

CHARACTERIZATION AND APPLICATION OF STARCH/CHITOSAN-BASED FILM INCORPORATED WITH VANILLIN FOR ACTIVE FOOD PACKAGING

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Abstract

Starch-based films are increasingly recognized as an environmentally sustainable substitute for petroleum-based packaging materials, owing to their biodegradable nature, renewability. This research aimed to characterize the starch/chitosan-based film incorporated with vanillin compound through their biological activity and physical-mechanical properties and application for fruit preservation. The antimicrobial activity of starch/vanillin film effectively showed inhibition against *Escherichia coli*, *Staphylococcus aureus*, *Salmonella enterica*, *Bacillus subtilis* and *Listeria monocytogenes* between 12% and 44%. The physical-mechanical-chemical analysis demonstrated that chitosan can increase the film hardness and time of elongation. Moreover, differential scanning calorimetry, thermogravimetry, and X-ray powder diffraction indicated that starch/chitosan/vanillin films were thermally stable at elevated temperatures up to 250 °C and the vanillin became amorphous during the casting process. Scanning electron microscopy revealed that the vanillin-incorporated films exhibited a smoother and denser surface relative to the control. Furthermore, the application of starch/chitosan/vanillin films as strawberry coatings and packaging materials significantly reduced the total bacterial load after 8 and 16 days of storage, respectively. The bioactive films developed in this study present a promising basis for the advancement of consumer-oriented food preservation technologies. This research was supported by the projects HUN-REN 2001007, TKP2021-EGA-28 and EU Horizon 2020 739593.