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Original Article

Volatile Oils of *Ocimum* species from South India

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Abstract

The essential oils of *Ocimum santum* and *O. basilicum* were obtained from a Clevenger apparatus distilled for 3hr. Both essential oil of *O. santum* and *O. basilicum* were analyzed by GC and GC-MS. The yield of the essential oil obtained from *Ocimum santum* (1.45% w/w) and *O. bascillum* (0.98% w/w). Methyl eugenol and eugenol were found to be major constituents of both fresh leaves of *O. santum* and *O. basilicum*.
Keywords: Lamiaceae; *Ocimum* species, essential oils, Methyl eugenol, Eugenol,

Introduction

The genus *Ocimum*, a member of the Lamiaceae family, contains 200 species of herbs and shrubs (Simon et al., 1999). They were naturally occurs in tropical and subtropical regions and is considered an important culinary herb and source of aromatic essential oils (Paton and Putievsky,1996). Sweet basil, Ocimum basilicum L., is the major culinary and essential oil source of this genus (Lawrence,1992). The essential oils from Ocimum contain many terpenes (linalool, citral, 1,8-cineole) andphenylpropanoids (e.g. methyl chavicol, eugenol) produced in specialized glandular trichomes (Charles and Simon,1990; Gang *et al*.,2001). It is also a source of aroma compounds and essential oils containing biologically active constituents that possess insecticidal and nematicidal properties (Deshpande and Tipnis, 1997; Chaterje *et al*., 1982). To the best of our knowledge, an investigation of the essential oil of *O. sanctum* and *O. basilicum* leaves of South India has not been reported to date. In the present study, the essential oils were isolated from fresh leaves and the volatiles oil was analyzed by GC/MS method.

Materials and Methods

Plant Materials

The fresh leaves of *Ocimum sanctum* and *Ocimum basilicum* were collected from Tirunelveli and Kanyakumari District, Tamil Nadu, South India. Voucher specimens of *Ocimum sanctum* and *Ocimum basilicum* were deposited at the Department of Biotechnology, Dr.M.G.R. Educational and Research Institute (Dr.M.G.R.University),Chennai- 600075.

Isolation of the Volatile Oils

The fresh leaves of *O. sanctum* and *O. basilicum* were chopped and hydrodistilled for 3h using a Clevenger-type apparatus. The essential oils were collected separately and stored in well capped bottles prior to analysis.

GC-MS Analysis

GC-MS was carried out with a Hewlett-Packard 6890/ Hewlett-Packard 5973 instrument. GC conditions were equipped on fused-silica capillary column 20m×0.25 mm i.d.,0.25µm film thickness). Helium (at 0.5 ml/min) was used as a carrier gas. Samples were injected in the split mode at a ratio of 1:10 - 1:100. The injector was kept at 240 °C and the transfer line at 280 °C. The column was maintained at 50 °C for 2 min and then programmed to 260 °C at 5 °C / min and held for 10 min at 260 °C. The MS was operated in the EI mode at 70 eV, in m/z range 42–350. The identification of the compounds was performed by comparing their retention indices and mass spectra with those reported (Adams, 1995) and supplemented by Wiley and Quadlib 1607 GC-MS libraries.

Results and Discussion

The percentage of essential oil obtained from *Ocimum santum* (1.45%w/w) and *O. basilicum* (0.98%w/w). The gas chromatograms of these three essential oils are given in fig. 1 and fig.2. The essential oils of both plants of *O.santum* and *O. basilicum* obtained from the Clevenger apparatus were found to be rich methyl eugenol and eugenol. As shown in Table 1 and 2, essential oils constituents in the both plant sample from Tirunelveli and coastal region, Kanyakumari, South India were identified by GC-MS method. The essential oil of *Ocimum santum* (L) which was identify as three major

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constituents such as methyl eugenol (37.5%), eugenol (31.3%) and unknown(31.1%). The *O. basilicum* was dominated by methyl eugenol, which accounted for 99.99%. The major constituents of methyl eugenol (66.66%), eugenol (25.53%) were identified.

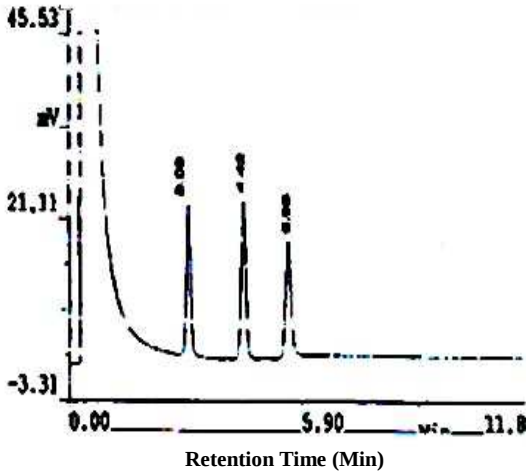


Fig.1: The GC-MS chromatogram of essential oil from the fresh leaf of *Ocimum santum.*

Table- 1: Chemical composition of essential oil from the fresh leaf of *Ocimum santum.*

SL. No	RT	% Area	Constituents	Methods
1	3.03	31.1	Unknown	GC-MS
2	4.42	37.5	Methyl Eugenol	GC-MS
3	5.55	31.3	Eugenol	GC-MS
Total		99.9		

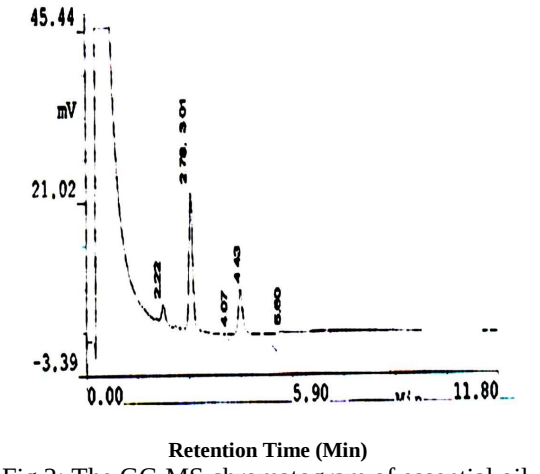
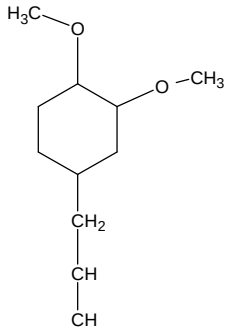


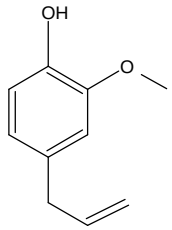
Fig.2: The GC-MS chromatogram of essential oil from the fresh leaf of *Ocimum basilicum*

Table- 2: Chemical composition of essential oil from the fresh leaf of *Ocimum basilicum.*

SL. No	RT	% Area	Constituents	methods
1	2.22	6.8	Unknown	-
2	2.78	0.6	Unknown	-
3	3.01	66.63	Unknown	-
4	4.07	0.087	Methyl eugenol	GC-MS
5	4.43	25.53	Eugenol	GC-MS
6	5.60	0.35	Unknown	-
Total		99.99		



Methyl eugenol



Eugenol

Methyl eugenol has been previously reported as the main constituent of the essential oils from *Ocimum selloi* and *Ocimum basilicum* (Ozcani and Chalchat, 2007; de Paula *et al*., 2007). In contrast, trace amount of methyl eugenol have been reported from the essential oil of *Juniperus angosturana* (Adams *et al*., 2009), and a low content in the essential oil from *Pimenta dioica* berries (Park *et al*.,2007). There is currently concern as to the carcinogenic potential of methyl eugenol.

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