

PHYSICAL CHARACTERIZATION AND ANTIMICROBIAL PROPERTIES OF PVA-CELLULOSE NANOFIBER-BASED FILMS

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ABSTRACT

Hybrid biopolymer-based composite films made up of 5% polyvinyl alcohol (PVA), 2.3% cellulose nano fibers (C NFs) and 1% chitosan, 4% glycerol and 0.5% cinnamon or clove essential oils (EOs) were prepared via solution blending and casting method. Beef cuts inoculated with *E. coli* O157:H7 and un-inoculated ones were wrapped with the films containing 1% chitosan, and others with the films containing 1% chitosan and 0.5% EOs then refrigerated at 4°C. Approximately 2 log reductions of bacterial growth of the cocktail mixture of five strains of *E. coli* O157:H7 was observed for chitosan and EO-added films in the two replications after 10 days. For shelf-life studies, beef cuts were wrapped with chitosan and EO-added films and refrigerated at 4°C. An average of 1 log reduction of the total counts was observed with either films containing chitosan and those incorporated with EOs after 10 days.

Physical tests of the polymer based-films showed that the tensile strength of the films was decreased with incorporation of 0.5% EOs. The yellowness of these polymer based films was a result of inclusion of chitosan and cinnamon EOs. For SEM-EDS analysis, rough surfaces were revealed on the surface of both kinds of films. However, EO-added films had the bud-like structures their rough surface. With FTIR analysis, only glycerol was detected to be present in the polymer-based composites.