028-2034

The European Commission's proposal for the post-2027 CAP establishes minimum environmental and climate priority areas that Member States must support (Article 4).^[12] From the six, intercropping can contribute to at least five—(a) climate change adaptation and water resilience; (b) climate change mitigation including carbon removals; (c) soil health; (d) preservation of biodiversity, such as conservation of habitats or species, landscape features; (e) development of organic farming—and thus should be rewarded in Member States' NRP Plans.

The CAP proposal provides multiple opportunities for Member States to support intercropping.^[13] CAP payments should support not only legumes but explicitly reward intercropping as an eligible and recognised practice. Crop-specific support schemes may distort prices, markets, and farm management planning. Instead, NRP Plans can foster the transition towards greater protein self-sufficiency by allocating CAP support based on proven practices aligned with the EU's climate and environmental objectives laid out in Article 4 of the proposal.

Therefore, **coupled income support** (Article 11) **could offer higher financing for mixed cropping than cultivating sole protein crops** to incentivise the practice. Under **agri-environmental and climate actions**, governments can support intercropping farmers under management commitments, as intercropping is aligned

with the set objectives, and voluntary transition towards resilient production systems (Article 10). One such possibility is significant support for commitments to maintain and transition towards **organic** farming, as it is well aligned with intercropping to facilitate its adoption.^[14]



Common Market Organisation

The proposal amending the CMO Regulation would create a new sector for protein crops and introduce marketing standards for them, among other products. Recognising the agronomic challenges and climatic and market vulnerability hindering farmers to engage in the protein sector, it aims to strengthen EU self-sufficiency in protein and feed and incentivise legume cultivation for human consumption, reducing import dependence for high-quality proteins and reinforcing strategic autonomy.^[15] An EU protein sector would oblige Member States to recognise producer organisations (PO) and interbranch organisations in the sector, thereby strengthening the value chain. This recognition would give access to POs and associations of producer organisations (APOs) to operational programmes—strategic projects of 3-7 years co-funded by the EU to support sharing risks, investments, logistics, management, storage, processing, and marketing infrastructure.^[16]

These overtures are welcome, however, the new CMO regulation needs to emphasise the practice of cultivation and prioritise funding for goods produced organically or by agroecological methods such as intercropping.

The new marketing standards could strengthen consumer education on how food is produced, empowering consumers to choose sustainable goods from diversified farming systems. In general, the CMO revision must focus on fair and stable prices, climate and environmental challenges, and tools to rebalance markets,^[17] strengthening farmers' bargaining power in protein value chains.

Promotion policies can also fund promotional programmes for legumes. These are already possible but limited to one ingredient, rendering it less interesting for producers. However, promotion programmes for organic, in itself a guaranteed sustainable system, are not limited to one product, allowing legume producers to promote the whole sector if shaping their campaigns around organic. Focusing on legumes would be a novelty in organic promotion campaigns.

Looking ahead

Overall, agricultural and food policies need to link funding to management practices, not crops, prioritising agroecological methods and systems that foster diversification and resilience, such as intercropping for protein production. The long-awaited EU **protein diversification strategy or plant-based action plan** must centre around sustainable production methods and practices of plant proteins and develop value chains and markets around species mixtures.

The **livestock strategy** mentioned in the Commission's 2026 work programme should also reference intercropping with legumes as a priority method for feed production, both fodder and grains, to reduce dependence on imported feed and improve the sustainability of EU livestock systems. At last, cohesion across agricultural, trade, research and innovation (Horizon Europe), and food policies will be essential to scale up intercropping and ensure a coherent EU-wide protein transition.

Partners



Authors

Boglarka Bozsogi,
IFOAM Organics Europe

Lionel Alletto
INRAE

Philippe Baret,
UC Louvain

Eric Justes,
CIRAD

Erik Mathijs,
KU Leuven

Gaetan Seimandi,
INRAE

Kairsty Topp,
SRUC

Christine Wattson,
SRUC



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