J. Subtrop. Agric. Res. Dev. 6(5): 603-605, December 2008, website: www.gscience.net

COMPOSITION OF THE LEAF OILS OF *Clausena heptaphylla* AND *Clausena suffruticosa**

J. U. CHOWDHURY[2] , J. BEGUM, M. N. I. BHUIYAN[2], F. A. LUCKY[3] and M. N. H. BHUIYAN[1*]

Leaf oils obtained from *Clausena heptaphylla* and *Clausena suffruticosa*, were analyzed by GC-MS. Thirty six terpene components were identified in the *Clausena heptaphylla* oil. The main components were 3-carene (64.33%), α-phellandrene (5.74%) and l-4-terpineol (5.15%). Twenty two terpene components were identified in *Clausena suffruticosa* oil with the main components being esdragole (58.23%), anethole (33.20%), linalol (3.38%) and β-ocimene (1.40%).

Clausena heptaphylla (Roxb.) Wight & Arn. (Bengali name-"Karanphal") is a shrub and *C. suffruticosa* Wight & Arn. (Bengali name-"Kalomorichal") is an under shrub. Both the plants distributed in south and Southeast Asia and belong to the family Rutaceae (Guillaumin, 1911; Hooker, 1875). The plants of this genus are known to be useful in paralysis, ulcerated nose, colic, stomach trouble, fever and headache, muscular pain, malarial fever (Thuy *et al.,* 1999; Yusuf *et al.,* 1994). They are also reputed as diuretic, astringent, insecticide, tonic and vermifuge (Perry, 1980). The leaves of the plants possess antimicrobial properties (Sohrab *et al.,* 2001; Begum *et al.,* 2006). Previous phytochemical studies on *Clausena* led to the isolation of carbazole alkaloids (Thuy *et al.,* 1999), clausmarin (Sohrab, 2000), lunamarin C (Sohrab 2002), coumarins (Huang *et al.,* 1997) and limonoids (Ngadjui *et al.,* 1989). A new carbazole alkaloid, named clausenal, was isolated from the leaves of *C. heptaphylla* and identified as 1, 8-dimethoxy-3-formylcarbazole from physical, chemical and synthetic evidences. The alkaloid was round to be active against both Gram-positive and Gram-negative bacteria, and fung (Chakraborty *et al*., 1995). In this paper, we report the results obtained by GC-MS on *C. heptaphylla* and *C. suffruticosa* leaf oils. This is the first report of the components of the leaf oils of *C. heptaphylla* and *C. suffruticosa.*

Fresh leaves of C. *heptaphylla* and *C. suffruticosa* were collected from the plants grown in the campus of BCSIR Laboratory, Chittagong during June 2007. Two-voucher specimens (Y-1006 and Y-1007) were deposited in the herbarium of BCSIR Laboratory, Chittagong, Bangladesh. The sundried leaves of *C. heptaphylla* and *C. suffruticosa* were cut into small pieces, and subjected to hydrodistillation method using Clevenger's apparatus for 4 hrs. The oil was extracted with diethyl ether and dried over anhydrous sodium sulfate.

GC-MS analysis: The essential oils from leaf of C. heptaphylla and C. suffruticosa were analyzed by GC-MS electron impact ionization (EI) method on GC-17A gas chromatograph (Shimadzu) coupled to a GC-MS QP 5050A Mass Spectrometer (Shimadzu); fused silica capillary column (30m x 2.5mm; 0.25 μm film thickness), coated with DB-1 (J&W); column temperature 100^{o}C (2 min) to 250^{o}C at the rate of 3^{o}C/min; carrier gas, helium at constant pressure of 90Kpa. Acquisition parameters full scan; scan range 40-350 amu. Comparing with the NIST library data identified the compounds.

The leaves of *Clausena heptaphylla* and *C. suffruticosa* native to Bangladesh yielded 0.2% and 0.25% (Volume/fresh wt.) of essential oils respectively. Table 1 showed the relative percentage of components for the *C. heptaphylla* oil. 36 components were identified that represented about 99.27% of the total oil. The main components were 3-carene (64.33%), followed by α-phellandrene (5.74%) and l-4-terpineol (5.15%). Other notable compounds are γ-elemene (1.08%), β-pinene (3.39%), α-pinene (3.45%), α-terpinene (1.07%), caryophyllene (1.18%), germacrene D (1.75%), isothujol (1.29%), m-cymene (2.29%) and terpinene (2.12%).

[1]Institute of Food Science and Technology (IFST), BCSIR, Dhaka, E-mail: nhbmb@yahoo.com, [2]BCSIR Laboratories, P.O. Chittagong Cantonment, Chittagong-4220, [3]Department of Biochemistry and Molecular Biology, University of Dhaka, Dhaka 1000, Bangladesh. *** Short communication.**

Table 1. Constituents of the leaf essential oil from *C. heptaphylla*.

Name of compounds	Percent content
α-Bourbonene	0.04
δ-Cadinene	0.06
α-Caryophyllene	0.20
δ-Elemene	0.07
γ-Elemene	1.08
α-Farnesene	0.58
α-Guaiene	0.11
α-Phellandrene	5.74
β-Pinene	3.39
α-Pinene	3.45
α-Terpinene	1.07
α-Thujene	0.54
2-Carene	0.73
3-Carene	64.33
4-Vinylguaiacol	0.23
Camphene	0.15
Caryophyllene	1.18
Caryophyllene oxide	0.37
Cis-Piperitol	0.11
Crypton	0.19
Dimethoxydurene	0.07
Estragole	0.16
Germacrene D	1.75
Isothujol	1.29
L-4-Terpineol	5.15
Lanceol,cis	0.10
m-Cymene	2.29
Menthol	0.13
Methyl-2, 5-Octadceadiyonate	0.13
Nerolidyl acetate	0.13
Pseudolimonene	0.24
Spathulenol	0.66
Tau-Cadinol	0.15
Terpinene	2.12
Tumerone	0.64
Z-Ocimene	0.77

Table 2 showed the presence of 22 components that represented 99.46% of the total oil of *C. suffruticosa* leaf. The main components were esdragole (58.23%), followed by anethole (33.20%), linalol (3.38%) and β-ocimene (1.40%). These results showed that the oils were complex mixture of numerous compounds; many of which were terpenes in nature and presented in trace amounts. It has been observed that there is great variation in the chemical composition of *C. heptaphylla* and *C. suffruticosa* 3-carene (64.33%) was the main component in *C. heptaphylla* but totally absent in *C. suffruticosa*.

Table 2. Constituents of the leaf essential oil from *C. suffruticosa*.

Name of the components	Percent content
α-Pinene	0.19
Sabinene	0.03
β-Myrcene	0.03
4-Hexen-1-ol, acetate	0.02
Limonene	0.02
β-Ocimene	1.40
1-Methylhexyl acetate	0.03
Linalol	3.38
2-Dodecen-4-yne, (E)-	0.02
Esdragole	58.23
Linalyl acetate	0.06
Anethole	33.20
γ-Amylbutyrolactone	0.38
Eugenol	0.69
Caryophyllene	0.87
α-Caryophyllene	0.10
Isohomogenol	0.08
γ-Elemene	0.30
.+/-.-trans-Nerolidol	0.13
δ-Undecalactone	0.17
tau.-Cadinol	0.07
Cubenol	0.05

On the basis of above results it may be suggested that *C. heptaphylla* and *C. subtaphylla,* growing widely in Bangladesh, can be utilized as a source for the isolation of natural 3-carene and esdragole respectively. This is the first report of this kind of analysis on the leaf oils of *C. heptaphylla* and *C. subtaphylla.*

REFERENCES

Begum, R., M. S. Rahman, M. R. Haque, A. M. S. Chowdhury, M. A. .Rashid. 2006. Antimicrobial Activity and Cytotoxicity of *Clausena suffruticosa*. Dhaka Univ. J. Pharm. Sci. 5, 81-83.

Chakraborty, A., C. Saha, G. Podder. B. K. Chowdhury and P. Bhattacharyya. 1995. Carbazole alkaloid with antimicrobial activity from *Clausena heptaphylla*. Phytochemistry. 38, 787-789.

Guillaumin, A. 1911. Rutaceae. *In*: Lecomte, H. Flore générale de l'Indo-Chine 1, 629-687.

Hooker, J. D. 1875. *Flora of British India*, Vol. I. Reeve & Co. Ltd, England. P. 506.

Huang S. C., P. L. Wu and T. S. Wu. 1997. Two coumarins from the root bark of the *Clausena excavata*. Phytochemistry. 44, 179-181.

Ngadjui, B. T., J. F. Ayafor and B. L..Sondengam. 1989. Limonoids from *Clausena anisata*. J. Nat. Prods. 52, 832-836.

Perry, L. M. 1980. *Medicinal plants of East and Southeast Asia: attributed properties and uses.* Cambridge: The MIT Press. p. 363.

Sohrab, M. H., C. M. Hasan and M. A. Rashid. 2002. Lunamarin C, a new terpenoid coumarin from *Clausena heptaphylla.* Pharmazie. 57, 573-574.

Sohrab, M. H., C. M. Hasan and M. A. Rashid. 2000. Clausmarin-A from the leaves of *Clausena heptaphylla.* Biochemical Systematics and Ecology. 28, 91-93.

Sohrab, M. H., M. A. Mazid, E. Rahman, C. M. Hasan.and M. A. Rashid. 2001. Antibacterial activity of *Clausena heptaphylla*. Fitoterapia. 72, 547-549.

Thuy, T. T., H. Ripperger, A. Porzel, T. V. Sung and G. Adam. 1999. Counlarins, limonoids and an alkaloid from Clausena excavate. Phytochemistry. 52, 511-516.

Yusuf, M., J. U. Chowdhury, M. A. Wahab and J. Begum. 1994. Medicinal Plants of Bangladesh. 1st edition, Bangladesh Council of Scientific and Industrial Research (BCSIR), Dhaka.