UNIVERSITI TEKNOLOGI MARA

EFFECT OF CHITOSAN-BASED EDIBLE COATING ON BIOLOGICAL PROPERTIES AND QUALITY OF FRUIT

NURAKMAL SYUHADA BINTI MOHD YUSSOFF

Thesis submitted in fulfilment of the requirement for degree of **B.Eng**

Faculty of Chemical Engineering

July 2017

ABSTRACT

Post-harvest disease of fruits Malaysia are a serious problem that need to be solve in order to ensure the industry can contribute more to the national economy. This problem causes a major loss of fruits during the harvesting process until to the consumers residential. Many invented technologies such as fruit waxing and use of pesticide, have been created to solve the problem, however they have their own drawbacks including use of unnatural ingredients, loss of fruit nutritional value and artificial appearance. Therefore, there are need in inventing a new approach to disentangle the issues by investigating on the effect of chitosan based edible coating on biological properties and quality of fruit. The aims of this research work are to develop chitosan based edible coating and to study on the effect of chitosan edible coating with different concentration of turmeric oil on appearance, weight loss, antimicrobial activity and microbial load towards fruit. Type of fruit selected for this study is strawberry and the turmeric oil is chosen as the additional value in the chitosan coating to inhibit the growth of Botrytis cinerea which is a fungal that causes the grey mould disease among strawberry plant. Through the appearance analysis, chitosan with additional of 10 uL of curcuma longa had the best appearance for three days compares to the chitosan edible coating with other concentration of curcuma longa. The disk diffusion analysis proves that the chitosan with 10uL of curcuma longa had the highest inhibition zone which is 17 mm compares to other concentrations. Meanwhile, the weight loss analysis shows that the chitosan with 15 uL of curcuma longa had the lowest weight loss which is 3.35% after 5 days of leaving period. Thru the total plate count analysis, the chitosan edible coating added with 15 uL of curcuma longa has the lowest total colony forming unit (CFU) which is 4400 CFU/mL and the log CFU is 3.64. Through conducted analysis, the chitosan coating with additional turmeric oil can preserve the quality of the strawberry and prolong its shelf life. It is a hope that this research work would contribute to agriculture industry especially in the fruits production by avoiding the exposure of harmful of pesticide during the plantation and would give significant impact towards supplier as it would prolong the post-harvest fruits shelf life. The study also give another options to the consumers to choose a fresh, safe, natural and high nutrients fruits in their diets.

ACKNOWLEDGEMENT

First and foremost, I would give my deepest thank God for giving me the opportunity to pursue my degree and completing the long and challenging journey productively. My gratitude and thanks go to my supervisor, Mdm Ummi Kalthum Ibrahim and co-supervisor Mdm Noorsuhana Mohd Yusof for the tolerance, ideas, provision and cooperation during assisting me with the research work. I would like also to give my best regards to staff of Faculty Chemical Engineering and Universiti Teknologi Mara for providing the facilities, accommodations, knowledge and assistance during this project.

My appreciation and special thanks dedicated to my family and friends for the patience, understanding, and encouragement to ensure my successful life and bringing me to be a better human. Alhamdulillah.

TABLE OF CONTENTS

CHAPTER ONE
INTRODUCTION

1.1 BACKGROUND STUDY

In this technology era, a lot of methods in food technology emerge with the aims to preserve the quality of fruit and increase its shelf life. Researchers have do a lot of study on fruit coating and the most common process is fruit waxing. Fruit waxing is done by covering fruits with artificial waxing material. Usually, fruits has their own natural waxes but, due to washing process after the harvest, their waxes has been wash off. This intervention technology use waxes which can be come from natural source such as carnauba waxes and beeswax or petroleum based waxes such as polyethylene. This method is used to prevent water loss and slow down spoilage and shrinkage. It also able to slow the ripening process, inhibit mould growth and give shiny and glossy appearance as a good impression for customers. By waxing the fruit, it also decrease the rate of transpiration and retard the browning process of the fruit. Therefore, the shelf life of fruit can be extended and quality and nutrients of the fruit can be retained.

Although, the process gives many benefits in food engineering, it also has the drawbacks. Due to this problems, edible coating is invented to solve the rising problems. Edible coating is a thin layer of materials that offers a barrier to oxygen, microbes that come from environment, moisture loss and solute movement for food plus, it can be consumed by consumers (Raghav, Agarwal, Saini, Vidhyapeeth, & Vidhyapeeth, 2016). It also do not add unfavourable properties to the fruits and environmental friendly due to its natural biodegradable source. It works by delaying the rate of respiration, decrease weight loss and extend the shelf life of fruits and vegetable during the postharvest storage (Kerch, 2015).

Edible coating is classified into three major classes taking into account the nature of their component: hydrocolloid (which contains proteins, polysaccharide or alginate) lipids (formed from fatty acids, acylglycerols or waxes) and composited (combination subtances from the two classes) (Skurtys O., Acevedo C., Pedreschi F., Enrione J., Osorio F., n.d.). In this study, chitosan coating in hydrocolloid categories is investigated.