DEVELOPMENT AND CHARACTERIZATION OF CHITOSAN-BASED EDIBLE COATING INCORPORATED WITH CURCUMA LONGA (TURMERIC) ESSENTIAL OIL

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ABSTRACT

Common problems related with fruits and vegetables such as foodborne pathogens that can cause foodborne illnesses, precocious decaying and economic losses related with fresh fruits retention have led to the development to find a technologies and systems for the main reason to protect the fruits and vegetables. One of the advance technology used nowadays is edible coatings based on natural compound.The increasing rate of fresh strawberries consumption allied to the excellent harvesting conditions that Malaysia can offer especially at Cameron Highlands, Fraser Hills and Kundasang, Sabah, have created a remarkable opportunity to increase the production competitiveness of this product while offering a product with high nutritive value that can better resist to the challenges of fruit processing, refrigeration and transport. Thus, this research approach can be further applied on strawberries which is always affected by problems, such as fungal infections (botrytis cineria), water loss, and losses of nutritional properties, in order to extent their shelf life. The objectives of this research were 1) to develop chitosan-based edible coating in order to improve the shelf-life of fruits and 2) to investigate the physical properties of fruits before and after the coatings experiment. . In this research, chitosan which is most widely used natural compounds in the edible coating development have been chosen. This research provides a review on the effects of main edible coating components, chitosan (100 ml), turmeric essential oil (0, 5, 10, 15, 20 µl) and starch (4g, 6g, 8g Tapioca powder) on the analysis of appearance, color, texture and surface tension of coated strawberry were studied during 5 days of storage at room temperature (26˚C±2˚C) and 50-60% relative humidity. Results showed that all the analysis give the same results which is addition of 20 µl of turmeric oil and 6g of tapioca powder into the chitosan solution possible to extend the shelf-life of strawberry except for the surface tension analysis which is addition of 5, 10 and 15 µl of turmeric oil and 6g of tapioca powder give a good results for surface tension values.

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CHAPTER ONE

INTRODUCTION

1.1 Research Background

Definition of edible coatings and films are thin layers of edible component that are applied to the surface of the fruits or vegetables in addition to or as a replacement for natural protective waxy coatings and act as physical barrier to control moisture, oxygen, carbon dioxide, flavor and aroma exchange between the food components and the atmosphere surrounding them (Pavlath & Orts, 2009b). Wax is the first edible coating used in history for the food packaging especially for fruits and vegetables (Han, 2013). In history of food packaging, the main reason of edible coating are used to prevent loss of moisture and to create a shiny fruit surface for appearance purposes.

According to Pavlath & Orts (2009b), in 1967, edible films and coating had very little commercial use, and were limited mostly to wax layers on fruits. Today, edible films and coatings use had expanded rapidly for retaining quality of a wide variety of foods, with total annual revenue exceeding $100 million (Pavlath and Orts, 2009). Edible coatings and films can be differentiated by three main groups of natural polymer which are polysaccharides (starch, cellulose and its derivatives, chitosan, alginate, gellan gum), proteins (collogen, zein, soybean and gluten proteins, milk proteins) and fats (bee wax, candelilla wax, carnauba wax, fatty acids, glycerols). These polymers are generally biodegradable, nontoxic, and some of them are effective barriers to oxygen and carbon dioxide (Tarun Pal Singh;Manish Kumar Chatli; Jhari Sahoo, 2014).