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# Combining galactomannans and proteins in the development of green polymers: aiming towards the future of packaging materials

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## ABSTRACT

Polymers are commonly employed in the development of packaging materials because they are lightweight, easy to produce, resistant to corrosion, and have mechanical and thermal properties that are appropriate for such applications. Several of the recent advances in terms of polymeric materials research are related to the reduction of their environmental impact by employing biodegradable polymers as alternative materials to conventional fossil fuel-based plastics. Given that food and agricultural by-products are a rich source of polymeric molecules, including proteins and polysaccharides, many studies have focused on the production of biopolymeric films using such macromolecules as precursor materials. Although both polysaccharides and proteins have been shown to be suitable for the production of films for biodegradable packaging, recent studies have aimed on enhancing film performance by employing blend systems, given that mixtures of proteins and polysaccharides should present a more cohesive network. In view of the aforementioned, the objective of this work was to develop biopolymeric films based on sunflower seed proteins with added galactomannans from locust bean gum (LGB), and to evaluate the effect of adding different amounts of galactomannans on film properties. Films were prepared by casting, using glycerol as plasticizer. Addition of galactomannan to the protein films led to improvements in the mechanical properties, given that it provided an increase in tensile strength while maintaining film flexibility. Increases in moisture content and water vapor permeability were observed as the LGB concentration increased in the blended films, this being attributed to the hydrophilic nature of the galactomannans. Adding LGB also affected color parameters, increasing lightness (luminosity) and decreasing color saturation. The addition of LGB did not significantly affect film thermal stability, with the X-Ray diffraction patterns obtained for

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the blended films being similar to the one observed for the pure protein film, with slight variations in peaks intensities.