UNIVERSITI TEKNOLOGI MARA

THE CHARACTERISTIC OF SAGO-BASED EDIBLE FILM INCORPORATED WITH DIFFERENT ANTIMICROBIAL ESSENTIAL OIL

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ABSTRACT

This study was conducted to study the characteristics of sago based edible films incorporated with essential oils (EOs) and its antimicrobial effectiveness against *Escherichia coli*. This edible films is an establish study on how we can replaced the usage of conventional petroleum-based plastic since it is non-degradable and can cause pollution. The films were prepared by heating a mixture of sago starch and glycerol as plasticizer. Two concentration of glycerol were used, 0.6 and 1.0 mL with an incorporation of antimicrobial agent such as turmeric (TO) and lemongrass (LGO) EO to film mixture with different concentration (0.2%, to 0.5% v/v). Physicochemical properties includes color and water vapor permeability and mechanical properties of the films were test to identify its compatibility as food packaging. Both films with 0.6 mL and 1.0 mL glycerol incorporated with LGO and turmeric have a significant yellow color and darker compared to commercialize ziploc sandwich bag bought from supermarket. WVP for films for both concentration of glycerol and EOs have shown a significant decreased of 5.30×10^{-3} to 4.80×10^{-3} and 3.90×10^{-3} while for films with 1.0mLglycerol give WVP of 6.90×10^{-3} to 5.30×10^{-3} and 6.30×10^{-3} as the concentration of EOs increased. Tensile testing machine was used to measure the tensile strength (TS) and elongation at break (EB) of the sago films. The optimum amount of glycerol added to the films seem to be 0.6mL since films incorporated with LGO and TO have an increasing TS from 2.928MPa to 4.471MPa and 4.646MPa respectively. Antimicrobial activity was test against *Escherichia coli (E.coli).* Result showed that sago film with LGO at concentration of 0.2%v/v has the lowest total colony count for both amount of glycerol added. Based on the results of the study it can be conclude that incorporation of LGO and TO improve the characteristic of the films.

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CHAPTER 1

INTRODUCTION

1.1 SUMMARY

Edible films are thin films prepared from a range of naturally derived material which can be divided into three categories hydrocolloids, lipids and composite. Starch, alginate, chitosan and cellulose derivatives are classified as polysaccharides group while lipids include waxes, acylglycerols and fatty acids. Composite is derived from the combination of those group of material (Du *et al.* 2011). In this research sago-starch is used to produce film. Starch has good film-forming ability due to its unique colloidal properties. Besides, low cost of raw material along its wide availability and ease of handling have make starch as the most common raw material used in edible film formation (Maizura *et al.* 2008). Glycerol is added to the film formulation as plasticizer to modify the mechanical properties. Essential oils are extracted from plant and have concentrated hydrophobic liquid containing volatile aroma compounds can be added into the edible film. This film can act as barrier to external element such as moisture, oils, gases and vapors so can extend foods shelf life and improve its quality (Du *et al.* 2011). Different antimicrobial essential oils such as turmeric and 'lemongrass' essential oils with different concentration are test on *Escherichia coli* which commonly found in drink juices. Certain test including mechanical test, films color measurement, microbial activity and water vapor permeability are conducted on the sago-based edible films. So, basically this research is done to produce an active packaging with optimum amount of essential oils concentration that can protect food from microorganism as well as increase the food shelf life.