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Synergistic Gelation Behavior of Xanthan Gum and Polysaccharides Isolated from Sea Coconut

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Abstract

Natural polysaccharides are widely distributed in nature and possess diverse biological activities, attracting considerable research interest for their potential applications in the food, pharmaceutical, and cosmetic industries.[1] However, little is known about polysaccharides in sea coconut (SCP), which has been used as a nutraceutical. SCP was extracted via water extraction followed by ethanol precipitation to give the final product with a yield of 9.92%. Structural elucidation revealed that SCP had a molecular weight of 18.174 kDa and was predominantly made of a linear polysaccharide with a mannose-to-galactose molar ratio of 5:1. The backbone comprised →4)-β-D-Manp-(1→, →4,6)-β-D-Manp-(1→, β-D-Manp-(1→, →4)-α-D-Manp-(1→, and →4)-β-D-Manp-(1→ residues, with terminal α-D-Galp residues attached as side chains. Despite the lack of intrinsic gelation capacity, SCP formed a firm and thixotropic hydrogel (SX) upon blending with xanthan gum (XG). The most pronounced synergistic interaction occurred at an SCP/XG ratio of 5:5, yielding a mixed hydrogel (SX) with higher storage modulus (G′) values at ambient temperature and during heating (25–80 °C) than comparable tara gum/XG (TX) and locust bean gum/XG (LX) systems. These findings provide insights into the fine structure of SCP and its synergistic gelation with XG.

References

[1] Mohammed, A.S.A., M. Naveed, and N. Jost, *Polysaccharides; classification, chemical properties, and future perspective applications in fields of pharmacology and biological medicine (a review of current applications and upcoming potentialities).* Journal of Polymers and the Environment, 2021. **29**(8): p. 2359-2371.

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