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Optimization of bioactive compound production from seaweed via subcritical water extraction

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Abstract. Seaweeds have been used for food, pharmaceutical and nutracuetical products due to its high bioactive compounds. The compounds are entrapped inside the seaweed require to be extracted out for product formulation. This study utilises Subcritical Water Extraction (SWE) technology to extract those compounds. SWE provides green extraction approach by using water as solvent, less operating time and cost effective. Three different seaweed samples were used, Brown Seaweed (Sample A) – Padina Sp., Brown Seaweed (Sample B) – Sargassum Sp., and Green Seaweed (Sample C) – Enteromorpha Sp. The reaction conditions were optimized include temperature (112.73 – 247.37 °C), reaction time (11.59 – 28.4 min) and concentration of biomass loading (6.59 – 23.41 %) for high carbohydrate and protein production. It was found that the highest carbohydrate of 31.8 w/w % was obtained by Sample C, extracting at temperature 140 °C, at 15 min of reaction time and 10 % of biomass loading. The highest protein concentration of 11.22 w/w % was achieved at temperature 220 °C, at 25 min of reaction time and 10 % of biomass loading by Sample C. Furthermore, the statistical analysis revealed that amongst the parameters investigated that temperature was the most critical factor during extraction of bioactive compounds. However, the concentration of biomass loading gave less significant effect to the carbohydrate and protein yields. Based on the findings, it was proven that the SWE has potential to be use in extractiong bioactive compounds from seaweed. However, further study on the extraction mechanism is required to understand the fundamental on the technology.

Keywords: bioactive compound, brown seaweed, carbohydrate, optimization, protein, subcritical water extraction