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Multipurpose bioplastic from soy residues: A pilot plant to Finland

Four companies have collaborated to develop the first process in the world to produce compostable bioplastic from food and feed production side streams. A biopolymer plant will be built in Uusikaupunki, Finland, in which bioplastic production will be piloted on an industrial scale.

Finnfoam, Brightplus, VTT Technical Research Centre of Finland and Nordic Soya have explored together the possibilities of soy molasses, i.e. soy processing side stream, as a raw material of the future. The research project, partly funded by Business Finland, took four years.

"The process developed as an outcome of this cooperation project is the first in the world to produce an ecological lactic acid polymer from the side streams of soy production. This way we can offer a sustainable alternative to sugar and corn based polylactide acid, i.e. PLA, says **Henri Nieminen**, CEO of Finnfoam.

Soy molasses, which is not suitable for food, has previously been disposed of by incineration. Producing biomaterials from side streams of food production also improves the food production value chain.

Nordic Soya Oy uses soy grown in Europe in its Uusikaupunki plant. Soy molasses left over from its processing has been used as the raw material in the research.

This Finnish innovation combines synthetic biology, chemistry and material technology in a completely new way.

"This project is both an excellent example of what expertise in industrial biotechnology can achieve and a triumph in converting a challenging industrial residue into a higher value product using microbes. This endeavour required significant efforts in technology at various stages of the process. It particularly made use of VTT's expertise in synthetic biology, the modification of microbes and optimisation of bioprocesses," says **Tiina Nakari-Setälä**, Vice President, Strategy and Business Intelligence at VTT.

An ecological alternative to plastic

In the future, this Finnish sustainable concept for the development and production of bio-based raw material can be extended to new markets where soybean is processed for food and feed production. Bioplastic produced from the residues of soy processing has huge potential as a scalable export product in circular economy. Globally, residues from soy production could produce around 22 million tonnes of bioplastic per year.

Also known for its medical applications, bioplastic is also ideal for, e.g., the manufacture of various compostable packaging applications and 3D-printing filaments.

Finnfoam intends to use the new bioplastic in the production of thermal insulation for buildings. Its ecological quality is enhanced by the fact that thermal insulation also serves as a carbon sink, thus helping to reduce the carbon footprint of buildings.



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The new plant operating by the end of 2023

For the purpose of piloting new biomaterial innovations, the companies are launching a pilot plant project in Uusikaupunki in connection with Nordic Soya Oy, the largest soy protein concentrate processing plant in EU. The pilot plant will be built during 2021-2022.

The full-scale plant will be operating by the end of 2023.

"When completed, the pilot plant will significantly support Finland's sustainable development ecosystem and creation of future jobs," says **Tiina Nakari-Setälä** of VTT.

At the beginning of 2021, Finnfoam Oy was divided into two companies, of which FF-Future will focus on future solutions. The pilot plant project is FF-Future's first major investment.

"Finland has a huge potential to become a pioneer in biomaterials, but this requires resources for testing the scalability of the production process. We want to build concrete resources for the national ecosystem in the industry, and we are looking for partners who are interested in building the production of Finnish biomaterials and commercialising it for the global markets," says Henri Nieminen.

Looking for pioneer-minded partners

Brightplus Oy, responsible for coordinating the project, produces new green chemistry innovations together with its partners that can be tested at the pilot plant.

"It is a major technological step forward that side streams that are unusable in food production can now be used to produce responsible high value bio-based products," says **Jarkko Leivo**, Technology Director of Brightplus Oy. "Depending on the application, we can modify the properties of the biomaterial, such as its transparency and thermoformability, or improve its chemical resistance and reusability. We are now looking for pioneer-minded partners interested in this great technology with whom we can develop more innovative applications for this biopolymer."

Henri Nieminen, the initiator of the project, expresses his gratitude to Brightplus and VTT for the technical success of the project, having developed a functional concept from thousands of alternatives examined, as well as Business Finland, whose financial support has been a prerequisite for the success of the project.

Further information

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Finnfoam Oy

Finnfoam Oy is a family-owned company founded in 1982 focused on production of thermal insulation materials. Finnfoam is one of the leading Baltic region producer of thermal insulation boards for building and construction insulation purposes, such as ground frost, base, wall and roof insulation materials. Main products are Finnfoam (XPS), FF-EPS and FF-PIR insulation boards. Finnfoam Oy is strongly committed to circular economy and generating more sustainable solutions for thermal insulation. Read more: www.finnfoam.com

Brightplus Oy

Brightplus is a pioneering Finnish biosourced materials company. We create reusable, recyclable and biodegradable side-stream material solutions with our visionary chemistry. Our versatile offering ranges from coating and barrier solutions to plastic replacement materials. Brightplus supports leading global manufacturers and major brands in e.g. packaging, consumer goods and agriculture to achieve their sustainability goals. Our multitalented team works closely with customers to co-create innovations that seamlessly comply with their existing processing methods and requirements. Our side-stream solutions reduce the circularity gap and meet the EU Green Deal 2030 targets. Read more: www.brightplus.com

VTT Technical Research Centre of Finland Ltd

VTT is a visionary research, development and innovation partner. We drive sustainable growth and tackle the biggest global challenges of our time, and turn them into growth opportunities. We go beyond the obvious to help the society and companies to grow through technological innovations. We have almost 80 years of experience of top-level research and science-based results. VTT is at the sweet spot where innovation and business come together. Read more: <https://www.vttresearch.com/fi>

Nordic Soya Oy

Nordic Soya production facility is the largest full scale, multi-stage soy processing plant in the European Union. The annual soybean processing capacity is 240,000 tonnes for feed, food and



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technology industries. Our main products include soybean meal, soy protein concentrate (SPC) and soy oil with co-products of soy molasses, lecithin and soy hulls. We are certified Europe Soya, Pro Terra and FoodChainID non-GMO refining facility, holding a membership of the Round Table on Responsible Soy Association. Our goal is to be Europe's leading producer of further refined, high quality soy raw materials for the food and feed industries. Read more:

<https://www.nordicsoya.com/>