SEAWEEDS FROM SUSTAINABLE AQUACULTURE AS FEEDSTOCK FOR BIODEGRADABLE BIOPLASTICS

Result in Brief

Project information

**SEABIOPLAS**

Grant agreement ID: 606032

[Project website](#)

Status

Closed project

Funded under:

**FP7-SME**

Overall budget:

€ 2 000 868,89

EU contribution

€ 1 490 000

Coordinated by:

**BANTRY MARINE RESEARCH STATION LIMITED**

Start date

1 October 2013

End date

30 September 2015

Seaweed – A sustainable source of bioplastics

Seaweed has been investigated as a raw material for a new generation of biologically derived plastic products. The process that has been developed also provides fish and animal feed as by-products.

Modern society relies heavily on plastics, including next-generation bioplastics derived from corn, wheat, sugar beets and sugar cane. Although these plastics are environmentally friendlier than fossil fuel-based alternatives, they compete for land with food produced for consumption.

The EU-funded project SEABIOPLAS (Seaweeds from sustainable aquaculture as feedstock for biodegradable bioplastics) has developed a process to use seaweed as a novel base for bioplastics. Not only will seaweed-based plastic not compete for land use, it will also save water and possibly achieve higher productivity.
The project’s main aim was to introduce sustainably cultivated seaweeds as feedstock for biodegradable bioplastics, contributing to innovation in the bioplastics sector and the transition from petrochemistry to green chemistry. Researchers also investigated the suitability of seaweed as a basis for fish and cattle feed.

Sustainability was increased by cultivating the seaweed in integrated multi-trophic aquaculture systems. This means the seawater used for the algae culture was nutrient-enriched due to its integration with salmon and seabream fish farms in Ireland and Portugal, respectively.

Gracilaria vermiculophylla and Alaria esculenta were the chosen species of seaweed. It was understood that the production methods would have a large impact on the seaweeds produced for extraction of relevant polysaccharides (ulvan, agar and alginate), as well as lactic acid production (and in turn its polymer polylactic acid (PLA)). Therefore, balance among nitrogen-enriched seawater supply, cultivation stocking densities and harvest timing was achieved with biomass sugar content reaching values four times higher than normal.

Drying, milling and chemical treatment were used to break the seaweed down into basic constituents. This powdered seaweed was then used as an ingredient for the bioplastic or fermented to produce lactic acid. The lactic acid was also used in the production of bioplastic.

Two different agars, one ulvan and one alginate, resulted from the optimised protocols that were tested as bioplastic ingredients. In addition, two different hydrolysates were produced at the pilot scale, aiming at further fermentation and PLA production. The correspondent residues both from polysaccharide extracts and from hydrolysis were then tested as feed supplements.

Using seaweed as a building block for bioplastics can have various environmental and financial advantages. Thus, SEABIOPLAS will help reduce the harmful environmental effects of fossil fuel-based plastics, thereby helping to achieve the EU 2020 target of 10% of market plastics being bioplastics.

Keywords
Seaweed, bioplastics, SEABIOPLAS, aquaculture, feedstock

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