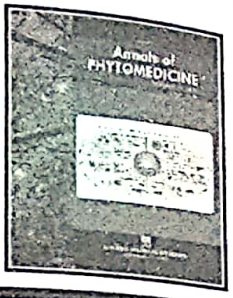
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Edible films and biodegradable packaging from agricultural waste

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Abstract

Rising alarm over plastic contamination and long term environmental impact has spurred interest in producing biopolymers from renewable feed stocks, particularly agricultural residues. Examples of such by products cereal husks, fruit and vegetable peels and similar wastes offer abundant, low cost and eco-friendly precursors for biopolymer synthesis. This review explores the valorization of agricultural residues for making biopolymers and edible films by considering their origins, extraction and processing approaches and performance attributes. Key biopolymers recoverable from agro waste include starch, cellulose, pectin, lignin and proteins, which can be isolated by physical, chemical or enzymatic procedures. Processing techniques such as solution casting, extrusion and electro spinning enable the formation of biobased films with tailored mechanical strength, barrier performance and biodegradability. These films have applications across food packaging, pharmaceuticals, agriculture and biomedical sectors. Despite their advantages, commercialization is hindered by limitations like inferior mechanical properties relative to conventional plastics, elevated production costs, variability in feedstock quality and the absence of standardized processing protocols. Overcoming these barriers through technological innovation and enabling policy measures is essential to scale industrial deployment of biofilms. This review highlights the role of agro waste valorization in advancing circular economy models and decreasing dependence on fossil derived plastics.

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