

Understanding climate impact on seaweed cultivation in the Belgian Part of the North Sea

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Open-sea seaweed cultivation offers a promising avenue in many applications as a source of sustainable biomass. Its production does not require arable farmland, fertilizers, or fresh water and can in some cases even have a positive environmental effect by removing excessive nutrients and carbon sequestration. Currently, scientists have been investigating the possibility of offshore seaweed cultivation within wind parks in the Belgian Part of the North Sea. However, one of the main challenges in open sea cultivation is that the cultured 'crops' are exposed to the same stressors as the wildlife residing there (e.g., eutrophication, pollution, climate change). Climate change is already rapidly affecting our oceans and seas, leading to increases in water temperature as well as changes in ocean chemistry, sea level, and oceanographic currents. Recently, the North Sea was even found to warm the fastest in the entire Atlantic for the period 1980–2020, with a warming of the sea surface temperature of 0.39 °C per decade (a total 1.58 °C change).

So far, few studies have examined the impact of these heat waves on marine biodiversity, especially in an aquaculture framework. In this study, we want to investigate the impact of realistic climate change scenarios on the growth and nutritional value of the commercially interesting species *Porphyra umbilicalis*. The experiment is set up using a multivariate testing approach where different temperature, salinity, and acidity conditions are taken into account. For the nutritional value, we look at multiple types of bioactive compounds including carbohydrates, protein, lipids, and pigments.

Understanding the impact of climate stressors on seaweed cultivation will shed light on the vulnerability of open-sea seaweed cultivation systems, as well as their broader significance towards human health.

Keywords

Aquaculture; Oceans And Human Health; Seaweed Cultivation; Nutritional Value; Climate Change