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Activity of chitosan films containing rhizome oil of *Alpinia malaccensis* against *Escherichia coli* and *Staphylococcus aureus*

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Food packaging and preservation are of utmost importance in the food industry in order to maintain food quality and safety. There are several drawbacks associated with conventional and traditional methods of food packaging and preservation. Recently, there have been many developments in food packaging and preservation using edible films made of natural materials. Chitosan is a bio-based film widely used for food packaging. Recently, plant derived essential oils (EOs) have gained increased attention as natural antimicrobials in the food industry. However, direct application of oil onto food surfaces has several drawbacks; poor solubility of oil in aqueous media, evaporation of the oil, degradation of the biological activity of the oil etc. Most of these drawbacks can be overcome by incorporation of oil into a carrier film. During this study, the rhizome oil of *Alpinia malaccensis* (Kalu Ala) was incorporated into chitosan films as a potential bio based food packaging film. The activity of chitosan films enriched with *A. malaccensis* rhizome oil was tested against *Escherichia coli* and *Staphylococcus aureus*.

Dry rhizome oil of *A. malaccensis* was extracted using steam distillation. The antibacterial activity of *A. malaccensis* oil and the oil incorporated chitosan films against *E.coli* and *S.aureus* was determined by measuring the optical density of broth cultures at 610 nm (OD_{610}). The inhibition of the growth of bacteria by the rhizome oil of *A. malaccensis* was more pronounced for *S. aureus* than for *E. coli*. The chitosan films enriched with dry rhizome oil of *A. malaccensis* (0.007 µg mm^{-2}, 0.014 µg mm^{-2} and 0.028 µg mm^{-2}) inhibited the growth *S. aureus* whereas the inhibition of the growth of *E. coli* was not prominent. The variation of the antibacterial activity of the oil enriched chitosan films with storage time was observed for five weeks since their preparation. The antibacterial activity of the films was not changed drastically during the period of five weeks. The incorporation of rhizome oil of *A. malaccensis* into chitosan films enhanced the antimicrobial activity of the film.

Keywords: *Alpinia malaccensis,* chitosan films*, Escherichia coli,* essential oil,*Staphylococcus aureus*

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