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Comparative environmental assessment of valorization strategies of the invasive macroalga *Sargassum muticum*

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Abstract

The invasive brown seaweed *Sargassum muticum* (Yendo) exhibits a significant content of phenolic compounds, polysaccharides and fucoxanthin, with potential biological activities. In this study, four valorization strategies for *S. muticum* biomass were compared under a life cycle perspective. Depending on the alternative, three products were obtained: sodium alginate, antioxidant extract and fucoxanthin-containing extract. Regardless of the approach, the combined extraction of alginate and antioxidant from wet alga constituted the most efficient scenario. Among the stages, supercritical extraction of fucoxanthin and non-isothermal autohydrolysis were identified as the major environmental burdens due to electricity consumption. Although changes in product distribution fairly affected the environmental impacts of the scenarios, the single extraction of antioxidant fraction and the integral valorization to obtain fucoxanthin, alginate and antioxidant were only competitive

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