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CHEMICAL COMPONENTS IN VOLATILE OIL FROM *BLUMEA BALSAMIFERA* (L.) DC.

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Abstract

GC-MS analysis of essential oil of *Blumea balsamifera* (L.) DC. leaf revealed the presence of 50 components, contributing to 99.07% of the oil. The dominant components in the oil from leaves were borneol (33.22%), caryophyllene (8.24%), ledol (7.12%), tetracyclo[6,3,2,0,(2.5).0(1,8) tridecan-9-ol, 4,4-dimethyl (5.18%), phytol(4.63%), caryophyllene oxide(4.07%), guaiol (3.44%), thujopsene-13 (4.42%), dimethoxy-durene (3.59%) and γ-eudesmol (3.18%).

Blumea balsamifera (L.) DC. (Syn. *Conyza balsamifera* L.) locally known as Kukur Sunga belongs to the family Asteraceae. It is a remarkable medicinal plant that grows wild in India to Southern China and throughout Southeast Asia (Perry 1980). The leaves are applied to the forehead to relieve headache. An infusion is used as a bath for women in childbirth. The decoction of the leaves and roots are used against fever and stomach pain (Ahmad and Ismail 2003). In Philippines, the plant is used as diuretic in hypertension and for dissolution of kidney stones. (Santos 1981). In our continued efforts at identifying medicinal plants with analgesic and antipyretic property and establishing scientific evidence in support of their activity, the acclaimed potency of the leaves of *B. balsamifera* against pain and fever stimulated our interest to screen the leaves extract of the plant. It's leaves also reported to have antifungal, antibacterial, antifebrile and anodyne properties (Ragasa *et al*. 2005, Asolkar *et al.* 1992). The leaves also prescribed in the treatment of coryza, fever, influenza, cough and dyspepsia (Amornchai *et al*. 1997a,b). Aqueous extract is used in food/drinks; as a perfume/incense; as a source of tannin (Perry 1980). *B. balsamifera* is high in essential oils, and contains significant amounts of camphor oil. The leaves of *B. balsamifera* are also used as a tea in the Philippines, and as a cure for colds. The essential oil from the leaves contains L-borneol, D-camphor and cineol (Amornchai *et al*. 1997a,b). Leaves contain 2 quercetin derives (Asolkar *et al*. 1992). Nijsiri *et al*. (1985) reported, cryptomeridiol from *B. balsamifera.* Essential oil contains levorotatory borneol, cineole, limonene, and palmitic and myristic acids; sesquiterpene alcohol, dimethyl ether; pyrocatechic tannin; glycoside and levorotatory camphor (Perry 1980). GC-mass spectral analysis of volatile oil determined the presence of sequiterpenoidal compounds (Morallo-Rejesus *et al.* 1990). *B. balsamifera* is a rare species distributed in hilly regions of moist evergreen forests in Bangladesh and has not been previously investigated. Hence, the chemical composition of oils from leaves of *B. balsamifera* are investigated.

Fresh leaves of *Blumea balsamifera* were collected from the plants grown in the campus of BCSIR Laboratories, Chittagong during October, 2008. One-voucher specimen (Y-307) was deposited in the herbarium of BCSIR Laboratories, Chittagong.

The fresh leaves of *Blumea balsamifera* were cut into small pieces and subjected to hydro-distillation method using Clevenger's apparatus for 4 hrs. The oil was extracted with diethyl ether and dried over anhydrous sodium sulfate prior to analysis. The oil yield from leaves was 0.40%.

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The essential oil from leaf of *Blumea balsamifera* was analyzed by GC-MS electron impact ionization method on GC-17A gas chromatograph (Shimadzu) coupled to a GC-MS QP 5050A Mass Spectrometer (Shimadzu); fused silica capillary column (30 m × 0. 25 mm; 0.25 μm film thickness), coated with DB-5 (J&W); column temperature 100° C (2 min) to 250° C at the rate of 3° C/min; carrier gas, helium at constant pressure of 90 Kpa. Acquisition parameters full scan; scan range 40 - 350 amu. The essential oil constituents were identified by comparing the mass spectra from NIST Library (NIST- 147 & NIST- 27).

Compound identification was done by comparing the NIST library data of the peaks with those reported in literature, mass spectra of the peaks with literature data. Percentage composition was computed from GC peak areas on DB-5 ms column. Identified chemical constituents of the oils are given in Table 1.

Table 1. Chemical constituents of leaves of *Blumea balsamifera*.

Sl. No.	Name of chemical constituents	%	Sl. No.	Name of chemical constituents	%
1	α-pinene	0.48	26	Aromadendrene	2.91
2	Camphene	0.47	27	Patchoulene	0.11
3	β-pinene	1.16	28	α-Selinene	0.32
4	1-octen-3-ol	0.71	29	γ--Muurolene	0.31
5	β-myrcene	0.06	30	δ-Cadinene	0.26
6	6-undecanol	0.11	31	Epicedrol	0.49
7	Limonene	0.19	32	Neoclovene, dihydro	0.10
8	(E) ocimene	1.16	33	β-Elemene	1.23
9	Linalool	1.31	34	Geranyl iso-valerate	0.07
10	Camphor	0.11	35	Ledol	7.12
11	Borneol	33.22	36	Germacrene -D-4-ol	0.22
12	Cuminal	0.06	37	Caryophyllene oxide	4.07
13	Perillaldehyde	0.22	38	Guaiol	3.44
14	Neryl acetate	0.40	39	Globulol	1.12
15	Perillol	0.09	40	2(1H)-naphthalene, octahydro-4-5a-methyl-7-(1-methylethyl)	0.61
16	Acetic acid	2.08	41	1,1-Dimethyl adamantane	0.86
17	Thujopsene-13	4.42	42	γ-eudesmol	3.18
18	Aromadendrene, dehydro	0.12	43	Tetracyclo [6,3,2,0,(2.5).0(1,8) tridecan-9-ol, 4,4-dimethyl]	5.18
19	Guaina-3,9-diene	0.75	44	4,4-Demethyladamanlaer-2-ol	1.10
20	℘-selinene	0.18	45	Cycloisolongifolene, 8,9-dehydro	0.16
21	3-Adamantanecarboxylic acid, phenylester	0.28	46	Carotol	0.47
22	Cyclobexene,1-(2-methyl-2-cyclopentenyl)-1-	0.10	47	Aromadendrene oxide	0.17
23	Dimethoxydurene	3.59	48	Adamantane, cyclopropyledene	0.11
24	Caryophyllene	8.24	49	Isopatchoulane	0.13
25	α-Caryophyllene	1.19	50	Phytol	4.63

Fifty components were found in the leaf oil. The main components were borneol (33.22%), caryophyllene (8.24%), ledol (7.12%), tetracyclo [6,3,2,0,(2.5).0(1,8) tridecan-9-ol, 4,4-dimethyl] (5.18%), phytol (4.63%), caryophyllene oxide (4.07%), guaiol (3.44%), thujopsene-13 (4.42%),

dimethoxydurene (3.59%) and γ-eudesmol (3.18%). It is revealted that the leaf oils are a complex mixture of numerous compounds, many of which were present in trace amounts. It is worth mentioning here that there is great variation in the chemical composition of the leaf of *B. balsamifera* oils. This is the first report of *B. balsamifera* leaf oil in Bangladesh. Thus, our data suggested that the oils offered new possibilities for the isolation of natural borneol and caryophyllene. The borneol source *B. balsamifera* is also an important herb of Ayurvedic medicine. In the Indian Materia Medica (Nadkarni 1976) it is described as containing a volatile oil with the odor of wormwood (the common name applied to several *Artemisia* species). They may give valuable information for chemotaxonomic studies on *Blumea* species and their relationships in the family Asteraceae.

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