



EIP-AGRI Operational Group – Innovative Swedish plant-based food ingredients for demanding applications within plant-based foods

This EIP-AGRI Operational Group explored the options and requirements for producing plant-based food ingredients for the Swedish food industry.

EAFRD-funded projects

Location: Stockholm, Sweden

Programming period: 2014-2020

Priority: P2 - Competitiveness

Focus Area: Farm's performance, restructuring & modernisation

Measures: M16 - Cooperation

Funding: RDP support 1 162 119.00 (SEK)

Timeframe: 2020 to 2021

Project promoter: Nordvara Nordisk Råvara AB*

* The Project promoter/beneficiary is an EIP-AGRI Operational Group (<https://ec.europa.eu/eip/agriculture/en>)

Email: gunnar@nordiskravara.se

Website: nordiskravara.se

Summary

The project partners in this EIP-AGRI Operational Group, Nordisk Råvara, Lyckeby Starch and Culinary, analysed the preconditions for growing and processing a range of raw materials for use in plant-based food production that does not rely on soy and animal-based additives. The crops chosen for study were specific varieties of amaranth, buckwheat, camelina, grey peas and quinoa, which were cultivated by growers in Nordisk Råvara's growers' network. Lyckeby Starch fractionated, analysed and measured the concentration and volume of the possible ingredients, while Culinary tested them in various applications, such as meat substitutes and bread.

Project results

The project concluded that the properties found in the tested plant materials would contribute to innovation in the form of new products, services and processes within the Swedish food industry. The project's feasibility assessment identified several of these materials could be produced on an industrial scale to meet market demand for plant-based food products.

Lessons & Recommendations

The key lesson from this project is that, with the right know-how, it is possible to use the inherent properties of locally produced raw materials to produce functional plant-based food ingredients without additives, and that these can produce all kinds of meat substitutes, pastries and other foods.

Context

Nordisk Råvara has a network of growers who produce both traditional crops and varieties that are new to the Swedish agricultural landscape. The crops produced for Nordisk Råvara are grown through traditional cultivation methods and are used to produce KRAV-certified food. The KRAV certification is a Swedish label for food produced without the use of artificial chemical pesticides and with strong animal welfare standards, a reduced climate impact, greater biodiversity and good working conditions.

Nordisk Råvara and its project partners Lyckeby Starch and Culinary wanted to provide farmers with access to several new crops to integrate into their crop rotations, as well as new sources of income and higher profitability. While they identified an increasing demand for plant-based foods, they also noted an ongoing set of challenges associated with the production of meat substitutes and new vegetarian/vegan products (i.e. concerning consistency, shape and taste). The project partners also identified a problem within the Swedish food industry that functional food ingredients and additives are often either imported and/or originate from animal sources.

The idea of this project was therefore to investigate the feasibility of developing Swedish plant-based organic foods – following the KRAV certification criteria – which don't rely on imported or animal-based additives and which, once cooked and prepared, have a great taste, appearance and texture.



Objectives

The project's ambition was to grow, process and develop the raw materials for plant-based foods and reduce the need for other ingredients and additives in food processing. The plant materials had to have high technical functionality, high quality nutritional content, good taste and scent, and be suitable for long-term, sustainable cultivation and production.

Activities

- > Analysis of preconditions: the project began with an analysis and literature review, mapping out which plant materials were in demand in the food industry, as well as their origins and applications. Prior to project meetings, participants gathered information in their respective networks about the supply from international producers of plant-based ingredients. The literature review was particularly significant in terms of researching plant-based raw materials, and the findings of the review provided relevant input for clarifying the focus of the project.
- > Choosing and cultivating different crops and varieties: the most crucial factors considered when choosing crops and varieties was whether they could be cultivated at scale according to the KRAV standards in Sweden. Protein content, functionality, bioavailability, bioactive substances, and the varieties' sensory qualities were also considered. The chosen crops - amaranth, buckwheat, camelina, grey peas and quinoa - were then grown by farmers in Nordisk Råvara's network and studied further.
- > Testing the crops' properties: the crops were then fractionated by grinding and sieving the ground flour, which was then separated into a coarse fraction, an intermediate fraction and a fine fraction. Their protein, starch and fibre functional properties were also tested.
- > Assessment of scaling: in order to gain an idea of the scope for producing the raw materials at an industrial scale, a thorough feasibility and scalability test was carried out.

Main results

The project's assessment was that the properties found in the tested plant material would contribute to innovation as new products, services and processes within the food industry in Sweden.

Amaranth - the project enabled the creation of a fine, light protein concentrate with a neutral taste. The potential applications of this material are many, but amaranth is particularly interesting as a filler and binder.

Buckwheat - protein was found in all of the fine, medium and coarse fractions after sifting, but the highest concentration of protein was found in the finest fraction, which was derived from a

smaller proportion of the seed. The most interesting application for buckwheat protein is as a gluten-free replacement for wheat, where it yields excellent results in bread mixes.

Camelina - tests showed that it was possible to extract protein at high concentrations with relatively simple means. The fibre fraction worked well as a thickener and stabiliser, but its mustard-like aftertaste limits its value.

Grey peas - the project's assessment was that the material has good potential, especially in the production of meat substitutes.

Quinoa - the concentrate had strong emulsifying and binding properties.

Key lessons

The key lesson from this project is that, with the right know-how, it is possible to use the inherent properties of locally produced raw materials to produce functional plant-based food ingredients without additives, and that these can produce all kinds of meat substitutes, pastries and other foods.

Another key finding is that the functional properties of the crops (protein, starch or fibre) can be made available without fractionation.

Based on the results achieved by the project, Nordisk Råvara has decided to proceed with developing functional ingredients for plant-based food production.

The project partners concluded that it was a very rewarding and educational collaboration, with great potential to create business benefits.

"The most important lesson was that it is possible to use the inherent properties of the raw materials as functional ingredients. With the right knowledge, you can eliminate all additives in addition to the pure raw material and still produce meat analogues, pastries, etc."

Gunnar Backman, Nordisk Råvara (2022)

Additional information:

www.landsbyggsnatverket.se



Funded by
the European Union