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Perspective

Evaluation of Growth and Crude Protein Content in Seaweed Cultivation in Food Production

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DESCRIPTION

The need for nutrient and protein-rich foods that are produced responsibly is rising as the world's population expands. Seaweeds are more productive than many terrestrial crops, including wheat, seeds, and soybeans, and they also have an amino acid composition that is suitable for human consumption. Species of seaweed like Porphyra yezoensis, according to available studies, can reach up to 47% protein on a dry weight basis, while more often reported quantities for seaweeds lie within 5-25% protein. Therefore, there are incentives to increase their growth rates and protein content even more in order to make seaweeds competitive protein sources. Benefits of growing seaweed in conjunction with both land-based and marine aquaculture have been found in a number of studies. For instance, Gracilaria chilensis exhibited 15% more nitrogen content and 81% more growth when Ulva rigida had approximately three times the growth and nitrogen content when grown in sea bream production effluent as compared to seawater when grown 100 m as opposed to 7000 m (control) from a salmon farm. 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 waters; however, cultivation in waters that actually emerged from industrial practises has received little attention, despite the fact that it is necessary because these water complex properties may affect the seaweed differently than simulated waters.

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. To reduce nutrient discharge, microalgae have been successfully grown in a variety of food industrial process waters, although the harvesting procedure is labor and energy intensive. 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 than microalgae. 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 examined the three green seaweeds Ulva fenestrata, Ulva intestinalis, and Chaetomorpha linum as well as the brown kelp Saccharina latissima. The Ulva and Chaetomorpha species are regarded as opportunistic "green tide" species that easily take nitrogen and develop quickly, whereas Saccharina latissima has been successfully cultivated in IMTA environments as a way to accelerate seaweed growth rates. A secondary objective was to quantify the total nitrogen and inorganic nutrients of the soil before to cultivation process fluids, allowing for dilutions of the seaweeds to be grown dependent on the ammonium (NH_4^+) concentration of the process waters. Measurements and comparisons of the seaweed's growth rates and crude protein content were made between various process fluids and dilutions, as well as with control seaweeds grown in untreated and NH_4^+-enriched seawater. Furthermore, the seaweed's colour was measured by examining the three band colours red, green, and blue in order to provide a clue as to their physiological health (RGB-values). As a result, we rely on manipulative tests to

- Demonstrate the possibilities of water used in food production processes as a seaweed culture medium.
- Analyze the potential for growth and crude protein content of the various seaweed species in these cultivations.

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