UNIVERSITI TEKNOLOGI MARA

# FORMULATION AND CHARACTERIZATION OF EDIBLE FILM FROM SAGO STARCH AND MANGO PEEL PECTIN

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# ABSTRACT

Fruit waste are potential economical source for development of edible film for food packaging. In mango processing industries, mango peels are considered as waste and usually discarded. However, mango peels consist of numerous valuable component which can be used to develop edible film such as pectin. This research aim is to extract pectin from mango peels, develop edible film from sago starch with incorporation of mango peels pectin and evaluate the effect on films mechanical, physical and barrier properties. Films were prepared using casting method with three different concentrations of extracted mango peels pectin which are 0, 5, 10 and 15% w/w sago starch. Pectin yield obtained in the extraction of pH 2.0 at 100 °C for 60 minutes was 19.5%. The finding in this study showed that the addition of pectin in sago starch solution results to increase in film tensile strength from 3.95 to 5.09 MPa. However, decrease in elongation was observed with increasing pectin content from 80.50% to 53.67%. On the other hands, increasing pectin content enhance water vapor permeability varying from $5.00 \times 10^{-9}$ to $6.82 \times 10^{-9}$ g $s^{-1}$ $m^{-1}$ $Pa^{-1}$. The solubility also increased with higher pectin content and temperature. Generally, the results show that the films have low solubility in water. This study reveals the advantage of mango peels pectin incorporation into sago starch based films as a potential source for the production and development edible film.

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# INTRODUCTION

## 1.1 Research Background

Packaging plays important role in food industry to preserve food quality and protecting it from contamination by moisture, air and micro-organisms. Petrochemical-derived plastic is commonly used for food packaging due to it cheapness, flexibility, durability, and impermeability to moisture and air. However, it is reported that plastic consist of many toxic chemicals including styrene, bisphenol A (BPA), and formaldehyde which can cause cancer. (Husain, 2015). Besides, the accumulation of the plastic waste has become a growing concern due to its non-biodegradable characteristic. Despite there are initiative to recycle the plastic, only 5% of the production of plastic are recycled (Espitia *et al.*, 2014). Therefore, development of sustainable materials for food packaging has emerged as an initiative to reduce the application of synthetic plastic.

Significant research has been conducted to develop a biodegradable, safe and environmentally friendly packaging as the substitute of plastic for food packaging. One of the alternative is edible film. Edible film is a thin layer of consumable material which act as a barrier to mass transfer such as humidity, oxygen and solute movement for the food (Bourtoom, 2008). Edible film can be consumed with the product and even if it is not consumed it can contribute to reduce environmental pollution. They are expected to degrade easily as it is made from edible ingredients. The utmost benefits of edible films are their biodegradability as well as their edibility. The functionality of edible film is almost similar with synthetic plastic. Therefore, edible film is one of the promising candidates that can partially replace the conventional synthetic plastic which can contribute in reduction of synthetic plastic utilization. The studies on edible film is important to develop the biodegradable packaging and contribute for the reduction of