



SINCE 1743

Infosheet on Seaweed (Kelp)

Macroalgae, or seaweeds, are the largest unexploited global biomass resource. The production of macroalgae relies on sunlight for energy and assimilation of CO₂ and nutrients, such as nitrogen (N) and phosphorus (P) for biomass growth, with a production potential of more than 4-10 times larger than that of land-based crops. Macroalgae serve as a sink to assimilate these elements (N and P), minimizing the effluent into the environment and converting them back into valuable carbohydrates and proteins. Macroalgae offer vast potential as resources for an array of different applications including sustainable energy carriers, chemicals, pharmaceuticals, and ingredients for the food and feed industry. Currently, the European seaweed industry relies on macroalgae collected from the wild with the exception of some Asian and African seaweeds such as Kappaphycus and Eucheuma which are cultivated for carrageenan extraction. The growing demand for raw materials for food, cosmetics and bioactive components, raises questions surrounding the sustainability of the European industry. As a result, there is an urgent need to upscale or develop methods for mass production of native seaweeds.

Macroalgae, or seaweeds offer vast potential as a resource for an array of different applications including sustainable energy carriers, chemicals, pharmaceuticals, and ingredients for the food and feed industry.

The principal commercial seaweed extracts are:

- Hydrocolloids (agar, alginate, carrageenan)
- Polysaccharides and sugar alcohols (mannitol, fucitol)
- Colorants (fucoxanthin, phycocyanin)
- Food

In addition, macroalgae, with high growth rates (kelp can achieve 50cm per day) may offer attractive alternative solutions that can produce methane (biogas) via anaerobic digestion. The methane biogas can be deployed to generate heat and/or electricity or be used as a transport fuel (CNG). Macroalgae are rich in sugars and can be fermented to produce bio-ethanol, butanol or utilized in pyrolysis - the chemical decomposition of organic materials by heating in the absence of oxygen or any other reagents. Macroalgae offer an attractive alternative to terrestrial based biomass production for energy generation