

Development and characterization of semi-refined carrageenan (SRC) films from *Eucheuma cottonii* incorporated with glycerol and α -tocopherol for active food packaging application

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ABSTRACT

This work focuses on the development of biodegradable active films packaging using all natural compounds with the aim of contributing sustainable film not only by reducing the plastic waste to environment but also as a potential substitute of synthetic preservative in food. Active film packaging was formulated using semi-refined carrageenan (SRC) biopolymer extracted from *Eucheuma cottonii* plasticized with glycerol (G) and incorporated with different concentrations of α -tocopherol (T_p) at 0.1, 0.2, 0.3 and 0.4% v/v as natural antioxidants. Opacity, water solubility and mechanical properties of the resultant film were analysed whereas the migration behaviour of antioxidant films into food simulant during 30 days storages were determined using total phenolic content and DPPH assay. The addition of T_p in SRC + G film decreased the tensile strength but increased the value of elongation at break significantly ($p < 0.05$). Opacity and water solubility were improved with increasing concentration of T_p ($p < 0.05$). The highest and prolonged release of antioxidant to food simulant was determined by SRC+G+ T_p 0.4% through 30 day storage with total phenolic content value of 2 mg GAE/L sample and 88.59% inhibition for DPPH assay. Hence, the new formulation of SRC+G with tocopherol could be an alternative degradable active packaging that might reduce the need of adding antioxidants directly into food products and also prolong the food shelf life.

KEYWORDS:

Antioxidants; Biodegradable polymers; Food products; Glycerol; Mechanical properties