

Protein Extraction by Enzyme-Assisted Extraction followed by Alkaline Extraction from Red Seaweed *Eucheuma denticulatum* (Spinosum) Used in Carrageenan Production

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Abstract : In 2014, the global amount of carrageenan production was 60,000 ton with a value of US\$ 626 million. From this number, it can be estimated that the total dried seaweed consumption for this production was at least 300,000 ton/year. The protein content of these types of seaweed is 5 - 25%. If just half of this total amount of protein could be extracted, 18,000 ton/year of a high-value protein product would be obtained. The overall aim of this study was to develop a technology that will ensure further utilization of the seaweed that is used only as raw materials for carrageenan production as single extraction at present. More specifically, proteins should be extracted from the seaweed either before or after extraction of carrageenan with focus on maintaining the quality of carrageenan as a main product. Different mechanical, chemical and enzymatic technologies were evaluated. The optimized process was implemented in lab scale and based on its results; the new experiments were done a pilot and larger scale. In order to calculate the efficiency of the new upstream multi-extraction process, protein content was tested before and after extraction. After this step, the extraction of carrageenan was done and carrageenan content and the effect of extraction on yield were evaluated. The functionality and quality of carrageenan were measured based on rheological parameters. The results showed that by using the new multi-extraction process (submitted patent); it is possible to extract almost 50% of total protein without any negative impact on the carrageenan quality. Moreover, compared to the routine carrageenan extraction process, the new multi-extraction process could increase the yield of carrageenan and the rheological properties such as gel strength in the final carrageenan had a promising improvement. The extracted protein has initially been screened as a plant protein source in typical food applications. Further work will be carried out in order to improve properties such as color, solubility, and taste.

Keywords : carrageenan, extraction, protein, seaweed

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