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Commentary

Evaluation of Seaweed Cultivation's Growth and Crude Protein Content for Food Processing

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DESCRIPTION

The need for protein rich, nutrient dense foods that are produced sustainably is rising as the world's population expands. Seaweeds have a high productivity relative to many terrestrial crops, such as wheat, seeds, and soybeans, as well as an advantageous amino acid profile for human consumption. According to research already conducted, Porphyra yezoensis, a type of seaweed, has been claimed to contain up to 47% protein on a dry weight (dw) basis, however more often reported seaweed protein levels range between 5%-25% (dw). Therefore, to make seaweeds competitive protein sources there are incentives to improve their growth rates and protein content further. Several studies have found benefits of farming seaweeds in combination with both land-based and sea-based aquaculture [1].

For instance, Gracilaria chilensis had an 81% increase in growth and a 15% increase in nitrogen content when grown 100 metres from a salmon farm as opposed to 7000 metres (the control), while Ulva rigida had an almost three-fold increase in growth and nitrogen content when grown in sea bream cultivation wastewater as opposed to seawater [2]. While other forms of nutrient-rich industrial side streams have received little study in recent years, seaweed cultivation in such Integrated Multi-Trophic Aquaculture (IMTA) systems has received extensive study. Seaweed has been grown in some studies in waters that mimicked the nutrient concentrations found in industrial process water, but little research has been done on growing it in waters that actually emerged from industrial practises, despite the fact that their complex properties might affect it differently than simulated waters [3]. Although seaweeds may be harvested while still in a food grade form and offer a variety of nutrients, there have been no investigations on seaweed farming in outflow waters from the food processing sector to date. Nearly all steps of food preparation include the use of water, which is frequently a rich source of high value substances including vitamins, proteins, and long chain fatty acids. A coagulation flocculation method can be used to recover the proteins and lipids. However, the remaining dissolved inorganic nutrients, such phosphorus and nitrogen, continue to be lost from the food processing sectors in significant amounts each year. Microalgae have successfully been cultivated in different food industry process waters to minimize the discharge of nutrients but the process of harvesting microalgae is difficult and energy consuming. Growing seaweed in process waters used in the food industry allows for the recycling of nutrients while also producing biomass yields with higher protein content that are simpler and less expensive to harvest. Nearly all steps of food preparation include the use of water, which is frequently a rich source of high value substances including vitamins, proteins, and long-chain fatty acids. A coagulation flocculation method can be used to recover the proteins and lipids. However, the remaining dissolved inorganic nutrients, such phosphorus and nitrogen, continue to be lost from the food processing sectors in significant amounts each year. Microalgae have successfully been cultured in diverse food industry process waters to limit the discharge of nutrients however the method of collecting microalgae is complicated and energy intensive [4].

Growing seaweed in process waters used in the food industry allows for the recycling of nutrients while also producing biomass yields with higher protein content that are simpler and less expensive to harvest. In this study, we investigated the claim that employing process fluids from the food manufacturing sectors as a growing medium will boost the growth rates and protein content of several species of seaweed. The aquaculture of salmon as well as the manufacturing of peeled shrimp, marinated herring, and oat-based goods was all conducted in the waters that were chosen. We evaluated the three green seaweeds Ulva fenestrata, Ulva intestinalis, and Chaetomorpha linum as well as the brown kelp Saccharina latissima. While Saccharina latissima has been successfully maintained in Integrated Multi-Trophic Aquaculture (IMTA) conditions as a technique to improve seaweed growth rates, Ulva and Chaetomorpha species are thought of as opportunistic "green tide" species that readily accept nitrogen and expand swiftly. Quantifying the soil's total nitrogen content and inorganic nutrients [5].

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