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Essential oils of *Ocimum gratissimum* L. and *Ocimum tenuiflorum* L. (syn. *Ocimum sanctum* L.) grown in Andhra Pradesh

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ABSTRACT

Gas chromatographic analysis of oils of shrubby and sacred basils grown under semi-arid tropical climatic conditions of Andhra Pradesh showed that ***Ocimum gratissimum*** *L. oil contained limonene (1.98%), eugenol (87.68%), β-caryophyllene (1.84%) and β -selinene (2.82%) as the major compounds. β - Bisabolene, γ-eudesmol, T - cadinol and β-eudesmol were identified as new minor compounds in this oil. The sacred basil (****Ocimum sanctum****) turned out to be a methyl eugenol chemotype. Eugenol (1.50%), methyl eugenol (72.41%), β-elemene (2.48%), isoeugenol (6.31%) and β - caryophyllene (12.00%) as the major compounds. Isoeugenol, α -guaiene(0.68%) and eugenol acetate (0.09%) were the new constituents identified.*

INTRODUCTION

Shrubby basil (***Ocimum gratissimum*** L. 2n = 40) is traded for its eugenol rich oil and grows wild in different parts of India. The chemotypes having eugenol, have been reported from India, Taiwan, erstwhile USSR, some North African countries including Egypt and Morocco. (Khosla *et al.*, 1985; Kurien *et al.*, 1984; Maheshwari *et al.*, 1988; Sobti *et al.*, 1980). Similarly thymol and methyl cinnamate types have been reported by Fun and Svendson (1990), Pino *et al.* (1996) and Sainsbury and Sofawora (1971) from Nigeria, Cuba and Aruba. In India, studies were conducted on the composition of essential oil of shrubby basil occurring / grown in Jammu, Assam, Kerala, Delhi and Karnataka, but no such studies were made earlier in Andhra Pradesh. The present investigation was, therefore, carried out on the chemical composition of essential oil of shrubby basil.

Sacred basil (***Ocimum tenuiflorum*** L. syn. ***Ocimum sanctum*** L. 2n = 32) is also known for its medicinal properties and is grown in Hindu homes. A number of morphotypes and chemotypes have been reported and subdivided sacred basil into citral, eugenol, methyl chavicol and chavibetol types. The eugenol (25.0-71.3%) type (Gupta, 1992; Khosla *et al.*, 1985; Lal *et al.*, 1978; Maheshwari *et al.*, 1987 and Philip and Damodaran 1985) was reported from India, Similar reports are available from Thailand (27.0 - 50.0%), and Surinam (Lawrence *et al.*, 1980; Diamantidis *et al.*, 1990). In addition, two more chemotypes namely a methyl eugenol type (37.7 - 45.4%) from Thailand and South India (70.9 - 72.7%) and a bisabolene chemotype (30.0 - 33.4%) from Thailand were also reported (Lawrence *et*

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al., 1980; Philip and Damodaran, 1985). Under Indian conditions this crop has been investigated fairly well in different states by various workers which reported encouraging results. However, it has not been studied under Andhra Pradesh conditions. Therefore, the present study was undertaken to work out the profile of essential oil of sacred basil grown in Andhra Pradesh and results are presented in this paper.

MATERIALS AND METHODS

Plants of shrubby and sacred basils growing in the Central Institute of Medicinal and Aromatic Plants Experimental Farm' Hyderabad were harvested at flowering stage and hydrodistilled in Clevenger's apparatus for 3 hrs. The essential oil samples, thus obtained were analysed gas chromatographically using Perkin Elmer 8500 gas chromatograph equipped with FID and 25 m x 0.25 mm glass capillary column BP-1 coated with methyl siloxane. The temperature was programmed from 60°-220°C at 5°C/min. with a final hold time of 10 min. The samples were injected with a split ratio of 1:80. The compounds were identified by comparing the relative retention times of the peaks with those of standard compounds run under the same conditions, Kovats retention indices on BP-1 column and peak enrichment on co-injection with authentic samples wherever possible.

RESULTS AND DISCUSSION

Shrubby basil

Hydrodistillation of the whole herb at flowering yielded 0.45% (v/w) essential oil on fresh weight basis. GC analysis showed 22 peaks out of which 19 compounds (19 peaks) representing 99.08% of the essential oil were identified (Table 1). Eugenol was the dominant constituent (87.68%) followed by β - selinene, limonene and β - caryophyllene. Four compounds namely, β - bisabolene, γ - eudesmol, T - cadinol and β - eudesmol present in our oil were not reported earlier in this oil.

Sacred basil

Hydrodistillation of the green whole herb at flowering gave 0.29% (v/w) essential oil on fresh weight basis. Out of the 27 peaks observed in the gas chromatogram, 21 compounds (21 peaks) representing 90.43% of the essential oil were identified (Table 2). Methyl eugenol followed by β - caryophyllene, isoeugenol, β - elemene and eugenol were the major components of the oil showing that the plant is a methyl eugenol chemotype. The content of methyl eugenol (72.41%) was much higher than that reported in Thailand oil but comparable to the one reported earlier in adjoining state of Tamil Nadu. Three compounds namely isoeugenol, α - guaiene and eugenol acetate found in this oil were not reported earlier in this oil.

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Table 1. Chemical composition of *Ocimum gratissimum* oil grown in Andhra Pradesh.

S.No.	Compound	Area %
1.	Sabinene	0.19
2.	p - Cymene	0.19
3.	Limonene	1.98
4.	Linalool	0.53
5.	α - Terpineol	0.86
6.	Geraniol	0.28
7.	Eugenol	87.68
8.	Methyl eugenol	0.64
9.	α - Copaene	0.76
10.	β - Caryophyllene	1.84
11.	Methyl isoeugenol	0.18
12.	α - Humulene	0.13
13.	Germacrene D	0.13
14.	β - Selinene	2.82
15.	β - Bisabolene	0.10
16.	Caryophyllene oxide	0.07
17.	γ - Eudesmol	0.15
18.	T - Cadinol	0.24
19.	β - Eudesmol	0.31

Table 2. Chemical composition of *Ocimum sanctum* oil grown in Andhra Pradesh.

S.No.	Compound	Area %
1.	Camphene	0.07
2.	Myrcene	0.10
3.	(E) - β - Ocimene	0.12
4.	γ - Terpinene	0.19
5.	Linalool	0.12
6.	Carveol*	0.35
7.	Eugenol	1.50
8.	Methyl eugenol	72.41
9.	β - Elemene	2.48
10.	Isoeugenol	6.31
11.	β - Caryophyllene	12.00
12.	α - Guaiene	0.68
13.	α - Humulene	0.98
14.	β - Selinene	0.31
15.	α - Murrolene	0.34
16.	Cadinene*	0.10
17.	Eugenol acetate	0.09
18.	Nerolidol*	0.14
19.	Caryphyllene oxide	0.16
20.	T - Cadinol	0.19
21.	Bisabolol*	0.16

* Correct isomer not identified