

NOTE**Chemical Composition of the Essential Oil of
Clausena heptaphylla W&A from Assam, India¶**

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The essential oil obtained by hydrodistillation from the leaves of *Clausena heptaphylla* (W&A) from Assam, India was analyzed by GC and GC-MS. 16 Compounds representing 97.8 % of the total oil were identified of which (E)-anethole (92.6 %), (Z)-anethole (1.2 %) and methyl chavicol (1.6 %) were the major components. Eight minor components were unreported so far.

Key Words: *Clausena heptaphylla*, Rutaceae, Volatile oil composition.

Clausena heptaphylla W&A (Rutaceae) commonly exist as bushy shrubs. It grows well in some of the areas of North Eastern India upto an altitude 1330 m¹ where the leaves are known traditionally for chewing with betel leaves and flavouring tobacco². The leaves of the plant possess a strong and pleasant aromatic odour. Recently, a report has been made from U.K. on this species indicating that the predominant component of the essential oil, obtained from its leaves was found to be anethole³. Variations of major component in the leaf essential oil of another *Clausena* species viz., *C. anisata* Hook have been often reported. According to Guenther's classical reference, anethole was listed as a major component in the essential oil of *C. anisata*⁴. The same phenyl propanoid was also reported to be the main component from the leaves of *C. anisata* grown in Java⁵. However, methyl chavicol was recorded as dominant constituent from the similar plant sources in Philippine⁶ and Nigeria⁷. The other species of *Clausena* (*C. dunniana* Levl.) leaves being grown in China contained isoanethole (93.1 %), as major constituent⁸. Methyl chavicol followed by (E)-anethole as major components in the leaf and fruit oil of *C. heptaphylla* growing wild in northeast, India have been reported^{9,10}. There has also been a report on an anethole rich leaf oil of this same species¹¹ of northeastern region of India. Based on these reports, a study was undertaken on indigenous *C. heptaphylla* growing wild in north Eastern part of India. Its major and minor components of the leaf oil have been studied in the light of earlier reports, but to

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the best of our knowledge no detailed GC-MS analysis of *C. heptaphylla* leaf oil from north eastern India has been carried out with respect to the minor components.

GC analysis was performed on Perkin-Elmer AUTOXL gas chromatograph using PE-Wax, fused silica capillary (30 m × 0.32 mm, film thickness 0.25 μ) and FID detector. Oven temperature was programmed from 50 to 230 ° at 5 °C/min; injector temperature 220 °C; detector temperature 250 °C; carrier gas hydrogen with inlet pressure of 6.5 psi.

GC-MS investigation of the oil was performed on Perkin Elmer Turbomass/auto XL system. A PE-wax fused silica capillary column (50 m × 0.3 mm, 0.25 μ film thickness) was employed. GC condition: injection 220 °C, split ratio 1:20, helium carrier flow 1 mL/min and oven temperature 50 to 230 °C @ 5 °/m. MS condition: ion source 250 °C and ionizing voltage 70 eV.

Identification of compounds: Compound identification was made on the basis of their mass spectra, followed by Wiley/NIST Library search and retention time of reference compounds available.

Fresh leaves of *C. heptaphylla* were collected from Assam, India after the proper identification of the plant material. A voucher specimen has been deposited in R & D centre for Medicinal & Aromatic Plants, Assam India.

Isolation of the essential oils: The leaves of *C. heptaphylla* were subjected to hydrodistillation in a conventional Clevenger type apparatus for 4 h and yielded 1.2 % light yellow coloured oil. The oil was dried over anhydrous sodium sulphate and stored at 4 °C until analyzed.

Chromatography of the oil: The essential oil (1 mL) was column chromatographed over 20 g silica gel (60-120 mesh) in order to get fractions enriched in minor components; the following fractions were collected (each fraction 5 mL). Fr. No. 1-6 eluted in hexane and frs. 7-10 eluted in hexane:EtOAc and 10-12 eluted in hexane:EtOAc (9.8:0.2). Minimum anethole was found in the last fraction which was enriched with eight minor constituents unreported so far.

The volatile oil was obtained by conventional hydrodistillation of *C. heptaphylla*, which gave an oil in 1.2 % yield on fresh weight basis. Isolated fractions from column chromatography after GC and GC-MS analysis resulted in the identification of sixteen constituents representing 97.8 % of the oil. The relative concentrations of the volatile components are presented in Table-1 according to their elution order on the PE-Wax column. The major constituents in the oil from the Assam are (E)-anethole (92.6 %), (Z)-anethole (1.2 %), methyl chavicol (1.6 %). On comparing our results with earlier reports on *C. heptaphylla* oils from the northeastern region of India^{3,9-11} it was evident than out of 16 constituents identified by

GC-MS, eight minor constituents were unreported so for *e.g.*, *p*-cymene (0.1 %), β -ocimene (0.2 %), farnesol (0.2 %), sesquiterpene alcohol (0.1 %), dehydro-aromadendrene (0.1 %), eugenol (0.2 %), anisyl ketone (0.3 %), guaiol (trace).

TABLE-1
CHEMICAL COMPOSITION (%) OF THE LEAF OIL OF
Clausena heptaphylla FROM ASSAM, INDIA

Components	Retention time	Percentage (%)
α -Pinene	2.01	0.1
β -Pinene	2.66	0.1
Myrcene	4.86	0.1
β -Ocimene	5.22	0.2
<i>p</i> -Cymene	6.77	0.1
Linalool	13.59	0.2
Methyl chavicol	16.34	1.6
(<i>Z</i>)-Anethole	18.38	1.2
(<i>E</i>)-Anethole	20.17	92.6
Farnesol	23.42	0.2
Anisaldehyde	24.26	0.7
Sesquiterpene alcohol [M ⁺ 222]	26.29	0.1
Dehydro-aromadendrene	26.75	0.1
Eugenol	27.27	0.2
Anisyl ketone	28.18	0.3
Guaiol	28.62	Trace

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