

## Short Communication

## Chemical composition of essential oil from the leaves of *Premna coriacea* Clarke

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**In this study, the chemical composition of the essential oil of *Premna coriacea* leaves was investigated. Extraction by hydrodistillation followed by gas chromatography and mass spectrometry (GC-MS) yielded 27 compounds representing 99.89% of the oil. The major volatile components of the oil were aromadendrene (23.51), caryophyllene (19.27), tetracontane (11.90), 17-pentatriacontene (6.61), 3',8,8'-trimethoxy-3-piperidyl-2,2'-binaphthalene-1,1',4,4'-tetrone (4.68), cis- $\alpha$ -bisabolene (4.65), octadecane, 3-ethyl-5-(2-ethylbutyl)- (4.21), 2-mercaptobenzothiazole (3.17) and tetratetracontane (2.38).**

**Key words:** *Premna coriacea*, essential oil, aromadendrene, caryophyllene.

### INTRODUCTION

The genus *Premna* L., belonging to the family Verbenaceae consists of 200 species distributed in the tropical and subtropical regions of Asia, Africa, Australia and the Pacific islands (Kadereit, 2004). In India, 31 species and six varieties have been recognized in *Premna* (Rajendran and Daniel, 2002). *Premna coriacea* Clarke is a large, woody climbing shrub with lenticellate branches and is endemic to Western Peninsular India (Ramaswamy et al., 2001). All *Premna* species are used as ayurvedic drug Agnimantha (Keshava Murthy and Yoganarasimhan, 1990). Plants that belong to *Premna* genus are known to have medicinal uses like carminative, diuretic, spasmolytic, hypoglycemic, stomach disorders, oedema, constipation, piles, cardiac diseases, expectorant, depaorative (Keshava Murthy and Yoganarasimhan, 1990; Khare, 2007; Prajapati et al., 2003). Plant parts of *P. coriacea* are also used as substitute for ayurvedic drug 'Agnimantha' (Yoganarasimhan, 1996). *P. coriacea* is used medicinally for its laxative, stomachic, cardiac and tonic activities (Yoganarasimhan, 1996). Literature survey has revealed that extensive phytochemical work has been reported in

many *Premna* species. The heartwood of *Premna tomentosa* has showed the presence of apiginin derivatives and leaves containing d and dl limonene, b-caryophyllene, a sesquiterpene hydrocarbon, a diterpene hydrocarbon and sesquiterpene tertiary alcohol (Khare, 2007).

The stem bark of *Premna latifolia* gave iridoid glycosides and geniposic acid (Rao et al., 1981), diterpenes (Rao et al., 1979). Isoprenoids have been isolated from stem bark of *Premna integrifolia* and *P. latifolia* (Rao et al., 1985), sesquiterpenes (Rao et al., 1982), premnalatin furnaoid (Rao et al., 1980), glycoside-A, glycoside-B (Rao and Subba Raju, 1981) and primarenes (Rao et al., 1982).

### MATERIALS AND METHODS

#### Plant materials

Leaves of *P. coriacea* were collected from Sakaleshpur, Hassan district, Karnataka, India, during the flowering period in March 2008. The plants were identified and authenticated by comparison with

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**Table 1.** Chemical composition of essential oil of *P. coriacea*.

S/N	Name of the compound	Composition (%)	Retention index	RI
1	Bicyclo[3.1.1]hept-2-ene, 2,6,6-trimethyl-, ( $\bar{n}$ )-	1.80	7.76	943
2	1-octen-3-ol	0.57	9.11	969
3	1,6-Octadien-3-ol, 3,7-dimethyl-, 2-aminobenzoate	0.49	13.17	2157
4	Copaene	0.68	22.62	1221
5	Caryophyllene	19.27	23.69	1494
6	Aromadendrene	23.51	24.13	1386
7	$\alpha$ -caryophyllene	3.95	24.81	1579
8	Cis- $\alpha$ -bisabolene	4.65	25.14	1518
9	1,6-cyclododecadiene, 1-methyl-5-methylene-8-(1-methylethyl)-, [s- (E,E)]-	0.60	25.71	1515
10	$\alpha$ -cubebene	0.71	25.96	1339
11	$\zeta$ -Elemene	0.81	26.21	1465
12	$\alpha$ -farnesene	0.96	26.52	1458
13	Caryophyllene oxide	1.32	28.93	1507
14	Ledene oxide-(ii)	1.06	29.06	1293
15	Cyclopentadecanol	0.53	32.51	1987
16	2,5-octadecadiynoic acid, methyl ester	0.84	33.32	2112
17	Z,Z,Z-4,6,9-nonadecatriene	0.34	37.20	1934
18	2-mercaptobenzothiazole	3.17	39.13	1501
19	Heptadecane, 9-hexyl-	0.61	39.71	2243
20	Hepatodecane 9-hexyl	1.12	42.04	
21	Phytol	1.42	42.43	
22	2-octadecodyethanol	1.70	44.27	2328
23	Tetratetracontane	2.38	46.42	4395
24	Octadecane, 3-ethyl-5-(2-ethylbutyl)-	4.21	48.49	2413
25	17-pentatriacontene	6.61	50.49	3508
26	3',8,8'-trimethoxy-3-piperidyl-2,2'- binaphthalene-1,1',4,4'-tetrone	4.68	51.59	4187
27	Tetracontane	11.90	58.96	4395

with Herbarium specimens. Voucher specimen (PS 25/20-3-2008) has been deposited in the Department of Bioscience, P. G. Centre, Hassan Karnataka, India.

#### Isolation of the essential oil

Freshly harvested samples of leaves were hydrodistilled for 6 h using a Clevenger type apparatus to obtain the essential oils. The oils were stored at 0°C in air-tight containers after drying over anhydrous sodium sulphate for GC-MS analysis.

#### Gas chromatography–mass spectrometry (GC-MS)

Gas chromatography-mass spectrometry (GC-MS) analysis was carried out in an Agilent gas chromatography N6890 fitted with a HP-5MS fused silica column (5% phenyl methyl polysiloxane 30 m x 0.25 mm, film thickness 0.25  $\mu$ m), interfaced with an Agilent 5975C VLMSD with triple axis mass detector. Oven temperature program was 60 to 230°C at 5°C min<sup>-1</sup>. Injector temperature was kept at 280°C. Helium was used as a carrier gas and was adjusted to column velocity flow of 1.0 ml/min<sup>-1</sup>. Split ratio was 1:10, whereas split flow of 10 ml/min<sup>-1</sup> mass range was 50 to 500. 1  $\mu$ l of sample (dissolved in hexane 100% v/v) was injected into the system. Identification of oil components was achieved based on their retention indices, and by comparison of their mass spectral

fragmentation patterns with those reported in the literature and stored on the MS library [NIST database (G1036A, revision D.01.00) /Chem station data system (D.02.00.275, version 2.0d)].

## RESULTS

The yield of essential oils from fresh leaves of *P. coriacea* was 0.082%. The qualitative and quantitative composition of the oil, analyzed by GC-MS is presented in Table 1. In total, 27 compounds were identified, representing 99.89% in the oil. The major volatile components of the oil were aromadendrene (23.51%), caryophyllene (19.27%), tetracontane (11.90%), 17-pentatriacontene (6.61%), 3',8,8'-trimethoxy-3-piperidyl-2,2'- binaphthalene-1,1',4,4'-tetrone (4.68%), cis- $\alpha$ -bisabolene (4.65%), octadecane, 3-ethyl-5-(2-ethylbutyl)- (4.21%),  $\alpha$ -caryophyllene(3.95%), 2-mercaptobenzothiazole (3.17) and tetratetracontane (2.38%). The minor compounds were bicyclo[3.1.1]hept-2-ene, 2,6,6-trimethyl-, ( $\pm$ )- (1.80%), 2-octadecodyethanol (1.70%), phytol (1.40%), caryophyllene oxide (1.32%), Hepatodecane9-hexyl (1.12%), ledene oxide-(II) (1.03%),  $\alpha$ -farnesene (0.96%),

2,5-octadecadiynoic acid, methyl ester (0.84),  $\alpha$ -elemene (0.81%),  $\beta$ -cubebene (0.71%), copaene (0.68%), 1,6-cyclodecadiene, 1-methyl-5-methylene- (0.60%), 1,9-n-heptadecane (0.61%), 1-octen-3-ol(0.57%), cyclopentadecanol (0.53%), 1,6-octadien-3-ol, 3,7-dimethyl-, 2-aminobenzoate (0.49%) and Z,Z,Z-4,6,9-nonadecatriene (0.34%). The results indicate that the chemical composition of the leaf oil of *P. coriacea* was different from the essential oil composition of other *Premna* spp., like *P. tomentosa* and *Premna barbata* (Lakshminarayen and Muthana, 1953; Chanotiya et al., 2009).

The major constituents reported from other *Premna* species are D-, DL-limonene and 1-octen-3-ol (Lakshminarayen and Muthana, 1953; Chanotiya et al., 2009). The present work revealed that armodendrene could be a good chemical marker of *P. coriacea*, since it has not been reported in other species. Mulyaningsih et al. (2010) showed that Aromadendrene had antibacterial activity against growth of *Staphylococcus saprophyticus*. The sesquiterpene aromadendrene bears a reactive exocyclic methylene group and a cyclopropane ring which can alkylate proteins and thereby disturb the conformation of protein. Additionally, since the compound is highly lipophilic, it causes disruption of cellular biomembranes (Sikkema et al., 1994, Wink, 2007, 2008). The second major compound of caryophyllene is a natural bicyclic sesquiterpene with a strongly spicy and woody odour that is responsible for the distinctive flavour of black pepper and clove oil; the oil from the stems and flowers of *Syzygium aromaticum*. Beta-caryophyllene was shown to selectively bind to the cannabinoid receptor type-2 (CB<sub>2</sub>) and to exert significant cannabimimetic anti-inflammatory effects in mice (Ghelardini et al., 2001).

In conclusion, the study of the essential oil of leaves of *P. coriacea* showed the presence of aromadendrene, caryophyllene and phytol. Further research can be performed to determine methods of effectively administering extracts of *P. coriacea* for medicinal use.

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