

Comparative study on the physicochemical properties of κ -carrageenan extracted from *Kappaphycus alvarezii* (doty) doty ex Silva in Tawau, Sabah, Malaysia and commercial κ -carrageenans

ABSTRACT

κ -Carrageenan is a linear, sulphated polysaccharide that is widely used in the food industry as a gelling agent due to its lack of toxicity and biocompatibility. In this study, the physicochemical properties of κ -carrageenan (TA150) derived from *Kappaphycus alvarezii* (formerly *Eucheuma cottonii*) in Tawau, Sabah were investigated and compared to commercial κ -carrageenan (SeaKem CM611, Gelcarin GP812, Gelcarin GP911 NF, and Grindsted® carrageenan CL220). TA150 exhibited the lowest lightness but highest yellowness, with L^* and b^* values reported as 82.69 and 17.16, respectively. The rupture strength of κ -carrageenan increased significantly with increasing concentration ($p < 0.05$). The water losses from κ -carrageenan gel increased with increasing storage times. TA150 lost the most water within 10 days of storage time. The water-holding capacity (WHC) of κ -carrageenan gel was reported to be excellent ($>90\%$) under all storage temperatures ($25\text{ }^\circ\text{C}$, $4\text{ }^\circ\text{C}$ and $18\text{ }^\circ\text{C}$). The moisture content, ash, acid-insoluble matter, and sulphate levels of κ -carrageenan samples were reported as 3.65, 11.41%, 17.75, 33.18%, 0.22, 3.74%, and 12.00, 6.19%, respectively. These samples were low in fat, protein, and crude fibre contents. The potassium content in κ -carrageenan was highest in Gelcarin GP812 (100.42 g/kg), followed by Grindsted® carrageenan CL220 (61.92 g/kg), TA150 (54.60 g/kg), Gelcarin GP911 NF (40.90 g/kg) and SeaKem CM611 (15.76 g/kg). No heavy metals were detected in TA150 and the other commercial κ -carrageenan samples except for lead. However, the concentration of lead detected in the κ -carrageenan samples fell within the acceptable ranges ($<5\text{ mg/kg}$) set by the Joint FAO/WHO Expert Committee on Food Additives (JECFA).

Keyword: *Eucheuma cottonii*; κ -Carrageenan; Physicochemical properties; Water-holding capacity; Ash; Minerals