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EXTRACTION AND RECONSTRUCTION OF VOLATILE OIL FROM
AMMANNOSTYLIS CINNABEA (LENDL.) RIDG. VAR. CINNABEA

WITTITA PAIBON

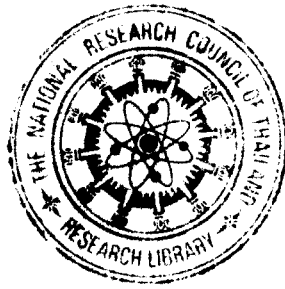
A Thesis Submitted to the Graduate School of Naresuan University
in Partial Fulfillment of the Requirements
for the Master of Science Degree
in Pharmaceutical Sciences (International Program)
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WITITA PAIBON

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This thesis entitled “Extraction and Reconstruction of Volatile oil from *Rhynchostylis gigantea* (Lindl.) Ridl. var *gigantea*” submitted by Witita Paibon in partial fulfillment of the requirements for the Master of Science Degree in Pharmaceutical Chemistry and Natural Products (International program) is hereby approved.

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ABSTRACT

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An orchid, *Rhynchostylis gigantea* (Lindl.) Ridl. var *gigantea* (Changkra) is well known for its unique scent which is very appealing for perfume, cosmetic and spa industries. The aims of this study were to find the appropriate method to extract the volatile oil from Changkra and also to reconstruct the oil with similar scent to the natural one. Through the studies, the scents of the oils were evaluated by both human assessors and an alternative tool, an electronic nose (e-nose).

In order to find the suitable extraction method, hydrodistillation, solvent extraction and enfleurage methods were applied for the extraction of volatile oil from *Jasminum sambac* Linn.; Oleaceae (Jasmine). This was due to the availability of the flower. The sensory test showed that the scent of the volatile oil from enfleurage method was the closest to that of the fresh flowers.

This method was then successfully applied for extraction of volatile oils from Changkra flowers. Gas chromatography-mass spectrometry (GC-MS) analysis revealed that the main aromatic constituents of Changkra oil were terpenoids and phenylpropanoids. Reconstruction of artificial Changkra oils was then conducted by mixing some of these chemical constituents in various ratios. Series of reconstructed oils were compared with the natural Changkra oil by six assessors in a preference test. The results showed that among 130 reconstructed oils, the CK_109 formulation had

the most similar scent to that of the natural oil. CK_109 was then compared with the natural Changkra oil and Changkra flowers using both a triangle discrimination test by 53 assessors and an e-nose. The results from both experiments suggested that the scent of CK_109 was similar to that of the natural Changkra oil than the fresh flower. This indicated that e-nose can be used as an alternative method for evaluation of the scents of flower volatile oils.

In conclusion, this study reports the extraction methods of the volatile oil from a Thai fragrant orchid Changkra for the first time. The process to reconstruct the artificial oil is demonstrated. In addition, two sensory evaluation techniques using human panels and an e-nose were successfully used. All procedures might be applied for perfumery and related industries.

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ABBREVIATIONS

α	=	alpha
β	=	beta
δ	=	delta
γ	=	gamma
π	=	the proportion of subjects in the population
μg	=	microgram
μl	=	microliter
μm	=	micrometer
amu	=	atomic mass unit
BB	=	benzyl benzoate
$^{\circ}\text{C}$	=	degree celsius
cm	=	centimeter
cont.	=	continue
CP	=	camphor
EG	=	eugenol
EI	=	electron ionization
e-nose	=	electronic nose
eV	=	electron volts
FN	=	farnesol
g	=	gram
GA	=	geranyl acetate
GC	=	gas chromatography
h	=	hour
H_0	=	null hypothesis
H_1	=	alternative hypothesis
HA	=	hexyl cinnamyl aldehyde
i.d.	=	inside diameter
in	=	inch
KI	=	kovat index

ABBREVIATIONS (CONT.)

m	=	meter
MB	=	methyl benzoate
MC	=	methyl cinnamate
mg	=	milligram
min	=	minute
ml	=	milliliter
mm	=	millimeter
MS	=	mass spectrometry
m/z	=	mass to charge ratio
n	=	number
NR	=	nerol
<i>p</i>	=	probability
PC	=	percent variance
PCA	=	principal component analysis
PEG	=	polyethylene glycol
RI	=	retention indices
R.S.D	=	relative standard deviation
SD	=	standard deviation
χ^2	=	chi-square values
TP	=	terpineol
VA	=	vanillin
w/w	=	weight by weight