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ESSENTIAL OIL COMPOSITION OF *ELETTARIOPSIS WANDOKTHONG* PICHEANS. & YUPPARACH RHIZOME FROM THAILAND

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Abstract: The essential oil from the fresh rhizome of *Elettariopsis wandokthong* Picheans. & Yupparach (Zingiberaceae) was obtained by hydrodistillation. Forty eight compounds were identified by gas chromatography-mass spectroscopy (GC-MS) technique. The three major compounds were camphene (22.51 %), fenchyl acetate (9.11 %) and 1, 8-cineole (8.12 %). This is the first report on the chemical composition of the essential oil of *E. wandokthong* fresh rhizome.

Keywords: *Elettariopsis wandokthong*, Zingiberaceae, essential oil

บทคัดย่อ: เมื่อน้ำมันระเหยง่ายจากเหง้าสดของว่านมหาเสน่ห์ซึ่งได้จากการกลั่นโดยวิธี hydrodistillationมาวิเคราะห์องค์ประกอบทางเคมีโดยใช้เทคนิค Gas Chromatography-Mass Spectroscopy (GC-MS) พบว่ามีองค์ประกอบทางเคมีทั้งหมด 48 ชนิด โดยองค์ประกอบทางเคมีหลักที่พบคือ camphene (22.51 %) fenchyl acetate (9.11 %) และ 1, 8-cineole (8.12 %) รายงานนี้เป็นการรายงานองค์ประกอบทางเคมีของน้ำมันหอมระเหยจากเหง้าสดของว่านมหาเสน่ห์เป็นครั้งแรก

คำสำคัญ: ว่านมหาเสน่ห์, Zingiberaceae, น้ำมันระเหยง่าย

INTRODUCTION

Elettariopsis, a small genus of herbaceous plants, belongs to the family Zingiberaceae. This genus includes 30 species, of which 20 are distributed in Southeast Asia (Sirirugsa, 1999; Leong-Skornickova and Newman, 2015). In Thailand, 10 species were recorded (Puma and Suddee, 2014). Several *Elettariopsis* species were used as food and medicine. For example, *E. curtisii* are used for the treatment of flatulence (Chuakul and Boonpleng, 2003) while *E. triloba* for the treatment of flatulence, yellow fever and bone ache (Ong *et al*., 2014). In addition, some of *Elettariopsis* were associated with beliefs such as *E. wandokthong*.

E. wandokthong, a new species from Thailand, is perennial herbs with creeping slender rhizome bearing pseudostem at intervals. The flowers are white with yellowish apex, light pinkish bracts. In Thailand, the vernacular names of this plant are Wan Dokthong and Wan Maha Saneh. This plant is believed to process a magical power and good luck (Picheansoonthon and Yupparach, 2010). In addition, the rhizome oil of this plant believed to increase sex appeal in woman (Picheansoonthon and Yupparach, 2007; Picheansoonthon and Yupparach, 2010).

Many *Elettariopsis* species have previously been studied for the chemical compositions of their essential oils, such as *E. biphylla* (Chumroenphat, Pasorn and Seansouk, 2015), *E. curtisii* (Ibrahim *et al*., 2009; Wong *et al*., 2010), *E. elan* (Wong, Sivasothy and Boey, 2006a), *E. rugosa* (Wong, Sivasothy and Boey, 2006c) and *E. smithiae* (Wong, Sivasothy and Boey, 2006c). However, there are no available information reported about essential oil composition from the fresh rhizomes of *E. wandokthong* from Thailand. Thus, the aim of this study was to investigate the chemical composition of the essential oil from the fresh rhizomes of *E. wandokthong* from Thailand.

MATERIALS AND METHODS

Plant material

The fresh rhizome of the plant sample was collected from botanical garden, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok, Thailand in July 2015. It was identified by comparison with related literature (Picheansoonthon and Yupparach, 2010) and then was confirmed by Assoc. Prof. Thatree Phadungcharoen and Assist. Prof. Dr. Thaya Jenjittikul. The living specimen was cultivated in botanical garden, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok, Thailand.

Isolation of essential oil

The fresh rhizomes of *E. wandokthong* (700 g) were washed with tap water, air dried and then blended into small pieces with the blender. The ground rhizomes were subjected to water-distillation using Clevenger apparatus for 4 hrs. The essential oil was collected and stored at 4°C in air-tight containers before analyzed by GC-MS technique.

GC-MS Analysis

The essential oil from the fresh rhizome of *E. wandokthong* was diluted in ethanol (HPLC grade, Merck, Germany) with the oil to ethanol ratio of 1:25 by volume. GC/MS analysis was performed using an Agilent Technologies 7890A GC system equipped with a 5975C inert XL EI/CI MAD with Triple-Axis detector. The DB-5 MS (phenyl: dimethyl arylene siloxane 5: 95) capillary column (30 m in length, 0.25 mm i.d., and 0.25 μm in thickness) was used as stationary phase. The carrier gas was helium with the flow rate of 1 ml/ minute. One microliter of diluted oil was injected using GC sampler 80 autosampler with splitless mode. The operating condition of GC oven temperature was started at 60°C for 1

minute, ramped at the rate of 3°C/ minute to 240°C and held for 5 min. The GC injector and GC-MSD interface temperatures were set at 180°C and 290°C, respectively. The mass range was 40-650 in the electron impact ionization positive mode at 70 eV with the rate of 2.42 amu / second. The total scan time was 65 min.

Identification of oil components

Chemical constituents of the essential oil were identified by comparing their mass fragmentation pattern with Adams Essential Oil Mass Spectral library and NIST05 Mass Spectral library. The amount of each oil component was determined on the basis of peak area measurement.

RESULTS AND DISCUSSION

The hydrodistillate of the fresh rhizome of *E. wandokthong* was clear and bright yellow oil with the percent yields of 0.37% v/w. The chemical constituents of the essential oils, their peak area percentages and Kovats Indices (KIs) are shown in Table 1, in order of their elution on the DB-5 MS column. Forty eight compounds, corresponding to 97.93%, were identified. The rhizome oil was mainly dominated by monoterpene hydrocarbon (43.32%) followed by oxygenated monoterpene (37.05%). The three major compounds were camphene **[3]** (22.51 %), fenchyl acetate **[23]** (9.11 %) and 1,8-cineole **[11]** (8.12 %). The structures of these major components are shown in Figure 1.

Similar experimental results were previously reported by Wong, Sivasothy and Boey (2006a). Camphene and fenchyl acetate were reported as the major compounds in rhizome and root oil of *E. elan* from Malaysia. However, the experimental results were different from those previously reported. (*E*)-2-Decenal was found to be the major chemical composition in *E. curtisii* and *E. slahmong* (Wong, Sivasothy and Boey, 2006b; Chairgulprasert *et al*., 2008; Ibrahim *et al*., 2009) whereas geranial, spathulenol and (5*E*)-5-Ethylidene-1-methyl-1-cycloheptene were found to be the major chemical composition in *E. smithiae*, *E. rugosa* and *E. biphylla*, respectively (Wong, Sivasothy and Boey, 2006c; Chumroenphat, Pasorn and Seansouk, 2015).

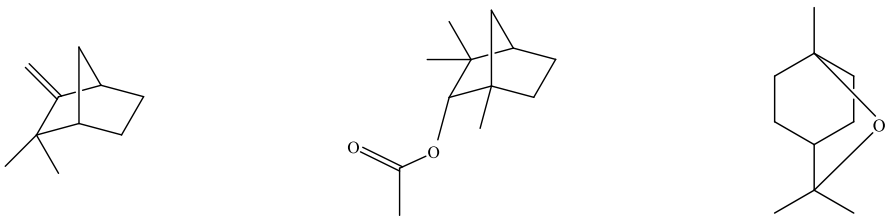
Table 1. Chemical constituents of essential oil from rhizome of *E. wandokthong*.

No.	Chemical composition	Class[a]	KI[b]	Content [%]
1	Tricyclene	MH	926	0.57
2	*α*-Pinene	MH	939	6.41
3	Camphene	MH	954	22.51
4	Sabinene	MH	975	0.13
5	*β*-Pinene	MH	979	3.33
6	Myrcene	MH	990	0.62
7	*α*-Phellandrene	MH	1002	0.48
8	*α*-Terpinene	MH	1017	0.10
9	*p*-Cymene	MH	1024	1.27
10	Limonene	MH	1029	5.06
11	1,8-Cineole	OM	1031	8.12
12	*β*-Ocimene	MH	1050	0.13
13	*γ*-Terpinene	MH	1059	0.95
14	*α*-Terpinolene	MH	1088	0.27
15	Fenchone	OM	1086	0.38
16	Linalool	OM	1096	0.64
17	*endo*-Fenchol	OM	1116	2.90
18	Camphor	OM	1146	2.18
19	Isoborneol	OM	1160	2.89
20	Borneol	OM	1169	3.12
21	Terpinen-4-ol	OM	1177	0.87
22	2-Carene	MH	-	1.38
23	*endo*-Fenchyl acetate	OM	1220	9.11
24	Thymol methyl ether	OM	1235	0.37
25	Bornyl acetate	OM	1288	3.83
26	Isobornyl acetate	OM	1285	0.85
27	4-Carene	MH	-	0.11
28	*α*-Terpinyl acetate	OM	1349	1.79
29	Gurjunene	SH	1409	0.17
30	1,4-Dimethoxy-2-*t*-butylbenzene	Other	-	0.10
31	Caryophyllene	SH	1419	0.88
32	*β*-Calarene	SH	1433	0.16
33	*γ*-Elemene	SH	1436	3.71
34	*cis*-Muurola-3,5-diene	SH	1450	0.14
35	Humulene	SH	1454	0.18
36	*γ*-Gurjunene	SH	1477	0.26
37	*γ*-Muurolene	SH	1479	0.36
38	Germacrene D	SH	1485	1.10
39	*α*-Muurolene	SH	1500	1.24
40	7-epi-*α*-Selinene	SH	1522	0.18
41	Cubenene	SH	-	0.55
42	Nerolidol	OS	1563	0.13
43	Spathulenol	OS	1578	2.73
44	Guaiol	OS	1600	0.37
45	Ledol	OS	1602	0.35

Table 1. Chemical constituents of essential oil from rhizome of *E. wandokthong* (cont.).

No.	Chemical composition	Class[a]	KI[b]	Content [%]
46	Alloaromadendrene	SH	1641	3.68
47	*α*-Cadinol	OS	1654	0.87
48	*t*-Cadinol	OS	-	0.40
	Compound class			
	Terpenoids			
	- Monoterpene hydrocarbons (MH)			43.32
	- Oxygenated monoterpenes (OM)			37.05
	- Sesquiterpene hydrocarbons (SH)			12.61
	- Oxygenated sesquiterpenes (OS)			4.85
	Others			0.10
	Total identified			**97.93**

[a]: MH: Monoterpene hydrocarbon; OM: Oxygenated monoterpene; SH: Sesquiterpene hydrocarbon; OS Oxygenated sesquiterpene
[b]: Kovats index is determined relative to n-alkanes (C6–C24) on a DB-5 MS column



(a) **(b)** **(c)**

Figure 1. Three major components of essential oil from the fresh rhizome of *E. wandokthong* (a) camphene (b) fenchyl acetate (c) 1,8-cineole

CONCLUSION

This is the first report on the chemical composition of essential oil from the fresh *E. wandokthong* rhizome from Thailand. The results obtained might be used as additional information for phytochemical and chemotaxonomic studies of the genus *Elettariopsis*.

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