CONFERENCE PROCEEDING

Development of Films for Suppression of Halitosis and Oral Antimicrobial from CMC in Durian Peel

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ABSTRACT

Carboxymethyl cellulose or CMC is a natural substance which can used for personal care products. CMC can be used as forming agent in the preparation of water-soluble film or as an edible film. Thus, this project was aimed to synthesize CMC for edible film production from cellulose that obtained from durian peel. Then, all herbs that known as halitosis treatment such as mint leaves, cloves, Indian marsh, sappan and guava leaves were added for oral antimicrobial investigation. The chemical structure of the cellulose and CMC were then characterized using FTIR. The physical and microbiological properties of the film were evaluated. For physical properties study found that the CMC obtained was relatively scentless, smoothness, slightly turbid, transparent and viscous. Additionally, results showed that CMC ratio was affects the physical characteristics of the film, the high CMC ratio gave the greater film tensile strength, weight and thickness. There were 3 formulas of edible film using CMC as film forming agent were carried out. Results found that 8% CMC, 14% of glycerin given good properties of the film. The films antimicrobial testing by agar diffusion test using *C.albicans* was conducted. The results showed partial inhibition zone threatening film of the mint, clove and Indian march, while there no inhibition zone from film that add with guava leaf and sappan including control film. This may be due to the low concentration of the herbal soak used in the film. Thus, higher herbal concentration or essential oil of herb should be concern for further study.

Keywords: Carboxymethyl cellulose, Durian peel, Edible film, *C.albicans*

INTRODUCTION

Thailand is the world's biggest producer and exporter of durian. In the last five years or longer, the exports of Thai durian have been increasing consistently. Meanwhile, a large amount of durian peel is thrown away each year, resulting in social and environmental problems linked to waste disposal. Many researches have been extensively studied on this agriculture waste such as fuel, fertilizers including absorbent materials. According to the known fact reported from Pramote *et al.*, (2011) that durian peel contains up to 30% of cellulose.

Therefore, in this study was interested in extracting cellulose from Monthong durian peel, then synthesized into CMC and used CMC for the preparation of the edible film. Physical properties the film. Moreover, well known halitosis treatment herbs then were added into the film for oral antimicrobial testing

METHODOLOGY

Part 1: Synthesis of CMC from cellulose of durian peel

CMC was synthesized according to the procedure described by Rachtanapun *et al*. (2007). Then Fourier transform infrared spectroscopy (FTIR) analysis.

Part 2: CMC film preparation

2.1: CMC film preparation

The formula was modified from the experiments of Kim *et al*. (2002). There were 3 formulas, each formula used CMC as a film-forming agent of 6, 8, and 10%, respectively. Additionally, 14% of glycerin was used as a plasticizer.

2.2: Herbals CMC film preparation

Preparation of herbal soak: mint powder, clove powder, Indian march powder, sappan powder, Guava leaf then added into film preparation step as descripts in Part 3.1.

Part 3: Films physical properties testing

The physical properties including thickness, weight, pH, tensile strength and water solubility were performed.

Part 4: Films antimicrobial testing

The study of the Microbial activity with Agar diffusion test, test with *C.albicans*. Measure clear zone with a Vernier Calipers.

RESULTS AND DISCUSSION

It was found from experiment 2 characteristic of CMC is white, coarse powder and scentless. For FTIR analysis of CMC (Figure 1) the absorption bands of the representative spectra of CMC obtained were similar indicating that CMC structure (Figure 2)

It was found from experiment 2.1 CMC film preparation. The characteristic of the film is scentless, smoothness, slightly turbid, transparent and viscous. The CMC ratio affects the physical characteristics of the film, the high CMC ratio the greater properties physical including tensile strength, weight, thickness. CMC film physical properties are shown in Table 1. Results also showed that 8% CMC as a film-forming agent produce the better film. The herbals adding CMC film shown in Figure 3, for Films antimicrobial testing by agar diffusion test using *C.albicans*., the results showed partial inhibition zone threatening film of the mint, clove and Indian march CMC film. While, no inhibition zone obtained from CMC film adding guava leaf, sappan including control film (formula 2), (Figure 4).

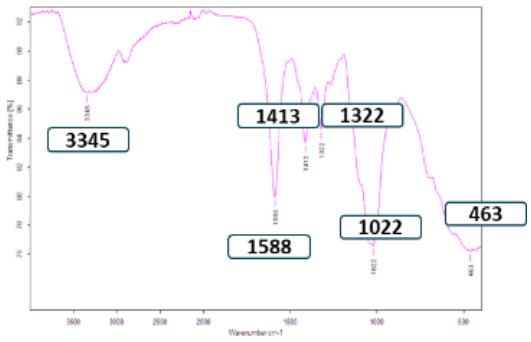

Figure.1 FTIR of CMC

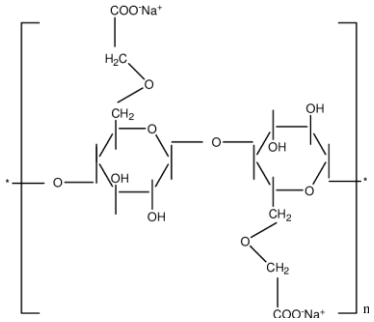

Figure.2 CMC structure

Figure.3 All herbals CMC film obtained from this study

Figure.4 The anti-fungal of herbs films in against *C. albicans* at 24 hours

Table 1. Physical properties of the Herbs film

Formulations	Physical properties				
	Weight (g)	Thickness (mm)	pH	Tensile strength (N/mm^2)	Solubility time (min)
1	0.0208±0.0044	0.178±0.024	6.36±0.05	0.0624±0.0055	0.52±0.02
2	**0.0342±0.0038**	**0.217±0.011**	**6.42±0.06**	**0.1923±0.0057**	**1.00±0.12**
3	0.0415±0.0025	0.316±0.070	6.48±0.06	1.4990±0.0808	1.55±0.14

CONCLUSION

Carboxymethyl cellulose was successfully synthesized from cellulose of durian peel, the resulting CMC can be used to prepare an edible film. The Film obtained using 8% CMC from durian peel as forming agent, use glycerin as a plasticizer provided good physical properties. The films antimicrobial testing with *C. albicans* was found partial inhibition zone for the film which prepare with mint, clove and Indian march.

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