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VOLATILE OIL COMPOSITION OF THE LEAVES OF *EUCALYPTUS CITRIODORA* HOOK.

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ABSTRACT
The leaves of *Eucalyptus citriodora* Hook. (Myrtaceae) of Delhi region yielded 0.22 % of the volatile oil which was analyzed by GC and GC-MS techniques. Fifteen components comprising 100 % of the total volatiles were identified which consisted of five monoterpenes (96.3 %) and ten aliphatic components (3.7 %). The major monoterpenes characterized included α- pinene (38.6 %), β -.pinene (25.7%), sabinene (19.6%) and α-thujene (11.9%). Among the aliphatic constituents, there were six hydrocarbons (2.3 %) and four aliphatic alcohols (1.4 %). Myrcene and all aliphatic constituents were present in trace amounts.
KEYWORDS: *Eucalyptus citriodora*, Myrtaceae, leaves, volatile oil composition.

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INTRODUCTION

Eucalyptus citriodora Hook. (syn. *Corymbia citriodora* Hook.), family Myrtaceae, is a native to Queensland, Australia and is spread throughout the tropics and in several other regions of the world[1]. It is a tall, evergreen and graceful tree, commonly known as lemon-scented gum and grown for production of essential oil, fuel wood, timbers and as source of nectar in honey production. It grows fast, coppices heavily, tolerates stress and is not browsed by livestock. It produces a lot of biomass in a short time but consumes a lot of water, depletes the ground water and renders the soil unproductive in some areas. It has been introduced into India for reclamation of waste lands, timber, pulp, fuel and volatile oil[2]. The leaves are intensely aromatic releasing a number of volatile terpenes into the environment. The essential oil of the leaves is a powerful antiseptic and is used all over the world as a respiratory decongestant, for relieving colds, coughs, bronchitis, flu, pneumonia, headache and sore throats[2-5]. It has disinfectant action and is applied externally to cure cuts and skin infections. It is inhaled to open blocked nasal passages. It is useful as gargles for sore throats and is taken internally for a wide range of complaints. The Eucalyptus oils are the starting material for the manufacture of citronellal and derived products. *E. citriodora* oil showed analgesic, anti-inflammatory[6], antimicrobial[4,7-9], acricidal[10], larvicidal[11,12] and phytotoxic[13,14] effects. The oil is mainly composed of citronellol, geranyl acetate, limonene and terpene-4-ol[15]. The present manuscript describes the isolation and analysis of the volatile oil of the leaves of *E. citriodora* of Delhi region.

METERIALS AND METHODS

Plant material

The leaves of *E. citriodora* were collected form Pacchim Vihar, New Delhi. The plant material was authenticated by Prof. M.P.Sharma, Department of Botany, Faculty of Science, Jamia Hamdard. A voucher specimen No. PRL/JH/08/33 is retained in the herbarium of the Department of Pharmacognosy and Phytochemistry, Faculty of Pharmacy, Jamia Hamdard.

Isolation of oil

The plant material (1 kg) was hydro-distilled in a Clavenger apparatus to obtain a pale yellow oil (0.22 %). It was dried over anhydrous sodium sulphate and stored at 4°C in the absence of light prior to analysis.

GC analysis

Analytical GC was carried out by injection 01.µL of the leaf oil on a Varian 3300 gas chromatograph with FID detector fitted with silicone DB-I capillary column (30 m x 0.25 mm, film thickness 0.25 µm). GC operation condition split mode: carrier gas helium at a rate of 1.5 mL/min; temperature programme, 80 - 225^0 C (4^0

C/min), injector temperature 280° C and detector temperature 300° C.

GC-MS analysis

GC-MS analysis was carried out by injection 0.1 µL of the leaf oil on a QP-2000 instrument with a mass selective HP 597A detector fitted with Ulbon HR-1 capillary column (50 m x 0.25 mm, film thickness 0.25 µm). GC-MS operation condition split mode: carrier gas helium at a flow rate of 1.5 mL/min; temperature programme 70-225^0 C (10^0 C/min), injector temperature 250° C and detector temperature 280° C. The mass spectrometry conditioned was as follows: ionization voltage, 70 eV; emission current, 40 mA; mass range 0 – 400Da, ion source temperature, 200º C.

Identification

Compounds in the essential oil were identified by comparison with the Kovats gas chromatographic retention index (KI) and mass spectral fragmentation pattern of each GC component to those of authentic standards available in the authors laboratory, data stored in the spectrometer data base using NBS 54 K.I. and Wiley L. built-in libraries and with those published in the literature[16, 17].

RESULT AND DISCUSSION

The components of the volatile oil of the leaves of *E. citriodora*, their retention indices and percentage are listed in **Table 1**. The constituents are arranged in the order of their elution on Ulbon HR-1 capillary column. Analysis of the oil by GC-MS led to identification of fifteen components comprising 100% of the total volatile oil. The oil contained five monoterpenes (96.3 %) and ten aliphatic components (3.7 %). The predominant monoterpenes were α -pinene (38.6 %), β- pinene (25.7%), sabinene (19.6%) and α-thujene (11.9%). All of them were the monoterpenic hydrocarbons. Among the aliphatic constituents, there were two saturated hydrocarbons (1.1%), four unsaturated hydrocarbons (1.2 %), three monohydroxy alcohols (1,1 %) and one dihydroxy alcohol (0.3 %). The oil components occurring in trace amounts included β-myrcene, n-eicosane, n-heneicos-3-ene, n-heneicos-10-ene, n-heneicos-8-ene, n-heneicosane, n-heneicos-4-ene, n-octadecan-3,12-diol, n-eicos-14-en-2-ol, n-eicosan-5-ol and n-eicosan-6-ol. The volatile oil was devoid of any sesquiterpene and aromatic components. The chemical composition of the volatile oil of Delhi region was entirely different from the earlier reported oil constituents. Generally citronellal (52-88 %) along with geraniol, citronellol, cetronellyl acetate and isopulegol were the predominant components of the *E. citriodora* oil[18-21]. However, oxygenated compounds and hydrocarbons in Cuban Eucalyptus leaf oil[18] and 6-octadecanal (77%) in Nigerian Eucalyptus leaf oil[12] have been reported as the prominent constituents.

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Table 1: Chemical composition of the volatile oil of *Eucalyptus citriodora* leaves

S.No.	Components	KI	Percentage composition
1.	α-Thujene	922	11.9
2.	α-Pinene	925	18.3
3.	Sabinene	960	19.6
4.	β-Pinene	965	25.7
5.	β-Myrcene	971	0.5
6.	n-Eicosane	2003	0.8
7.	n-Heneicos-10-ene	2011	0.2
8.	n-Heneicos-3-ene	2018	0.3
9.	n-Octadecan-3,12-diol	2027	0.3
10.	n-Eicos-14-en-2-ol *	2045	0.3
11.	n-Eicosan-5-ol *	2071	0.5
12.	n-Heneicos-8-ene	2095	0.3
13.	n-Heneicosane	2105	0.3
14.	n-Heneicos-4-ene	2135	0.4
15.	n-Eicosan-6-ol *	2112	0.3

*Compounds reported for the first time in eucalyptus oil

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