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ANTIMICROBIAL ACTIVITY OF BIODEGRADABLE PACKAGING FILM DEVELOPED USING PALMYRAH TUBER STARCH, ESSENTIAL OIL AND CHEMICAL PRESERVATIVES

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Abstract

Food packaging materials are an integral component in the food supply chain to ensure food quality, safety and for the protection of the food products. Novel food packaging materials are designed to improve the quality characteristics, preservative or protective properties of packaged foods. Starch is the most abundance biopolymer used for the formulation biodegradable and edible films. Active ingredients, such as essential oil and preservatives are able to incorporate for the formulation of edible film in order to achieve better performances. This study investigated the effectiveness essential oil and chemical preservatives against *E. coli*, *Psuedomonas aeruginosa*, and *Bacillus brevis*. The antimicrobial activity of packaging films formulated with different concentration (0.25, 0.5, 1.0, 1.5% w/w) of clove oil, cinnamon oil, sodium metabisulphite, sodium benzoate and potassium sorbate was investigated using the disc diffusion test. Antimicrobial activity of the film incorporated with the combination of above preservatives also evaluated to study the synergetic effect of them. Diameter of the inhibitory zone observed against *E.coli* for the film incorporated with clove oil with the concentration of 1.0 % and 1.5% is 18mm and 20mm respectively. Diameter of the inhibitory zone observed against *Bacillus brevis* for the film incorporated with clove oil with the concentration of 1.0 % and 1.5% is 8mm and 20mm respectively. Inhibitory zone was observed against *E.coli* for the film incorporated with cinnamon oil with the concentration of 1.0 % (17mm) and 1.5% (24mm) and also a clear zone was observed against *Bacillus brevis* for cinnamon oil with the concentration of 1.0 % (8mm) and 1.5% (17mm). While inhibition zone (8mm) was observed only for the 1.5% of clove oil and cinnamon oil against *Psuedomonas fluorescens*. Inhibitory zone was not observed for any of the films prepared with preservatives such as sodium metabisulphite, sodium benzoate and potassium sorbate. In conclusion, active biodegradable packaging films with antimicrobial properties are able to be formulated and developed using clove oil, cinnamon oil and other food grade chemical preservatives. The best formulation was the starch (4.0%), gelatin (1.0%), glycerol (1.5%), clove oil (1.5%) or cinnamon oil (1.5%).

Keywords: Active film, Biodegradable, Essential oil, Palmyrah tuber starch