Characterization of k-carrageenan/Locust bean gum-based films with b-carotene emulsion

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Abstract

New bio-based materials have been exploited to develop biodegradable and edible films as an effort to extend shelf life and improve quality of food while reducing packaging waste. The objective of this study was to investigate physicochemical properties of k-carrageenan/locust bean gum (k-car/LBG) films with different b-carotene emulsion concentrations.
To prepare oil-in-water emulsions, b-carotene (0.03% v/v) was dissolved in medium-chain triglycerides (MCTs), and the solution was mixed (1:9 v/v) with a pectin solution (3% w/v) as emulsifier. Film forming solutions were prepared by adding b-carotene emulsion (0-3% w/w) into the k-car/LBG solution (40/60% w/w) with 0.3% (w/v) of glycerol. Films with different b-carotene concentrations were characterized in terms of optical, mechanical and barrier properties and compared with control films without b-carotene.
The results suggested that mechanical, physical and barrier properties of k-car/LBG films were influenced by the presence of b-carotene. Results showed that addition of b-carotene to the k-car/LBG films studied resulted in significant decrease ($p<0.05$) in water vapour transmission rate values. Film opacity values (ranging from 4.9 to 12.5 %) increased when b-carotene was incorporated to the film.

Therefore, b-carotene emulsions have potential to be used as a natural additive on k-car/LBG films, particularly in the food packaging industry.