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Red Microalgae as Functional Foods : An integrated study

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Abstract

Global demand for macroalgal and microalgal foods is growing, and algae are increasingly being consumed for functional benefits beyond the traditional considerations of nutrition. Among the principal algal sources are red microalgae, which produce unique biochemicals including novel sulfated polysaccharides (SP) (including dietary fibers), unsaturated fatty acids (EPA, DHA, AA), natural pigments (phycobilproteins, zeaxanthin), and a variety of other specialchemicals (e.g., floridoside) and minerals.Of particular interest is the red microalgae*Porphyridium* sp., whose cells are encapsulated within a SP and extracellular portions are dissolved in the growth medium. Those SP have unique rheological characteristics and have been shown to act as a platform for metal incorporation, taking advantage of their ion-exchange capabilities and their negative charge.The current study – motivated by the ongoing searchfor novel, bioactive ingredients that are capable of enhancing and extending the functionality of emulsions – investigated the use of SP from red microalgae as potential stabilizers in food emulsions and the combination of emulsifying and antibacterial activities of a Zn-PS complex.

Optimization and Characterization of Oil Emulsions : the properties of emulsions were characterized based on physical stability, electrokinetic charge and overall appearance. In addition, the study examined emulsion responsiveness to sonication and to major environmental stressors ($2 < pH < 8$ and salinity 0-300 mM NaCl).

Antibacterial Activities of a Zn-PS Complex:dairy emulsions and oil-in water emulsions were stable in low concentrations of a Zn-PS complex (<0.2% and <500 ppm Zn). This complex was also shown to have higher effect on inhibition of bacterial growth when compared with the algal polysaccharide alone.

Overall, the data supportthe potential of using functional sulfated polysaccharides from red microalgae to stabilize emulsions and inhibit contamination in food applications.This information is believed to be of importance for possible utilization of red microalgal polysaccharides as novel emulsifiers in the rational design of food emulsions and potentially in other food applications. These encouraging results indicate that we should pursue the development of red microalgae as novel functional foods.

Keywords—red microalgae, functional food, antibacterial activities, food stabilizers

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