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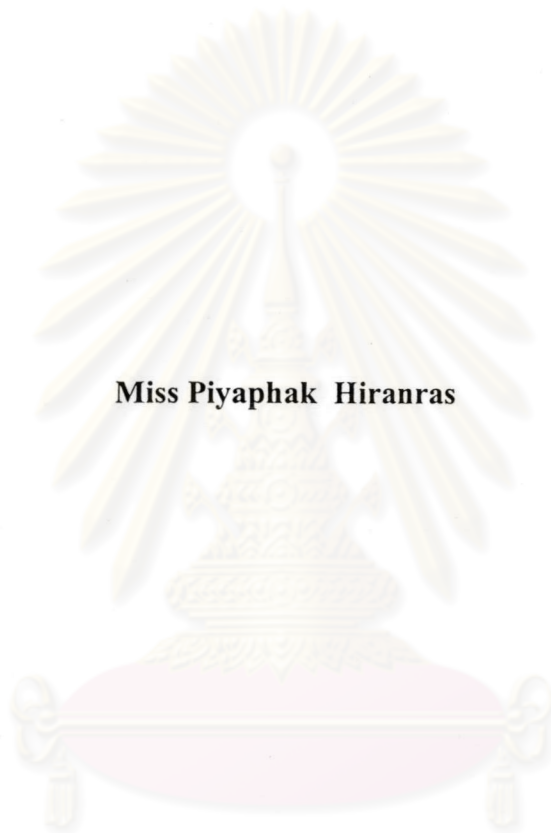
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ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

**FORMULATION OF *GARCINIA MANGOSTANA* LINN. EXTRACT BUCCAL  
MUCOADHESIVE FILM**



**Miss Piyaphak Hiranras**

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

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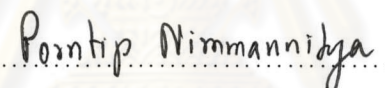
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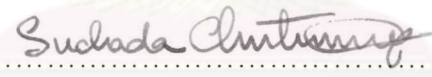
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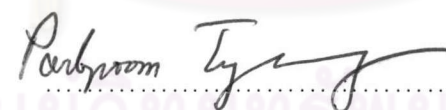
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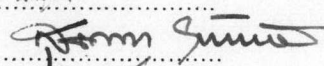
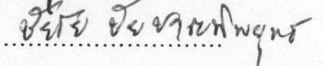


ปิยภัค นีรภัทร การตั้งตำรับฟิล์มยึดติดเยื่อของปากของสารสกัดจากเปลือกมังคุด (FORMULATION OF GARCINIA MANGOSTANA LINN. EXTRACT BUCCAL MUCOADHESIVE FILM) อาจารย์ที่ปรึกษา : รศ.ดร.สุชาติ ชูติมาวรรณ, อาจารย์ที่ปรึกษาร่วม : รศ. ชัยโย ชัยชาญพิทยุทธ ,255 หน้า ISBN 974-17-0757-6

สารสกัดจากเปลือกแห้งของมังคุดสามารถเตรียมและทำให้บริสุทธิ์ขึ้นได้เป็นผงผลึกสีเหลืองซึ่งมีสารแมงโกสติน จากการศึกษาฤทธิ์ต้านแบคทีเรีย พบว่าได้ผลดีกับสแตฟีโลคอคคัสออเรียส เอทีซีซี 25923 สเตรปโตคอคคัสสเตรปโตคอคคัสแซนควิส เอทีซีซี เคทีเอสเค2 และสเตรปโตคอคคัสแซนควิส (แยกจากช่องปากของผู้ป่วย) การศึกษานี้เตรียมฟิล์มลักษณะ 2 ชั้นประกอบด้วยชั้นยึดติดเยื่อเมือกซึ่งเตรียมจากพอลิเมอร์ชนิดชอบน้ำที่มีสารสกัดและชั้นรองรับเตรียมจากเอทิลเซลลูโลส พอลิเมอร์ชนิดยึดติดเยื่อเมือกหลายชนิดที่ศึกษาได้แก่ ไคโตแซน ชนิดน้ำหนักโมเลกุลต่ำ กลางและสูง คาร์บอกซิเมทิลเซลลูโลสโซเดียม (เอชซีเอ็มซี) ไฮดรอกซีโพรพิลเมทิลเซลลูโลส (เอชพีเอ็มซี) คาร์โบพอล934 (ซีพี934) และการใช้สองชนิดร่วมกัน ได้ศึกษาผลของน้ำหนักโมเลกุลของไคโตแซน ชนิดและความเข้มข้นของกรดที่ใช้ในการเตรียมฟิล์มไคโตแซน ความเข้มข้นของซีพี934 ที่ใช้ร่วมกับฟิล์มของเอชซีเอ็มซีหรือเอชพีเอ็มซีต่อคุณสมบัติทางกายภาพต่างๆของฟิล์ม ซึ่งได้แก่ ลักษณะคุณสมบัติการพองน้ำ ความต้านทานเชิงกล การกั้นน้ำ แรงและเวลายึดติดเยื่อเมือกและการปลดปล่อยของแมงโกสตินจากฟิล์ม เมื่อน้ำหนักโมเลกุลของไคโตแซนเพิ่มขึ้น ทำให้ความทนแรงดึง คุณสมบัติการพองน้ำและแรงยึดติดเยื่อเมือกเพิ่มขึ้น แต่เปอร์เซ็นต์ความยึดลดลง ฟิล์มไคโตแซนซึ่งเตรียมจากกรดอะซิติกให้ฟิล์มที่พองน้ำได้สูงกว่าที่เตรียมจากกรดแลคติก การผสมซีพี934ในปริมาณ 10 และ 20 %เข้ากับเอชซีเอ็มซีให้ฟิล์มที่มีคุณสมบัติเชิงกลดีขึ้นแต่ให้ผลต่างกันเมื่อผสมกับเอชพีเอ็มซี อย่างไรก็ตามซีพี934 ช่วยทำให้ฟิล์มเอชพีเอ็มซีมีแรงยึดติดเยื่อเมือกสูงขึ้นและเวลานานขึ้น ฟิล์มผสมสารสกัดแมงโกสตินลักษณะ 2 ชั้นได้คัดเลือกเตรียมขึ้นจาก 3 สูตรตำรับที่ดีที่สุดได้แก่ ฟิล์มเอชพีเอ็มซีผสมกับซีพี934 20% ฟิล์มไคโตแซนชนิดน้ำหนักโมเลกุลปานกลางซึ่งเตรียมจากกรดอะซิติก 1% และกรดแลคติก 1%ได้ใช้ในการศึกษาการปลดปล่อยยา พบว่ากลไกการปลดปล่อยเป็นแบบควบคุมโดยการแพร่ ทุกสูตรตำรับมีความคงตัวดีเมื่อเก็บในสภาวะอุณหภูมิ 40°เซลเซียสและความชื้นสัมพัทธ์ 75%เป็นเวลา 3 เดือนเมื่อวิเคราะห์ปริมาณแมงโกสตินด้วยวิธีเอชพีแอลซี

ศูนย์วิทยุทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

ภาควิชาเภสัชกรรม  
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ลายมือชื่อนิสิต..... อิงกิตา พิทยภัค  
ลายมือชื่ออาจารย์ที่ปรึกษา.....   
ลายมือชื่ออาจารย์ที่ปรึกษาร่วม..... 



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KEYWORD : *GARCINIA MANGOSTANA* / MANGOSTIN / MUCOADHESIVE FILM / SCMC / HPMC / CARBOPOL / CHITOSAN

PIYAPHAH HIRANRAS : FORMULATION OF *GARCINIA MANGOSTANA* LINN. EXTRACT BUCCAL MUCOADHESIVE FILM THISIS ADVISOR: ASSOC. PROF. SUCHADA CHUTIMAWORAPAN, Ph.D. THESIS CO-ADVISOR : ASSOC. PROF. CHAIYO CHAICHANTIPYUHT, M.Sc. in Pharm. 255 pp. ISBN 974-17-0757-6

Crude extract from dried fruit rinds of *Garcinia mangostana* Linn. was prepared and purified as yellow crystalline powder of mangostin. The extract showed antibacterial activity against *Staphylococcus aureus* ATCC 25923, *Streptococcus mutans* ATCC KPSK<sub>2</sub> and *Streptococcus sanguis* (a clinical isolate). Bilayered buccal mucoadhesive films which comprised of a mucoadhesive layer prepared from hydrophilic polymer with the extract and the backing layer prepared from ethylcellulose were investigated. Various types of mucoadhesive polymers included chitosan of low, medium and high molecular weight (LMW, MMW, HMW), carboxymethylcellulose sodium (SCMC), hydroxypropyl methyl cellulose (HPMC), Carbopol 934 (CP934) and combined polymers. Effects of molecular weight of chitosan, types and concentration of acid used in the preparation of chitosan film, concentration of CP934 in SCMC or HPMC films on the physical properties of the film were studied. They included appearance, swelling, mechanical resistance, water repellent, mucoadhesive force and time and release of mangostin from films. As the MW of chitosan increased, the tensile strength, swelling property and the mucoadhesive force increased, however, the percentage elongation decreased. Chitosan films prepared from acetic acid showed higher degree of swelling than those prepared from lactic acid. Combination of CP934 10 and 20% w/w with SCMC exhibited better mechanical properties, whereas, the different results obtained from those prepared from CP934 and HPMC. However, CP934 improved the mucoadhesive force and time of HPMC films. Bilayered films containing mangostin were prepared from three selected formulations included HPMC combined with 20% CP934, chitosan MMW prepared with 1% acetic acid and 1% lactic acid for release study. The release mechanism was demonstrated to follow diffusion-controlled model. All formulations were stable under the storage at 40°C and 75% relative humidity for 3 months with respect to the mangostin content analysed by HPLC method.

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## LIST OF ABBREVIATIONS

ANOVA	=	analysis of variance
$^{\circ}\text{C}$	=	degree Celcius
CP934	=	pharmaceutical grade of carbopol 934
cm	=	centimeter
$\text{cm}^2$	=	square centimeter
conc	=	concentration
CV	=	coefficient of variation
df	=	degree of freedom
et al.	=	and others
g	=	gram
HMW	=	high molecular weight
hr	=	hour
HPLC	=	high performance liquid chromatography
HPMC	=	hydroxypropyl methylcellulose
k	=	release rate constant
LMW	=	low molecular weight
MBC	=	minimal bactericidal concentration
mg	=	milligram
MIC	=	minimal inhibitory concentration
min	=	minute
ml	=	milliliter
mm	=	millimeter
$\text{mm}^2$	=	square millimeter
MMW	=	medium molecular weight
mPas	=	millipascal.second
MS	=	Mass spectrometry
MW	=	molecular weight
N	=	Newton
No.	=	number
nm	=	nanometer



**LIST OF ABBREVIATIONS (continued)**

$R^2$	=	coefficient of determination
RH	=	relative humidity
rpm	=	revolution per minute
s	=	second
SCMC	=	sodium carboxymethylcellulose
SD	=	standard deviation
SS	=	sum of square
TLC	=	thin layer chromatography
UV	=	ultraviolet
VR	=	variance ratio
v/v	=	volume by volume
w/w	=	weight by weight
$\mu\text{g}$ , mcg	=	microgram
$\mu\text{l}$	=	microliter

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