

CHAPTER II

HISTORICAL

1. Chemical Constituents of Essential Oil in Lauraceae Family

The Lauraceae family comprises many species and has a worldwide distribution. They are known to possess characteristic aromatic constituents. The essential oils of some Lauraceae species (belonging to the genus *Cinnamomum* and *Litsea*) could be useful natural resources for terpenes, which are commercially important chemicals in the flavor, fragrance and pharmaceutical industries. Essential oils are usually chemically complex mixture. Only few groups of naturally occurring products contain as many compounds as essential oils. The following review focuses only on Thai Lauraceae plants of which the chemical composition of their essential oils have been previously worked on. The list of these compounds are shown below.

Table 1 Chemical constituents of essential oils from some Lauraceous plants

Plant part	Chemical constituents	References
Leaves	<i>Cinnamomum camphora</i> Nees.et. Eberm. Monoterpene sabinene, myrcene, (<i>Z</i>)- β -ocimene, <i>trans</i> -sabinene hydrate, α -thujene, (+,-)camphene, <i>p</i> -cymene, terpinene, dipentene, fenchene, geranial, neral, phellandrene, (α,β)-pinene, (α,γ)- terpinolene, Oxygenated monoterpene (α,δ)-terpineol, borneol, borneol. camphor, carvacrol, 1,8-cineole,	Medici, Pieretti and Salvatore, 1992 ; Duke, 1992 ; Pe'lissier <i>et al.</i> , 1995 ; Baruah and Bhagat, 1975

Table 1 (continue)

Plant part	Chemical constituents	References
	<p>citronellol, <i>p</i>-cymol, gerniol, geranyl acetate, hotrienol, nerol, neryl acetate. (<i>cis,trans</i>)-ocimene, α-terpinyl acetate, α-terpineol, terpinin-<i>l</i>-ol, terpinen-<i>l</i>-ol, orthodene, piperitone</p> <p>Diterpenoid</p> <p>camphorene</p> <p>Sesquiterpene</p> <p>(β,δ)-elemene, α-cubebene, cubenol. α-copaene, (α,β)-santalene, <i>cis</i>-α-bergamotene, <i>epi</i>-β-santalene. (<i>E</i>)-β-farnesene, (<i>Z</i>)-(<i>E</i>)-α-farnesene, bicyclogermacrene, α-muurolene. (<i>E,E</i>)-α-farnesene, calamenene, calacorene, bisabolene, cadinadiene. (α-δ)-cadinene, α-calacorene. cadinene, β-elemene. α-humulene, β-caryophyllene. caryophyllene, epicampherol, limonene, junenol. germacrene B, epicubenol, myrcene. humulene, nerolidol. β-selinene,</p> <p>Oxygenated sesquiterpene</p> <p>spathulenol, caryophyllene oxide, humulene oxide, β-eudesmol, (α,β)-bisabolol, cadinenol, cadineol, <i>trans</i>-cadinol, α-cadinol, campherenol, campherenone, linalool, (-)-linalool. <i>cis</i>-linalool oxide, linalyl acetate,</p>	

Table 1 (continued)

Plant part	Chemical constituents	References
	<p><i>trans</i>-muurolol, nerolidol,</p> <p>Phenylpropanoid</p> <p>dihydroeugenol, cuminalcohol. cuminaldehyde, dihydrocuminy alcohol, eugenol. methyl eugenol. safrole,</p> <p>Aliphatic alcohol</p> <p>acetaldehyde, cinnamonol, azulene. camphoracene, camphazulene, camphorenone, caprinaldehyde, capronaldehyde, 3,7-dimethylocta- 1,7-dien-3,6-diol, 3,7-dimethylocta- 1,5-dien-3,7-diol, 3,5-dimethyl-4,6- di-<i>o</i>-methylphloracetophenone, dimethylsecoisolariciresinol, 5- dodecanyl-4-hydroxy-4-methyl-2- cyclopentenone, ethyl phenol. (α.β)- hexanal. <i>n</i>-hexanol, <i>cis</i>-3-hexenol. <i>n</i>- hexylaldehyde, isovaleraldehyde, mesityloxide, methyl-isobutyl ketone. methyl-vinyl ketone, furfural. tragetonol, myristinaldehyde. pentenylaldehyde, propionaldehyde, sterinaldehyde, piperonal, suvenol, secoisosolariciresinol-dim-ethyl- ether</p> <p>Benzenoid</p> <p>vanillin</p>	

Table 1 (continued)

Plant part	Chemical constituents	References
Aerial part	<p>Long chain hydrocarbon</p> <p><i>cis</i>-2,6,6-trimethyl-2-vinyl-5-hydroxytetrahydrofuran, decane, tridecane, salvene</p> <p><i>Cinnamomum camphora</i> Th. Fries.</p> <p>Monoterpene</p> <p>α-thujene, (α,β)-pinene, camphene, sabinene, myrcene, α-phellandrene, <i>p</i>-cymene, limonene, (<i>Z</i>)-β-ocimene, γ-terpinene, <i>trans</i>-sabinene hydrate</p> <p>Oxygenated monoterpene</p> <p>1,8-cineole, linalool, δ-terpineol, γ-terpineol, camphor</p> <p>Sesquiterpene</p> <p>(β,δ)-elemene, α-cubebene, α-copaene, β-caryophyllene, α-santalene, <i>cis</i>-α-bergamotene, <i>epi</i>-β-santalene, α-humulene, (<i>E</i>)-β-farnesene, bicyclogermacrene, α-muurolene, β-santalene, (<i>Z,E</i>)-α-farnesene, bicyclogermacrene, α-muurolene, (<i>E,E</i>)-α-farnesene, calamenene, (α,δ)-cadinene, calacorene, germacrene B</p> <p>Oxygenated sesquiterpene</p> <p>spathelenol, caryophyllene oxide, humulene oxide, <i>trans</i>-cadinol, β-eudesmol, α-cadinol</p>	Tisserand and Balancs, 1995 ; Pe'lissier <i>et al.</i> , 1995

Table 1 (continued)

Plant part	Chemical constituents	References
Leaves	<p>Phenylpropanoid safrole, eugenol</p> <p>Long chain hydrocarbon decane, tridecane</p> <p><i>Cinnamomum porrectum</i> Kosterm</p> <p>Monoterpene α-thujene, (α,β)-pinene, camphene, sabinene, α-phellandrene, <i>p</i>-cymene, limenene, δ-3-carene, (<i>E</i>)-ocimene, sabinene hydrate, terpinolene, <i>allo</i>-ocimene</p> <p>Oxygenated monoterpene <i>1,4</i>-cineol, <i>1,8</i>-cineol, linalool, citronellol, borneol, terpinen-4-ol, α-terpineol, citronellal, geraniol, geranial, methyl geranate, bornyl acetate, methyl citronellate</p> <p>Sesquiterpene (δ,β,γ)-elemene, β-caryophyllene, (α,β)-humulene, β-selinene, α-farnesene, α-muurolene, (δ,γ)-cadinene,</p> <p>Oxygenated sesquiterpene elemol, viridiflorol, α-guaiol, farnesol, δ-cadinol, eudesmol</p> <p>Long chain hydrocarbon octanal, 2,6-dimethyl-5-heptenol</p>	Tai, Ting and Nie. 1964 : Tai, Ting and Nie, 1965 : Essential Oil Research Group. 1975 ; Ding, 1994

Table 1 (continued)

Plant part	Chemical constituents	References
Root bark	<p>Phenylpropanoid <i>(E)</i>-methyl cinnamate <i>Cinnamomum porrectum</i> Kosterm</p> <p>Sesquiterpene α-cubebene, α-copaene, β-elemene. α-gurjunene, α-humulene, <i>allo</i>- aromadendrene, germacrene D. β- selinene, valencene, α-muurolene, β- bisabolene, (γ, δ)-cadinene, calamenene</p> <p>Oxygenated sesquiterpene aromadendrene epoxide, epiglobulol. spathulenol, caryophyllene oxide, globulol, viridiflorol, (α, δ)-cadinol. guaiazulene</p> <p>Long chain hydrocarbon tetradecanal</p> <p>Benzenoid benzaldehyde, benzyl benzoate</p>	Center for Education, 1995
Wood	<p>Phenylpropanoid safrole, elemicin <i>Cinnamomum porrectum</i> Kosterm</p> <p>Sesquiterpene α-cubebene, calamenene</p> <p>Oxygenated sesquiterpene (δ, α)-cadinol, cadalene</p> <p>Benzenoid benzaldehyde, piperonal, 2,4- dimethyl benzoic acid, 2,3-dimethyl</p>	Yacob, Zakaria and Ramli, 1990

Table 1 (continued)

Plant part	Chemical constituents	References
Aerial part	benzoic acid, benzyl benzoate	Nath, Hazarida and Buruan, 1996
	Long chain hydrocarbon	
	tetradecanal	
	Phenylpropanoid	
Fruits	safrole, methyl eugenol, elemicin	Gogoi, Baruah and Nath, 1997
	<i>Litsea cubeba</i> Pers.	
	Oxygenated monoterpene	
	1,8-cineole, linalool, citronellal, isopulegol, citronellol, neral, geraniol	
Leaves	Long chain hydrocarbon	Guenther, 1972 ; Council of Scientific and Industrial Research, 1962 ; Akgul <i>et al.</i> , 1989 ; Duke, 1992 ; Muller-Riebau <i>et al.</i> , 1995
	methyl-heptenone	
	<i>Litsea cubeba</i> Pers.	
	Monoterpene	
Leaves	limonene	Guenther, 1972 ; Council of Scientific and Industrial Research, 1962 ; Akgul <i>et al.</i> , 1989 ; Duke, 1992 ; Muller-Riebau <i>et al.</i> , 1995
	Oxygenated monoterpene	
	linalool, neral, geraniol	
	<i>Laurus nobilis</i> L.	
Leaves	Hemiterpenoid	Guenther, 1972 ; Council of Scientific and Industrial Research, 1962 ; Akgul <i>et al.</i> , 1989 ; Duke, 1992 ; Muller-Riebau <i>et al.</i> , 1995
	2-methyl-butanal, 3-methylbutanal, 3-methyl-butanol	
	Monoterpene	
	camphene, δ -3-carene, <i>p</i> -cymene, limonene, phellandral, α -thujene, (α , β)-phellandrene, (α , β)-pinene, sabinene, (<i>cis,trans</i>)-sabinene hydrate, (α , γ)-terpinene, terpinolene,	
Leaves	Oxygenated monoterpene	Guenther, 1972 ; Council of Scientific and Industrial Research, 1962 ; Akgul <i>et al.</i> , 1989 ; Duke, 1992 ; Muller-Riebau <i>et al.</i> , 1995
	borneol, bornyl acetate, camphor,	

Table 1 (continued)

Plant part	Chemical constituents	References
	<p>trans-carveol, carvone, <i>1,8</i>-cineole, cineole, dehydro-<i>1,8</i>-cineole, geraniol, geranyl acetate, linalool, terpinen-4-ol, α-terpineol, α-terpinyl acetate, α-terpinyl formate, thuj-2-en-4-ol.</p> <p>Sesquiterpene</p> <p>α-amorphene, <i>allo</i>-aromadendrene, artemorin, bicyclodermacrene, bicyclosesquiphellandrene, <i>cis</i>-α-bisabolene, β-bisabolene, cubebene, calamenene, α-bourbonene, (α, γ, δ)-cardinene, cadi-3,5-diene, cadi-1(6),5-diene, caryophyllene, ledene, β-caryophyllene, α-copaene, (α, β)-cubebene, cyclosativene, myrcene, 1-epibicyclosesquiphellandrene, β-eudesmol, α-guaiene, α-gurjunene, laurenobiolide, (α, γ)-muurolene, myrtenol, myrtenal, neryl acetate, (<i>cis,trans</i>)-ocimene, neral, nerol, santamarine, (α, β)-selinene, reynosin, tulipinolide, verlotrin, α-ylangene, (β, γ)-elemene</p> <p>Oxygenated sesquiterpene</p> <p>caryophyllene oxide, perillyl alcohol, viridiflorol</p> <p>Phenylpropanoid</p> <p>eugenol acetate, acetoeugenol, elimicin, cinnamyl acetate, cuminyl</p>	

Table 1 (continued)

Plant part	Chemical constituents	References
	<p>alcohol, eugenol eugenyl acetate, methyl cinnamate, methyl eugenol, trans-methyl eugenol</p> <p>Aliphatic alcohol</p> <p>acetone, δ-acetoxy-carvotanacetone, benzaldehyde, butanol, butanal, hexanol, hexanal, <i>cis</i>-3-hexanol, <i>trans</i>-2-hexanal, <i>cis</i>-3-hexenol, kaempferol, <i>cis</i>-<i>p</i>-menth-2-en-1-ol, <i>cis</i>-<i>p</i>-mentha-2,8-dien-1-ol, methyl heptenone, 2-methylpropanol, pentanol, pentanal, 1-penten-3-ol, methanol.</p> <p>Long chain hydrocarbon</p> <p>ethyl-pentanoate, methylpropionate, 2-methylpropyl acetate, tridecane, 2-methylpropyl-2-methylpropionate, pentyl acetate, tetradecane, toluene, hexadecane</p>	