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Chemical composition of the leaf oil of *Litsea glutinosa* (Lour.) C. B. Rob. from Ha Tinh province

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Abstract. Fresh leaves of *Litsea glutinosa* (Lour.) C. B. Rob. from Ha Tinh were steam distilled to produce an oil in 0.15% yield. The essential oil was analysis by a combination of capillary GC and GC/MS. Seventy eight compounds were detected in the oil, of which more than 95.18% were terpenoids. The major components were (E)-β-ocimene (13.35%), β-caryophyllene (27.20%) and bicyclogermacrene (18.16%).

Keywords: *Litsea glutinosa*, Lauraceae, essential oil composition, (E)-β-ocimene, β-caryophyllene, bicyclogermacrene.

1. Introduction

The genus Litsea is a member of the Lauraceae and comprises more than 400 species which are distributed widely throughout tropical and subtropical Asia, Australia, North America to subtropical South America; 73 species have been recorded in China, most of them located in south and southwest warm regions [1]; 45 species have been found in Vietnam, until now [2].

Litsea glutinosa is an evergreen medium-sized tree. Its barks and leaves are used as a demulcent and mild astringent for diarrhea and dysentery, the roots are used for poulticing sprains and bruises, and the oil extracted from the seeds is used in the treatment of rheumatism [3]. Some psychopharmacological actions of the essential oil of *Litsea glutinosa* (Lour.) C. B. Rob. have been studies by Menon K. M. et al. [4]. Effect of essential oil of *Litsea glutinosa* (Lour.) C. B. Rob. on cardiovascular system and isolated tissues have been investigated by same authors [5]. Flavonoids and aporphine alkaloids were isolated from *Litsea glutinosa* [6, 7]. A water-soluble arabinoxylan (D-xylose and L-arabinose in the molar ratio 1.0:3.4) was isolated from the mucilaginous bark of *Litsea glutinosa* [8].

Recently, research disclosed that the MeOH extract of *Litsea glutinosa* bark effectively inhibited both Gram-positive and Gram-

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negative bacteria. The results justify the reported uses in diarrhea and dysentery [9].

The BuOH extract of the leaves and twigs of *Litsea glutinosa* were shown to exhibit significant cytotoxic activity against human Hela cell lines in vitro. Chemical examination of the BuOH extract of the leaves and twigs of *Litsea glutinosa* collected from Xishuangbanna resulted in the isolation of two new aporphine alkaloids, namely litseglutine A and B, along with two known aporphine alkaloids, boldine and laurolitsine [10].

In the course of the systematic study of Litsea in Indochina, monoterpenes, sesquiterpenes and other components of the leaf oil of *Litsea glutinosa* from Ha Tinh province have been investigated.

2. Experimental

1. ***Source-*** *Litsea glutinosa* (Lour.) C. B. Rob. (Lauraceae), is a shrub tree up to 7-10^{m} high, growing in Vietnam. The leaves of *Litsea glutinosa* were collected in April 2009, in Vu Quang National park, Ha Tinh province. A voucher specimen (NH110) was deposited at the Herbarium of the Faculty of Biology, Vinh University.

Fresh leaves were shredded and their oil were obtained by steam distillation for 3h at normal pressure, according to the Vietnamese Pharmacopoeia [11]. The yield of the fresh leaf oil was 0.15%.

2. ***GC-*** About 15mg of oil, which was dried with anhydrous sodium sulfate, was dissolved in 1ml of n-hexane (for spectroscopy or chromatography).

GC analysis was performed on a HP 6890 Plus Gas chromatograph equipped with a FID and fitted with HP-5MS column (L = 30mm, ID = 0.25mm, film thickness = 0.25μm). The analytical conditions were: carrier gas H_2, injector temperature (PTV) 250°C, detector temperature 260°C, temperature programmed 60° (2 min hold) to 220° (10 min hold) at 4°C/min.

3. ***GC/MS-*** An Agilent Technologies HP 6890 N Plus Chromatograph was fitted with a fused silica capillary col. HP-5MS column (L = 30mm, ID = 0.25mm, film thickness = 0.25μm). The condition of use were the same as described above with He as carrier gas, and interface with a mass spectrometer HP 5973 MSD (70eV). Component identification was carried out by comparing MS data with those reported in Library Willey on Chemstation HP, and in some cases substances identified from oils known composition and also with standard substances [12-17].

3. Results and discussion

Of the more than 90 leaf oil components of *Litsea glutinosa* that were separated by capillary GC in this study, 78 were identified after GC/MS analysis, representing 95.18% of the total (Table 1).

Table 1. Volatile leaf components of *Litsea glutinosa* (Lour.) C. B. Rob. from Ha Tinh

No	Compounds	KI	% FID
	tricylene	927	trace
	α-thujene	931	0.37
	α-pinene	939	3.38
	camphene	953	0.41
	sabinene	976	0.29
	β-pinene	980	3.26
	myrcene	990	1.91
	α-phellandrene	1006	0.65
	δ^3-carene	1011	0.50
	α-terpinene	1017	trace
	p-cymene	1026	trace
	o-cymene	1028	trace

limonene	1032	1.30
(Z)-β-ocimene	1042	2.54
(E)-β-ocimene	1053	13.35
γ-terpinene	1061	0.12
α-terpinolene	1090	0.14
linalool	1100	trace
nonanal	1102	trace
(E)-4,8-dimethyl-1,3,7-nonatriene	1104	0.41
alloocimene	1128	0.48
geijerene	1143	trace
menthone	1153	0.66
iso-menthone	1163	0.14
(Z)-anethol	1165	1.04
decanal	1180	0.20
octyl acetate	1183	trace
linalyl acetate	1261	0.15
2-undecanone	1273	trace
(E)-anethole	1285	0.24
bornyl acetate	1289	trace
undecanal	1290	trace
bicycloelemene	1327	0.20
α-cubebene	1343	0.14
neryl acetate	1362	trace
α-ylangene	1374	trace
α-copaene	1376	0.24
β-bourbonene	1386	0.15
β-cubebene	1389	0.14
β-elemene	1391	0.66
iso-caryophyllene	1409	0.10
dodecanal	1412	0.18
β-caryophyllene	1419	27.20
γ-elemene	1433	0.19
α-guaiene	1440	trace
aromadendrene	1443	trace
3,7-guaiadiene	1447	0.10
α-humulene	1454	3.04
(+)-epi-bicyclosesquiphellandrene	1474	0.10
germacrene D	1480	1.48
α-amophene	1485	0.66
β-selinene	1490	0.10
bicyclogermacrene	1499	18.16
(E,E)-α-farnesene	1506	0.81
γ-cadinene	1514	0.21
δ-cadinene	1525	0.56
germacrene B	1536	0.82
(E)-nerolidol	1558	2.73
bourboneol	1567	trace
germacrene-D-4-ol	1574	0.10
spathulenol	1577	0.67
caryophyllene oxide	1581	2.21
cedrol	1598	0.16
ledol	1600	0.26
α-cedrene	1640	trace
τ-muurolol	1641	0.91
β-eudesmol	1651	0.13
α-cadinol	1653	0.13
(Z)-β-asarone	1676	trace
minsulfide	1742	trace
benzyl benzoate	1760	0.27
tetradecanal	1770	trace
6,10, 14-trimethyl 2-pentadecanone	1829	0.31
n-eicosane	2000	trace
n-heneicosane	2100	trace
phytol	2125	0.33
n-docosane	2200	trace
n-heptacosane	2700	0.19

Note: trace < 0,1; KI = Kovats index

The monoterpenes represented the most abundant component with (E)-β-ocimene (13.35%), α-pinene (3.38%), β-pinene (3.26%), (Z)-β-ocimene (2.54%), myrcene (1.91%), limonene (1.30%), (E)-anethol (1.04%) and other components with content lower than 1.00%. Among the sesquiterpenes, there were caryophyllene (27.20%), bicyclogermacrene (18.16%), α-humulene (3.04%), nerolidol (2.73%), caryophyllene oxide (2.21%), germacrene D (1.48%) and other constituents with content lower than 1.00%.

The oxygenated compounds such as linalool, nonanal, menthone, iso-menthone, (Z)-, (E)- anethol, decanal, octyl acetate, linalyl acetate, 2-undecanone, bornyl acetate, undecanal, neryl acetate, dodecanal, (E)-nerolidol, bourboneol, germacrene-D-4-ol, spathulenol, caryophyllene oxide, cerdrol, ledol, ι-muurolol, nerolidol, β-eudesmol, α-cadinol, (Z)-β-asarone, benzyl benzoate, tetradecanal, 6,10,14-trimethyl 2-pentadecanone and phytol have a relatively small content, but contribute to the charactistic odor of this oil.

This essential oil contains also small amount of n-paraffin: n-eicosane, n-heneicosane, n-docosane and n-heptacosane.

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Nghiên cứu thành phần hóa học tinh dầu lá cây Bời lời nhớt (*Litsea glutinosa* (Lour.) C. B. Rob.) ở Hà Tĩnh

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Hàm lượng tinh dầu từ lá cây Bời lời nhớt là 0,15% theo nguyên liệu tươi. Nghiên cứu thành phần hóa học của tinh dầu lá cây Bời lời nhớt (*Litsea glutinosa* (Lour.) C. B. Rob.) ở Hà Tĩnh bằng phương pháp sắc ký khí (GC) và sắc ký khí khối phổ (GC/MS), hơn 90 hợp chất được tách ra từ tinh dầu, trong đó 78 hợp chất được xác định (chiếm 95,18% tổng hàm lượng tinh dầu). Thành phần chính của tinh dầu là (E)-β-ocimen (13,35%), β-caryophyllen (27,20%) và bicyclogermacren (18,16%).