

Cultivation of legumes for food and feed strengthens the security of the whole food chain

The sustainability and the security of supply of Finnish food production are both challenged by the combination of dependence on nitrogen fertilisers produced with fossil energy and the low self-sufficiency of supplementary protein feeds. The use of nitrogen-fixing legumes in the food system diversifies plant protein sources, reduces environmental emissions and increases biodiversity. This requires the active development of legume cultivation and use.

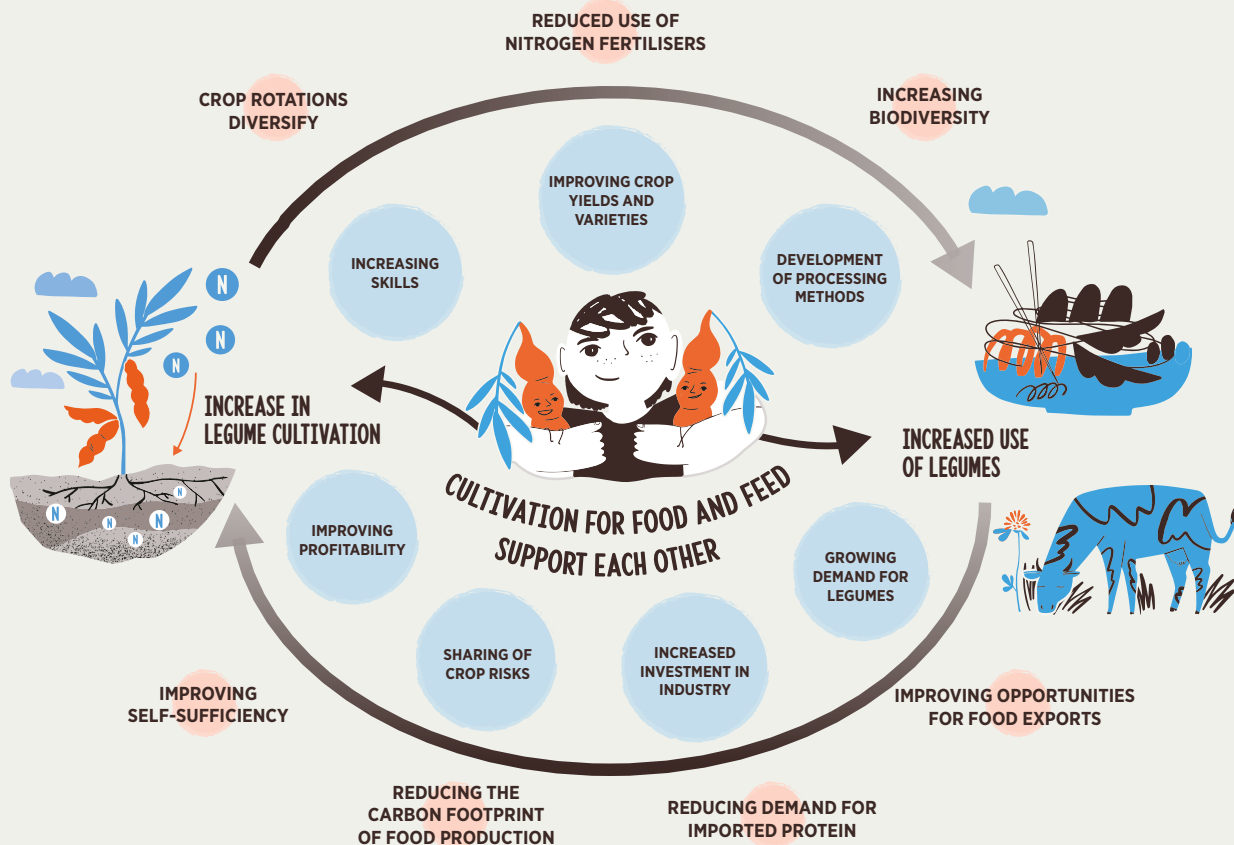


This is how we will promote the cultivation of legumes and strengthen Finnish food production:

- 1. We will increase legume production in our food system.** The cultivation of nitrogen-fixing legumes reduces the need for using synthetic nitrogen fertiliser, thus replacing imported inputs. The use of legumes in crop rotations and the production of plant proteins strengthen the self-sufficiency of local food production.
- 2. We will replace imported protein with home-grown legume feeds.** Livestock production based on domestic feed and inputs ensures food security in northern food production conditions.
- 3. We will create long-term incentives and tools for the production of legumes.** The cultivation of legumes requires policies that support long-term production along with new tools for farmers' educational needs and for the management of production risks.

1. We will increase legume production in our food system

The growing of legumes makes use of biological nitrogen fixation in crop production for food and feed, and reduces the environmental emissions of food production as well as the strong dependence on nitrogen fertilisers produced with fossil energy. It diversifies plant production and helps our adaptation to climate change.



The cultivation area of grain legumes has increased in recent years, but still accounts for only 2.2% of the arable area in Finland. The area of field pea has increased, but that of faba bean has been hampered by successive dry growing seasons. In favourable conditions, faba bean and field pea produce 5 - 6 t/ha without nitrogen fertiliser, which is competitive with cereal production. Of the forage legumes, red clover is the most widely cultivated in the Nordic countries, and its share of the forage crops is increasing.

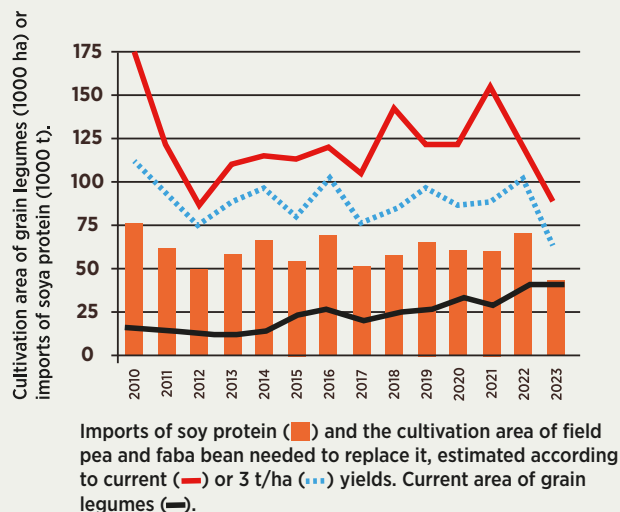
A healthy legume crop, with its root bacteria, can fix more than 200 kg/ha of atmospheric nitrogen. After harvest, some tens of kilos remain and benefit the next crop in the rotation.

For the production of grain and forage legumes to be multiplied by the necessary amount, major increases in activity are needed in:

- breeding of legume varieties (tolerance to drought and winter cold, resistance to diseases, absence of antinutrients);
- improving soil structure and water economy (spring moisture saving and utilisation);
- development of cultivation methods (crop rotations, starter nitrogen, irrigation, mixed farming, plant protection); and
- exploitation of yield potential (e.g. identification of yield gaps and optimisation of farming practices).

2. We will replace imported protein with home-grown legume feeds

Domestic forages and cereals, along with their side streams, largely secure the protein supply of farm animals. In the case of protein supplements, the replacement of imported feeds with legumes will provide a decisive boost to protein self-sufficiency. Livestock production based on domestic feeds and inputs ensures food security in northern production conditions.



The low level of self-sufficiency of supplementary protein feed (around 24%) is a challenge, particularly in pig and poultry production. For example, in 2023, approximately 87,000 tonnes of soybean meal, 120,000 tonnes of rapeseed and 240,000 tonnes of rapeseed meal were imported to Finland. To replace soybean imported into Finland from outside the EU, the area of domestic grain legume production should be multiplied 3-fold.

Imported protein feeds or feeds produced with synthetic N fertilizers may be replaced, in part or in full, by legume feeds

- In pig and poultry production, the antinutrient-free varieties and the developing processing methods make it possible to replace imported protein, even entirely, if the diet is supplemented with amino acids or other domestic protein fractions.
- For ruminant feeding, feeds produced with synthetic N fertilisers can be extensively replaced with forage and grain legumes. For dairy cows, grain legumes do not always meet the production responses obtained with rapeseed feeds, but they may increase the production of microbial protein, the main protein source for dairy cows.



According to a life-cycle analysis, replacing grass with clover in half of the dairy cow diet reduced the carbon footprint of milk by 7% and the eutrophication potential of water bodies by 12%.

Industrially processed faba bean proved to be as effective a protein supplement as imported rapeseed meal in the dairy cow feeding trial.



83 %

of producers agree that the cultivation of legumes in Finland would be a good way to increase domestic food security.

54 %

of producers agreed that there was insufficient information on the potential of legume production.

3. We will create long-term incentives and tools for the production of legumes

Farmers have a positive attitude towards legume cultivation, but this requires economic viability. A policy that encourages farming should be long-term. Furthermore, new tools are needed for the information needs of farmers and for the management of increasing weather and market risks.

Increasing the production and use of legumes has extensive social support. The transition to a plant-based diet and the pursuit of protein self-sufficiency increase the demand for legumes. **In Nordic conditions, the amount and quality of grain legume yields vary greatly from year to year. Therefore, the food and feed use of legumes is mutually supportive: batches and side streams that do not meet food quality requirements can be turned into feed.**

Increasing the cultivation of legumes improves security of supply by reducing dependency on foreign inputs, such as imported protein supplements and the raw materials used for

production of nitrogen fertilisers, the prices and availability of which have fluctuated considerably. Progressive climate change increases the weather risks and brings into question the security of supply of food production.

It is vital to improve the profitability of farming and to educate and advise farmers. Today, farmers have a very limited opportunity to shift the increase in production costs to prices, so they are forced to bear not only the crop risk, but also the market risk.

New tools, such as insurance and contracts, leading to a fair distribution of risks and added value, must be developed for farmers. Guidance and training should focus on the skills of cultivation technology and the further processing of crops as well as market and financial skills.

Increasing the production of legumes requires:

- long-term policies supporting production
- improving the profitability of farming;
- sharing of the risks borne by farmers; and
- responding to farmers' information needs.

The Leg4Life research project advances the health and well-being of the population and environment by promoting the cultivation of legumes and their use as food and feed. Leg4Life (2019–2025) is a joint project between the University of Helsinki, the Finnish Institute for Health and Welfare and the Natural Resources Institute Finland. The project is funded by the Strategic Research Council (SRC) established within the Research Council of Finland.

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