

Physicochemical and Mechanical Properties of Carrageenan/Gelatin Film Incorporated with Bottle Gourd (*Lagenaria siceraria*)

Nur Fathini Ismail^a, Suzaira Bakar^{ab*}

Structured Abstract

Background: Packaging is the most crucial component in guaranteeing food safety. To address the issues of environmental pollution and resource depletion brought on by petrochemical-based, non-degradable and non-renewable plastic materials with sustainable alternative materials are urgently required. Food is frequently packaged in plastic, but consumers are constantly asking for safer substitutes. Although synthetic plastics made from petrochemical resources are convenient for packaging, a serious issue today is that they are not biodegradable or recyclable, leading to the production of enormous amounts of waste. The utilisation of biodegradable polymers derived from natural resources like polysaccharides and protein can be attributed to serve as an eco-friendly alternative to synthetic polymers. The study focused on the use of carrageenan and gelatin as the primary components in composite films incorporating with bottle gourd. The objective was to assess the physical, mechanical, and antioxidant characteristics of carrageenan/gelatin composite films blended with bottle gourd as bottle gourd has high amount of antioxidants.

Methods: The method of this study started with extraction of bottle gourd, preparation of carrageenan/gelatin/bottle gourd film and determination of physicochemical and mechanical properties of the composite film.

Results: The results indicated that increasing amount of bottle gourd resulted in higher film opacity but reduced thickness and solubility. Total Phenolic Content, Total Flavanoid Content, and DPPH Radical Scavenging in the film significantly increased with the rising bottle gourd concentration. Next, FTIR analysis showed the existence of sulphur in bottle gourd. Tensile strength and young modulus decreased with increasing volume of bottle gourd due to its elevated elongation at break. FESEM analysis demonstrated that higher bottle gourd concentrations produced a more uniform and smoother surface on the carrageenan/gelatin film.

Conclusion: In conclusion, the findings of this study indicated that combining bottle gourd significantly enhances the performance of carrageenan/gelatin composite films, and potentially serving as a suitable option for food active packaging.

Keywords: Composite film, bottle gourd, gelatin, carrageenan.

*Correspondence: suzaira@uitm.edu.my

^aSchool of Industrial Technology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia.

^bFood Science Research Group, Universiti Teknologi MARA, Shah Alam, Malaysia.