

Environmental Policies



TRansition paths to sUstainable legume-based systems in Europe

About TRUE

The EU funded project "TRansition paths to sUstainable legume based systems in Europe" (TRUE) is a balanced practice-research partnership of 24 institutions, which aims to identify the best routes, or “transition paths” to **increase sustainable legume cultivation and consumption across Europe** and includes the entire legume feed and food value chains.

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This policy brief addresses the need to

- **reduce the use of synthetic nitrogen fertiliser** through the cultivation of home-grown legumes.
- **invest in R&D, agricultural extension services, and knowledge transfer** to allow a smooth transition.
- **invest in applied research** such as breeding of new legumes varieties.



Policy implications and recommendations

Within the EU, the development of supranational protein strategies and their implementation via effective knowledge transfer is considered a pillar to realise the economic development of rural areas. However, most of these strategies value legumes in a rather narrow way, mostly for their protein content. Consequently, such plants do not help actors along the value chain capitalise from the multitude of other benefits legumes provide to agri-food and -feed systems, from farm-to-fork.

1

The implementation of policies that encourage reduced use of synthetic nitrogen fertiliser use and/or increase organic nitrogen provisions could be an important step towards increasing home-grown legume cultivation. Although, it is not clear to what extent this will impact human consumption of legumes.

2

Such policies would need to be supported by significant **investment in R&D, agricultural extension services, and knowledge transfer** to allow for a smooth transition from high use of synthetic nitrogen fertiliser in conventional agriculture to precision- and agroecological-farming.

3

Legume cultivation has many technical challenges which need to be tackled through applied research.

For example, developing more effective crop types such as new varieties with higher and more stable yields, better pest resistance, reduced time to harvest, and which may also minimise nitrogen loss and optimise nitrogen-cycling in-field.



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Challenges with current legume cultivation

Legumes can provide multiple benefits to Europe's cropped systems, citizens health, and the environment. However, these potential benefits are often hindered by lower average gross margins. Furthermore, there are environmental and economic risks posed by high input dependency for a narrow range of crops, plus high levels of plant-protein import dependency for animal feed.

Protein crops have been subsidised within the CAP. But despite these incentives, grain legumes cultivation has persisted at an exceptionally low level (1-4%) across the EU, and well below a proposed minimum target of 1 crop in 6, and idealised target of $\frac{1}{4}$ (or 25% of the rotation).

Commonly proposed policy options

to promote legume production in Europe are:

1. **pay a premium to compensate farmers** for the lower profit
2. **recognise areas cropped with legumes as a mean to fulfil the objectives of Ecological Focus Areas (EFAs)**, which are to make European agriculture more environmentally sustainable. The introduction of legumes in EFAs has been criticised as they are considered ineffective crops to increase biodiversity. The ban on the application of pesticides on EFAs has negatively influenced legumes in those areas. In addition, grain legume cropping is often selected as an EFA measure in place of other (non-cash-crop) based approaches that are more effective at delivering environmental and biodiversity provisions.



TRUE Findings

This policy brief builds on the H2020 funded TRUE project, which demonstrated that **increased legume production and consumption is hindered by system lock-ins that span the entire value chain**, not just production. Holistic, value-chain wide approaches are required to tackle these system lock-ins.

At the level of the cropped system, these approaches should consider: the role of farmers' knowledge and provision of independent advice and education regarding crop selection, availability of improved varieties, and agronomy. This should be extended to **ensure awareness of legumes potential to fulfil agroecological functions, including important environmental benefits such as optimising soil provisions and combating climate change** through more efficient management of reactive nutrients such as nitrogen and phosphorus, reduce GHG and eutrophication losses.

Increasingly, such potential is exploited commercially, offering unique selling points for traders, and especially for farmers engaged in short value chains.



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Future CAP (Common Agricultural Policy)

The future of the transition to legume supported food- and feed-systems is also connected to developing future CAP in the EU. The objectives of the future CAP are multiple. They span various agri-food sectors from competitiveness and food sovereignty to environmental care and climate action.

Here we present evidence from a multi-actor assessment, engaging stakeholders from across the whole value chain, to explore how legumes production and consumption are connected to each of the objectives of the future CAP and how legumes can be best used to deliver their multiple benefits in Europe.



Evidence and Analysis



Stakeholders from across the legume value chains were consulted to co-identify a suite of policy recommendations to help realise sustainable, home-grown legume-supported food- and feed-systems, and from the point of production to that of consumption. Stakeholders ranked the policy scenarios according to 10 statements shown in Table 1 (Balázs et al., 2020). **Regulating the use of synthetic nitrogen fertiliser was the most highly ranked option.**

Table 1. Description of statements outlining different policy interventions that affect legume production and consumption in Europe.

Statement Type	Statement Description
1	Changing international trade agreements would reduce the EU's dependency on non-taxable soybean imports
2	Agricultural incentives within the CAP support cultivation of legumes
3	Green direct payments of the CAP foster the transition to sustainable food and feed systems
4	Policies supporting legume production and consumption increase industrialised livestock production as well
5	Investments in agri-food and -feed research and knowledge transfer increase the competitiveness of protein crops and legume-supported food products
6	Preventing the use of inorganic nitrogen fertilisers creates room for more legume production
7	Climate change policies may have an effect on the reduction of meat production and consumption; they also increase legume cropping and decrease the use of inorganic ferti-
8	Nutrition, diet and health policies and public campaigns that promote the inclusion of legumes in the human diet make legumes more visible and also increase imports for con-
9	Public food procurement strategies that focus on sustainability offer healthier options in foodservice markets that trigger shifts towards legume-supported diets
10	Providing transparency of market data boosts legume value chains

Current use of synthetic nitrogen fertilisers

Nitrogen application to the soil in Agriculture, Forestry and Other Land Use (AFOLU) is the main driver of anthropogenic sources of nitrogen dioxide (NO₂) and in particular, the lack of synchronisation between N application and crop uptake, and the fact that 50% of the nitrogen applied to crops is lost to the system. Decreases in application rate increases precision in timing of application. The use of slow-release approaches would have very large effects, lowering emissions and reducing nitrogen-leaching into the water bodies. Nitrogen availability is a critical limiting factor in plant growth, hence nitrogen fertilisation needs to rely on more sustainable agricultural practices. It is well recognised that nitrogen limitation can be alleviated through plant-microbes symbiosis by growing legumes. Besides fixing nitrogen, legumes provide various co-benefits to agricultural systems by increasing crop diversity if properly included in rotation plan and increasing soil organic matter where crop residues are incorporated in the soil after harvest.

High-input agricultural practices are long-established drivers of increased production, but these are also associated with loss of soil functions and biodiversity loss (Scholes et al., 2018; Lassaletta et al., 2016). Global fertiliser use and pesticide production increased linearly between 1960-2000 (Tilman et al., 2001), including global increases of seven- and three-fold increases for synthetic N fertiliser- and phosphorus-use, respectively (Tilman et al., 2001). In Europe, irrigation area doubled, total nitrogen fertiliser use increased by 800% (FAOSTAT, 2018) since the early 1960s. The increased global demand for meat and dairy products has resulted in an increased allocation of crop production for feed and use in input-intensive monoculture.



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Regulating the use of synthetic nitrogen fertilisers



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The European Commission is promoting (EC, 2019) the goal of zero pollution from nitrogen-fertiliser by reducing losses by at least 50%. This goal can be achieved by lowering nitrogen-fertiliser use. In this respect, agricultural practices that optimise resource use efficiency will be promoted, such as precision-agriculture and applying balanced fertilisation and sustainable nutrient management throughout crop life cycles. **Legumes should play an important role in sustainable nutrient management**, increasing soil health and ecosystem function more generally. Environmental co-benefits of legumes include reduced nitrogen-leaching, improved food sources for pollinators, and elevated levels of 'structural diversity' (*i.e.* crop diversification) of farmland. However, simply regulating nitrogen-fertiliser use would not be enough to shift towards increased legume production. **Closing the nutrients cycle**, *i.e.* encouraging a circular organic nitrogen economy, at the local, regional, and national levels, including linking urban and rural nutrient cycles, would provide a more-sustainable use of natural resources.

It is also necessary to **integrate nitrogen-fertiliser reductions with other interventions**, including the breeding of new varieties (*e.g.* for pest-resistant, and higher yield), provision of independent agricultural extension services, more research and innovation, and investment in the processing capacities for legume-derived carbohydrates (*i.e.* fibre/starches and oils, respectively), and proteins to help add value and boost demand and consumption.



We argue that the overall policy goal should not be to invest public money in the production of legumes but rather to **create enabling conditions such as improved capacities for processing and consumption legumes at appropriate local- and regional scales.**



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FURTHER READING

Policy Briefs on: CAP (DOI: [10.5281/zenodo.4911263](https://doi.org/10.5281/zenodo.4911263))
Delphi (DOI: [10.5281/zenodo.4911276](https://doi.org/10.5281/zenodo.4911276))
Nutrition (DOI: [10.5281/zenodo.4911360](https://doi.org/10.5281/zenodo.4911360))



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