

การศึกษาเคโมเมทริกส์ของน้ำมันหอมระเหยจากพืชไทยสกุล *Cinnamomum*



นางสาวเบญจา ฉวีวรรณชล

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CHEMOMETRIC STUDY OF ESSENTIAL OILS FROM THAI *CINNAMOMUM* SPECIES

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A Thesis Submitted in Partial Fulfillment of the Requirements  
for the Degree of Master of Science in Pharmacy Program in Pharmacognosy

Department of Pharmacognosy

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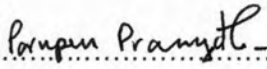
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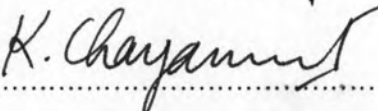
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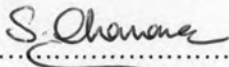
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เบญจา ฉวีวรรณชล : การศึกษาเคโมเมตริกส์ของน้ำมันหอมระเหยจากพืชไทยสกุล *CINNAMOMUM*. (CHEMOMETRIC STUDY OF ESSENTIAL OILS FROM THAI *CINNAMOMUM* SPECIES) อ. ที่ปรึกษา : รศ.ดร.วันชัย ดีเอกนามกุล, 136 หน้า.

ได้ทำการศึกษา น้ำมันหอมระเหยจากใบของพืชไทยในสกุลอบเชย (*Cinnamomum* spp.) ด้วยวิธี headspace GC-MS และ การวิเคราะห์ทางเคโมเมตริกส์ โดยเก็บรวบรวมตัวอย่างใบพืชจำนวน 42 ตัวอย่าง จาก 9 ชนิด และ 6 ตัวอย่างที่ไม่ระบุชนิด จากพื้นที่ต่างๆ ของประเทศไทย จากการวิเคราะห์พบองค์ประกอบทางเคมีจำนวน 128 ชนิด และได้ใช้ข้อมูลดังกล่าวเป็นตัวแปรในการศึกษาการจำแนกกลุ่มตัวแปรด้วยวิธีทางเคโมเมตริกส์ 2 วิธีคือ เทคนิค Hierarchical Cluster Analysis (HCA) และ Principal Component Analysis (PCA) เพื่อจัดจำแนกตัวอย่างตามรูปแบบขององค์ประกอบทางเคมี ซึ่งเทคนิค HCA ที่ใช้การวัดความคล้ายด้วยการคำนวณค่าสัมประสิทธิ์สหสัมพันธ์แบบ Pearson correlation และการรวมกลุ่มแบบ Between-groups Linkage เป็นเทคนิคที่เหมาะสมในการจัดจำแนกกลุ่มตามองค์ประกอบทางเคมีสำหรับการศึกษา นี้ ผลจากการวิเคราะห์จำแนกกลุ่มพบว่า ตัวอย่างพืชชนิดเดียวกันถูกจัดอยู่ในกลุ่มเดียวกันแม้ว่าจะมีความแตกต่างขององค์ประกอบหลักทางเคมีก็ตาม พบ 2 chemotype จาก 6 ตัวอย่างของ *C. camphora* คือ camphor type และ linalool type เช่นเดียวกับ *C. verum* ที่พบ 2 chemotype ได้แก่ linalool type และ eugenol type สำหรับ *C. iners* ส่วนมากมีองค์ประกอบหลักเป็นสาร caryophyllene เช่นเดียวกับ *C. subavenium* ส่วน *C. iners* อีกกลุ่มหนึ่งมีสาร linalool เป็นองค์ประกอบหลักซึ่งทำให้ถูกจัดอยู่ในกลุ่มเดียวกับ *C. camphora* ชนิด linalool type ผลการศึกษาเหล่านี้บ่งชี้ว่า สามารถใช้องค์ประกอบทางเคมีของน้ำมันหอมระเหยจากใบของพืชสกุลอบเชยในการจำแนกชนิดของตัวอย่างพืชได้ โดยใช้วิธีทางเคโมเมตริกส์ในการวิเคราะห์จำแนกกลุ่ม

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BENJA CHAVEEVANCHOL : CHEMOMETRIC STUDY OF ESSENTIAL OILS FROM THAI  
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The leaf essential oils of Thai *Cinnamomum* species were investigated by headspace GC-MS and chemometric method. Forty-two mature leaf samples representing nine species and six unidentified samples were collected from various locations in Thailand. One hundred and twenty-eight chemical constituents were identified from these samples and used as dependent variables for chemometric analysis. Hierarchical cluster analysis (HCA) and principal component analysis (PCA) were employed to classify samples in the terms of their chemical profiles. It is clear that cluster analysis using Pearson correlation with the between group linkage is an adequate chemometric method in making chemical classification analysis for this study. Based on the results of cluster analysis, samples of the same species were grouped into one cluster even though there are some differences in the major components. Six samples of *C. camphora* appeared in two chemotypic forms: camphor type and linalool type. Eight samples of *C. verum* also fall into two chemotypes: linalool type and eugenol type. Most *C. iners*, as well as *C. subavenium*, were rich in (*E*)-caryophyllene. A prominent compound in another group of *C. iners* appeared to be linalool. They were, therefore, classified in the same cluster of the linalool type of *C. camphora*. Based on these results, it is clear that the use of the chemical compositions of the leaf essential oils of genus *Cinnamomum* is a very promising tool in making taxonomic judgement by using chemometric cluster analysis.

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## LIST OF ABBREVIATIONS

cm	=	Centimeter
μm	=	Micrometer
g	=	gram
mg	=	Milligram
GC	=	Gas Chromatography
GC-MS	=	Gas Chromatography – Mass Spectrometry
HS	=	Headspace
i.d.	=	Internal diameter
min	=	Minute
°C	=	Degree Celsius
TOT	=	Total ion exchange
RT	=	Retention time
spp.	=	Species
HCA	=	Hierarchical cluster analysis
PCA	=	Principal component analysis
No.	=	Number
Fig.	=	Figure