

สารออกฤทธิ์ทางชีวภาพของหญ้าค้อนกลอง *Sphaeranthus africanus* Linn.

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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต

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BIOACTIVE COMPOUNDS OF *Sphaeranthus africanus* Linn.

Miss Wimolpun Rungprom

A Thesis Submitted in Partial Fulfillment of the Requirements  
for the Degree of Master of Science in Chemistry

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Graduate School

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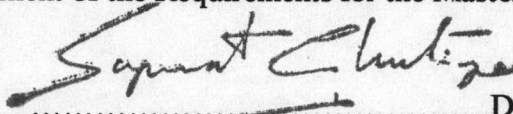
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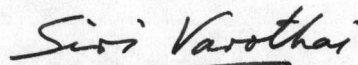
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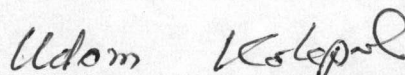
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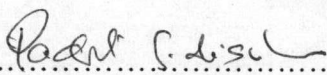
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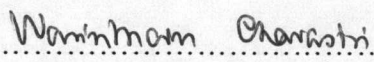
  
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วิมลพรรณ รุ่งพรหม : สารออกฤทธิ์ทางชีวภาพของหญ้าค้อนกลอง (BIOACTIVE COMPOUNDS OF *Sphaeranthus africanus* Linn.) อ. ที่ปรึกษา : ร.ศ. ดร. อุดม ก๊กผล , 114 หน้า. ISBN 974-639-692-7.

ในการเสาะหาสารออกฤทธิ์ทางชีวภาพของหญ้าค้อนกลอง *Sphaeranthus africanus* Linn. พบว่าสิ่งสกัดคลอโรฟอร์มและสิ่งสกัดบิวทานอลแสดงความเป็นพิษต่อไรสีน้ำตาล (*Artemia salina* Linn.) และ คาร์ซีโนมาเซลล์ไลด์หลายชนิด สามารถแยกสารจากสิ่งสกัดทั้งสอง ได้ 9 ชนิด คือ fridelan-3 $\beta$ -ol ของผสมสเตียรอยด์ 2-*o-n*-buthyl- $\beta$ -fructopyranose, quercetagetin-3,6,7-trimethyl ether, quercetagetin-3,3',7-trimethyl ether, quercetagetin-3,7-dimethyl, quercetin, 3 $\alpha$ , 5 $\beta$ -diangeoloxoyloxy-7-hydroxycarvotacetone และ 2,4 $\alpha$ , 6 $\beta$ -triangeoloxoyloxy-5-( sec-propyl)-2-cyclohexenone ( carvotacetone analog) ซึ่งสารสองชนิดหลังเป็นสารใหม่

ผลการศึกษาฤทธิ์ทางชีวภาพของหญ้าค้อนกลอง พบว่า สารประกอบฟลาโวนอยด์ และ อนุพันธ์ของ cavotacetone มีฤทธิ์ทางชีวภาพ สารประกอบฟลาโวนอยด์ quercetagetin-3,6,7-trimethyl ether, quercetagetin-3,3',7-trimethyl ether , quercetagetin-3,7-dimethyl ether และ quercetin แสดงฤทธิ์ในการยับยั้ง ไซคลิกเอเอ็มพี ที่ ความเข้มข้น 10 mg/ml โดยมีเปอร์เซ็นต์การยับยั้งตามลำดับ ดังนี้ 75%, 50%, 42%, 87.5% นอกจากนี้ 3 $\alpha$ , 5 $\beta$ -diangeoloxoyloxy-7-hydroxycarvotacetone และ 2,4 $\alpha$ , 6 $\beta$ -triangeoloxoyloxy-5-( sec-propyl)-2-cyclohexenone ยังแสดงความเป็นพิษต่อไรสีน้ำตาล โดยค่า LC<sub>50</sub> มีค่า 11.45  $\mu$ g/ml และ 12.34  $\mu$ g/ml ตามลำดับ

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WIMOLPUN RUNGPRON : BIOACTIVE COMPOUNDS OF *Sphaeranthus africanus* Linn. THESIS ADVISOR : ASSOC. PROF. UDOM KOKPOL, Ph.D.

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In a search for bioactive compounds of *Sphaeranthus africanus* Linn., chloroform and butanol crude extracts revealed high cytotoxicity against brine shrimp (*Artemia salina* Linn.) and various carcinoma cell lines. The separation of two active fractions led to the isolation of nine compounds : fridelan-3 $\beta$ -ol, mixture of steroids, 2-O-*n*-buthyl- $\beta$ -fructopyranose, quercetagetin-3,6,7-trimethyl ether, quercetagetin-3,3',7-trimethyl ether, quercetagetin-3,7-dimethyl ether, quercetin, 3 $\alpha$ ,5 $\beta$ -diangeloxoyloxy-7-hydroxycarvotacetone and 2,4 $\alpha$ , 6 $\beta$  triangeloxoyloxy-5-(sec-propyl)-2-cyclohexenone (carvotacetone analogue). The last two compounds were found to be new compounds.

The bioassay result indicated that both flavonoids and carvotacetone derivatives showed biological activities. Quercetagetin-3,6,7-trimethyl ether, quercetagetin-3,3',7-trimethyl ether quercetagetin-3,7-dimethyl ether and quercetin inhibited cAMP at dose 10 mg/ml with percentage inhibition of 75%, 50%, 42% and 87.5%, respectively. The 3 $\alpha$ ,5 $\beta$ -diangeloxoyloxy-7-hydroxycarvotacetone and 2,4 $\alpha$ , 6 $\beta$  triangeloxoyloxy-5-(sec-propyl)-2-cyclohexenone showed cytotoxicity against brine shrimp with LC<sub>50</sub> of 11.45 and 12.34  $\mu$ g/ml, respectively.

ภาควิชา.....เคมี

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ลายมือชื่อนิสิต.....วิมลพร รุ่งพร

ลายมือชื่ออาจารย์ที่ปรึกษา.....อุดม กอกป

ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....

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## List of Abbreviations

TLC	= thin layer chromatography
R <sub>f</sub>	= retardation factor
m.p.	= melting point
°C	= degree celsius
w/w	= weight by weight
g	= gram
Kg	= kilogram
mg	= milligram
ml	= milliliter
UV	= ultra-violet
m/z	= mass per charge
M.W.	= molecular weight
IR	= infrared
GC	= gas chromatography
FT	= fourier transformed
NMR	= nuclear magnetic resonance
TMS	= tetramethyl silane
DMSO	= dimethylsulfoxide
δ	= chemical shift
J	= coupling constant
Hz	= Hertz
s	= singlet
dd	= doublet of doublet
ddd	= doublet of doublet of doublet
d	= doublet
t	= triplet
q	= quartet
quint	= quintet
m	= multiplet

DEPT	= distortionless enhancement by polarization transfer
HMQC	= $^1\text{H}$ -detected heteronuclear multiple-quantum coherence <i>via</i> direct coupling
HMBC	= heteronuclear multiple bond connectivity by 2D multiple quantum NMR
COSY	= two-dimensional $^1\text{H}$ correlation Spectroscopy
NOESY	= nuclear overhauser effect Spectroscopy
ppm	= part per million
LC <sub>50</sub>	= lethal concentration (concentration caused 50% lethality)