
Potential of polysaccharides for food packaging applications

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Food packaging accounts for more than 50% of the global market for fossil fuel-derived plastic packaging and is the fastest growing sector of this market. However, in recent years, their use has become a major concern for the environment. The extensive use of plastics and the lack of proper recycling systems have led to an estimated accumulation (from 1950 to 2015) of about 4.9 billion tons of waste in landfills and water bodies worldwide. As a result, recent strategies have been implemented globally with the aim of reducing dependence on fuel-based feedstock, increasing the recyclability of plastics, and reducing plastic leakage into the environment. Sustainable packaging is also an area of research and innovation that is necessary today. Many investigations are based on materials that come from biological sources and can be used as substitutes for conventional plastics to produce biodegradable and/or recyclable packaging. Both proteins and polysaccharides have good film-forming properties. However, proteins generally find higher value-added applications as food or feed ingredients. For the present study, different types of polysaccharides from different sources were selected to provide a broad overview of the main physicochemical properties of polysaccharides under standardized conditions for their applications in food packaging. Their performances were evaluated as film-forming solutions and as self-standing films, especially for barrier, mechanical and optical properties. In addition, an aging test was performed to characterize the evolution of these properties under different storage conditions, in order to evaluate their long-term stability. The use of some of these polysaccharides as coatings for paper-based packaging, as well as the development of multilayer packaging, are suggested as the most promising applications. The biodegradability of polysaccharides also offers an alternative waste treatment route for these applications where recycling is not technically or economically feasible.