NOTE

Chemical Composition of Essential Oil of *Bauhinia acuminata* Leaves

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(Received: 19 December 2011;

Accepted: 26 October 2012)

AJC-12345

Essential oil isolated by hydrodistillation of the fresh leaves of *Bauhinia acuminata* was analyzed by GC-MS. Nineteen compounds comprising 89.9 % of the leaf oil were identified. The leaf oil was characterized by absence of monoterpenoids. Phytol (65.90 %) was identified as major constituent in *B. acuminata* leaf oil. Sesquiterpenoids, β -caryophyllene (13.87 %) and caryophyllene oxide (3.15 %), were the other major constituents.

Key Words: *Bauhinia acuminata*, Essential oil, GC-MS, Phytol, β -Caryophyllene.

Genus *Bauhinia* belonging to the family Caesalpiniaceae consists of over 250 species of trees and shrubs¹. They are distributed in various geographic locations in tropical climates. Plants in genus *Bauhinia* have characteristic butterfly shaped leaves. Most *Bauhinia* spp. have applications in traditional medicines. *Bauhinia microstachya* is used for diabetics in herbal medicine. *B. reticulata* and *B. refescens* are used for treatment round worm, conjunctivitis, anthrax, dysentery, blood-poisoning, leprosy and lung diseases^{2,3}. *B. variegata* is used for skin diseases and ulcerations in Africa. *B. variegata* bark extracts are used for treatment of cancer in India⁴. *Bauhinia acuminata* is an ornamental tree with white flowers bearing tropical shade and it is distributed throughout India in warm climates. Previous studies showed juvenomimetic activity of *B. acuminata* against *Dysdercus cingulatus*⁵. Its bark is used for the treatment of leucorrhoea and shyphilis⁶. Further, *B. acuminata* crude extract showed hemolytic activity against human erythrocytes in a dose-dependent manner⁷. GC-MS analysis of the essential oil obtained from *B. acuminata* leaves is reported in the present study.

Fresh leaves of *B. acuminata* were collected from Thiruvananthapuram, Kerala and the specimen was identified by Dr. Mathew Dan, Tropical Botanic Garden and Research Institute, Pacha-Palode, Thiruvananthapuram.

Extraction of essential oil: Fresh leaves (650 g) were subjected to hydrodistillation for 6 h using a Clevenger-type apparatus. Pungent smelling, light greenish yellow coloured essential oil (0.05 mL, 0.008 %, v/w) was obtained. The oil

was dried over anhydrous sodium sulphate and kept at 4 °C until analyzed.

GC-MS analysis: The essential oil of *Bauhinia acuminata* leaves was subjected to GC-MS analysis by splitless injection of 1.0 μ L of the oil on a Hewlett Packard 6890 gas chromatograph fitted with a cross-linked 5 % PH ME siloxane HP-5 MS capillary column (30 m $\times$ 0.32 mm, 0.25 μ m coating thickness) coupled with a model 5973 mass detector. GC-MS operation conditions: injector temperature 220 °C; transfer line 240 °C; oven temperature programme 60-246 °C (3 °C/min); carrier gas helium, 1.4 mL/min; detector temperature 250 °C. Mass spectra: Electron impact (EI⁺) mode 70 eV with a mass range of 40-450 m/z, ion source temperature 250 °C. Linear retention indices (LRI) of constituents were determined using *n*-alkanes as standards⁸. Individual components were identified by Wiley 275.L database matching, comparison of retention times and comparison of mass spectra of constituents with published data (Table-1).

GC-MS analysis resulted in identification of 19 compounds comprising 89.9 % of *B. acuminata* leaf oil. Phytol (65.90 %) was the major constituent in the leaf oil. Phytol (3,7,11,15-tetramethyl-2-hexadecen-1-ol) is a diterpene alcohol. It is used as a precursor for the manufacture of vitamins E and K^{9,10}. Phytol in esterified form is commonly found in green vegetables as the side chain of chlorophyll molecule. Phytanic acid (3,7,11,15-tetramethyl hexadecanoic acid) is an acid derivative of phytol and human obtain it through the consumption of dietary sources. Free phytol, when administered orally, is

TABLE-1
CHEMICAL COMPOSITION OF THE
LEAF OIL OF *Bauhinia acuminata*

RT	Compound	LRI _{cal}	%
21.54	β-Caryophyllene	1422	13.87
22.64	α-Humulene	1449	1.76
22.89	Isomethyl-α-ionone	1455	0.17
23.94	β-Ionone	1482	0.10
24.87	α-Farnesene	1506	0.10
27.13	1,6,10-Dodecatrien-3-ol	1566	0.26
27.32	3-Hexen-1-ol	1571	0.24
27.68	Caryophyllene oxide	1580	3.15
28.53	Humulene epoxide (II)	1502	0.35
29.40	Caryophylla-4(12),8(13)-dien-5α-ol	1626	0.22
29.61	Caryophylla-4(12),8(13)-dien-5β-ol	1631	1.00
29.77	α-Murolol	1636	0.32
30.25	α-Cadinol	1648	0.40
30.35	Isoaromadendrene epoxide	1651	0.11
32.80	Farnesol	1717	0.24
35.24	1-Octadecene	1788	0.26
46.33	Phytol	2143	65.90
46.93	Sclareolide	2163	0.24
55.91	Octacosane	2496	0.21

readily absorbed and converted to phytanic acid in rats and humans¹¹. Sumac flea beetle *Blepharida rhois* was reported to use phytol synthesized by its host plant as a deterrent against predation¹².

Sesquiterpenes and their oxygenated derivatives constituted the second major class of compounds in *B. acuminata* leaf oil. β-Caryophyllene (13.87 %), caryophyllene oxide (3.15 %) and α-caryophyllene (1.76 %) were the major sesquiterpene components. β-Caryophyllene is a natural bicyclic sesquiterpene with a rare cyclobutene ring. It is usually found in nature as a mixture with α-humulene (α-caryophyllene) and isocaryophyllene. It is used in spice blends, citrus flavors, soaps, detergents, creams and lotions and also in a variety of food products and beverages^{13,14}. β-Caryophyllene is known for its antiinflammatory and local anesthetic activities^{15,16}. β-Caryophyllene is also responsible for the spiciness of black pepper¹⁷.

Previous studies identified the major constituents in volatile oils of *Bauhinia* species as, β-elemene (56.9 %), lepidozenol (22.3 %), β-bourbonene (12.4 %) (*B. aculeata*); spathulenol (15.9 %), γ-elemene (11.8 %) (*B. brevipes*); α-copaene (28.8 %), β-caryophyllene (18.5 %), bicyclogermacrene (14.0 %), α-humulene (11.8 %) (*B. foficata*); spathulenol (27.0 %), β-caryophyllene (17.4 %),

bicyclogermacrene (12.3 %), isospathulenol (10.8 %) (*B. longifolia*); β-caryophyllene (46.6 %), α-elemene (22.6 %), spathulenol (14.1 %) (*B. rufa*) and germacrene D (24.7%), γ-elemene (18.7 %), spathulenol (13.3 %) (*B. variegata*)¹⁸. Essential oil of *B. acuminata* with phytol and caryophyllenes as its major constituents has a unique chemical profile compared to previously reported *Bauhinia* species.

ACKNOWLEDGEMENTS

The authors thank the Head of the Department, Department of Chemistry and The Principal, Mar Ivanios College Thiruvananthapuram for providing laboratory facilities. The authors also acknowledged to Textile Committee, Kannur for GC-MS analysis.

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