

UNIVERSITI TEKNOLOGI MARA

**EDIBLE COATING FILM
INCORPORATED WITH TURMERIC
OIL AS ANTIOXIDATION AGENT
FOR FRESH-CUT 'FUJI' APPLES**

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Thesis submitted in fulfillment
of the requirements for the degree of
Master of Science

Faculty of Chemical Engineering

August 2019

ABSTRACT

This research is about edible coating incorporated with turmeric oil as antioxidation agent for fresh-cut 'Fuji' apples. Focusing on the performance of fresh-cut fruits as it has crucial problem commonly faced which is enzymatic browning process. This process easily occurred due to cutting process that lead to damage of respiration tissues. Edible coating film are used nowadays as alternative method to preserve fresh-cut fruits instead of using other preservation methods such as salting, pickling, freezing, drying and many others. Edible coatings are made up of hydrocolloid such as starch, protein and lipid. This edible coating film functionality in postponing the enzymatic browning process could be enhanced with presence of additives such as antioxidation agent. Objectives of this research are to formulate the composite edible coating emulsion (CECE) with different concentrations of turmeric oil for fresh-cut fruits coating, to characterise the CECE and the coated fresh-cut fruits in chill condition (6°C) and lastly, to analyse the relationship between dipping time and concentrations of turmeric oil on browning index of the coated fresh-cut fruits through Response Surface Methodology (RSM). In this study, cassava starch and carboxymethyl cellulose (CMC) were chosen as based biopolymer to produce ECE to be applied on fresh-cut 'Fuji' apples. Meanwhile, citric acid used as cross-linking agent, glycerol as plasticiser and turmeric oil (TO) was added in the emulsion as it contains many active compounds that could act as antioxidation agent, thus, embellish more the coating properties. Fresh-cut 'Fuji' apples are used as samples due to high sugar content which could lead to enzymatic browning process and deterioration in short time. The CECE were analysed through surface tension and wettability. It reveals that 6%(w/v) of cassava starch, 2% (w/v) of CMC, 2%(v/v) of glycerol and 0.5%(w/v) of citric acids gave the optimum results for surface tension and wettability (spreading coefficient, work of adhesion and cohesion). Moreover, the Fourier Transform Infrared (FTIR) analysis described that there were interactions occurred when the raw materials being mixed which was show by the changes of peak number and hydrogen concentration. The optimum CECE performance was tested through few characterisations which are weight loss, percentage firmness loss, oxidase enzyme analysis and total phenolic contents (TPC). The weight loss and percentage firmness loss were done for 5 days of storage with different amount of TO concentration and CECE dipping time. From these analyses, it ascertains that at 17.5 $\mu\text{L}/\text{mL}$ of TO concentration with 180 s dipping time gave the optimum results. Then, further analyses on enzymatic browning process were done which are oxidase analysis and TPC by using UV-Vis spectroscopy. Results obtained showed that coating with presence of TO lower the oxidase content with percentage efficiency of 41.41% for Day 5 and it also reveals that it had the highest TPC. Surface morphology was analysed by using Scanning Electron Microscope (SEM), while coating thickness was analysed through digital microscopic. The RSM are used to determine the relationship of different TO concentration and dipping time towards browning index. The RSM analysis showed that 30 $\mu\text{L}/\text{mL}$ concentration of TO with 180 s dipping time had the lowest value of browning index. Therefore, it can be concluded that the edible coating film contains TO as antioxidation agent and can be used as alternative method in preserving the fresh-cut 'Fuji' apples.

ACKNOWLEDGEMENT

In the name of Allah, the Most Gracious and the Most Merciful

All praises to Allah S.W.T for giving me this opportunity for furthering my study to master level and also gave me physical and mentally strength during this topsy-turvy journey.

I want to express my deep gratitude to my supervisor, Associate Professor Dr. Junaidah Jai for the continuous encouragement, motivation, guidance and supervision towards my research and thesis writing. I appreciate all her contributions of time, ideas and funding in order to complete my study. Besides that, I would like to extent my gratitude to my co-supervisor Dr. Istikamah Subuki and Puan Nurul Asyikin Md. Zaki for their guidance, insightful comments and endless support throughout this challenging adventure.

My sincere thanks to all staff from Faculty of Chemical Engineering especially to Deputy Dean; Professor Dr. Norazah Abdul Rahman, Head of Postgraduates; Dr. Putri Nadzrul Faizura Megat Khamaruddin, Puan Adibah Md. Zen and all the laboratory science officer especially Puan Azizan Din and Puan Nor Suhaila Sabli for the guidance and helps during my research.

I am grateful of being in the Edible Coating Film team that always encourage each other, changing and sharing ideas as well as constantly giving the good advices. I would like to thanks the team members Puan Noorsuhana Mohd Yusof, Puan Fariza Hamidon and Puan Norasmah Mohamed Manshur for their guidance and support during these 3 years.

I also would like to express my very profound gratitude to my family especially my parents and sisters: Md. Sharif Muhamed, ██████████ Zatul 'Iffa, Zatul Izzura, Zatul Illyana, Zatul Izzat and Ruzitah Abdullah (aunt). Thank you for being my backbones and providing me continuously support, expenses as well as encourage me spiritually throughout my years of study. This accomplishment would not have been possible without them.

Finally, I would like to express my sincere gratitude to my postgraduate colleague and friends: Nurul Fatin Alia Mustapha, Izni Mariah Ibrahim, Rafizah Zaiton, Ezan Suhailah Mohd Kassim, Faridatul Akmal Ahmad Jamali, Nurul Shuhada Mohd. Makhtar, Nur Assyiqah Syuhadah Mohd. Asri, Azianna Gusniah, Nurulfitri Abdullah, Nur Hafizah Zainal Abidin, Aizatul Fatimah Azlan and Nur Sarah Izaty Hasni for their precious encouragement, ideas, advices and always by my side when I need a hand. Not forget, thank you to my friends that give mentally support and always believe in me through out my years of study: Nurul Nadia Razak, Norazura Samsuddin, Wan Nor Nadhirah Wan Nor Azmi, Nurul Anira Mohd. Arif, Adeliana Rosli, Siti Rahmas Abit and Nur Aliah Nadhirah Ahmad Razli.

Thank you also to those who involves directly or indirectly during the process of completing my research and thesis writing.

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