VOL. 51 JULY - SEPTEMBER 2007

Indian Perfumer

Investigation of the essential oils of *Cinnamomum tamala* Nees. grown at Jorhat, Assam

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ABSTRACT

The essential oils, obtained by hydro-distillation of the leaf and stem bark of *Cinnamomum tamala* Nees., grown at Baghchung area of Jorhat, Assam were analyzed by GC and GC-MS. Twenty four and twenty five components, representing 99.34 and 89.54% of the total leaf and stem bark oils were identified, respectively. Eugenol (70.6%) was the major component in the leaf oil, while a terpineol (47.2) followed by p-cymene (9.7) were the major components in the stem bark oil. These findings on comparison with those reported for the stem bark essential oil of *C. tamala*, revealed the natural existence of one more chemotype source for the species.

INTRODUCTION

Cinnamomum tamala Nees (Lauraceae), known as 'Indian cassia' or 'Tejpat' is an evergreen, aromatic tree occurring in tropical and sub-tropical Himalayas including Northeast India. The leaf is the source of 'tejpat spice of commerce'. It is very much popular among the people of northern India and since antiquity has been used as a flavoring agent which is inevitable in the preparations of vegetarian and non-vegetarian dishes. It is reported to be hypoglycemic, stimulant, carminative, used in Indian systems of traditional medicines in colic, cough, diarrhoea, gonorrhoea, rheumatisms, irritations, boils, conjunctivitis and itching (Chopra *et al.*, 1956; Chatterjee & Prakashi, 1991, Hussain *et al.*, 1992, Baruah & Nath, 2004).

Essential oils of *C. tamala* native to different geographical locations have been investigated. Apart from the occurrence of eugenol type essential oil (Gulati, 1982, Nath *et al.*,1999), linalool, cinnamaldehyde, cinnamaldehyde-linalool and transsabinene hydrate -(z) β–ocimene and eugenol-linalool type oils from the leaves of the species have been reported (Gulati *et al.*, 1977; Sood *et al.*, 1979; Bradu & Sobti, 1988; Nath *et al.*, 1994, Showkat *et al.*, 2004, Baruah *et al.*, 2005). Except a work of Baruah *et al.*, (2005), little has been known about the composition of stem bark essential oil of *C. tamala*. The present communication deals with the leaves and stem bark essential oils of a taxon of the species grown at Baghchung, Jorhat, Assam.

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MATERIALS AND METHODS

The leaves and stem bark of *C. tamala* were collected from a single tree from the Baghchung, Jorhat (86 m) Assam. Voucher specimens (RRLJ 1499) were deposited in the Herbarium of Regional Research Laboratory, Jorhat. Fresh leaves and ground stem bark were subjected to hydro-distillation separately, in Clevenger-type apparatus for 3 and 5 h, respectively. The oils obtained were dried over anhydrous Na_2SO_4 and stored in sealed glass vials under refrigeration. Refractive index of the oil was determined using a Carl Zeiss 3300 g. Abbe's Refractometer.

GC analysis was performed using a Varion 3700 GC equipped with FID fitted with a 2.5 mm X 2.2 mm stainless steel column packed with 15% SE-52 coated on 80/100 mesh Chromosorb W-HP. Nitrogen was the carrier gas at a flow rate of 30 ml/min. The column temperature was programmed as 90°C (12 min), 90°-220°C (2°C/min) and 220°C (20 min).

GC-MS analysis was carried out with a Finnigan Matt INCOS 50 GC-MS/DC equipped with library search data of 42222 spectra using a DB-5 fused silica capillary column of 30 m X 0.25 mm (0.25 m film thickness). The temperature was programmed as 75°C (5 min); 75°-200°C (5°C/min) and 200°C (15 min) with helium as carrier gas, an ion source temperature 180°C and an electron energy 70 eV. Component identification was done by comparison with reference compounds, by peak enrichment and by matching their 70 eV EI mass spectra with those of library search data.

RESULTS AND DISCUSSION

The leaf oil, 1.4% yield (v/w in FWB) and with a refractive index of 1.5253 (21°C) was a golden yellow mobile liquid. The stem bark oil, 0.5% yield and with a refractive index 1.4233 (21°C) was a pale yellow mobile liquid. The leaf oil has clove-like smell and possessing a pungent and warm taste. The bark oil has spicy smell and possessing a mild pungent taste.

Twenty four components representing 99.34% of the total leaf oil are identified. Eugenol (70.63%) followed by a-phellandrene (14.92) are the major components. The other components identified in leaf oil were benzaldehyde (1.09), a-pinene (2.32), p-cymene (2.45), 1, 8 cineole (1.26), linalool (1.09) and eugenyl acetate (1.23). In the stem bark oil, 25 components representing 89.54% of the total oil are identified. a-terpineol (47.16%) is the major component followed by p-cymene (9.66), 1,8-cineole (6.80) and a phellandrene (6.62). The other components identified were a-pinene (3.80), β-pinene (1.60), myrcene (1.09), ?-terpinene (1.14), linalool (1.16), terpin-4-ol (3.16) and caryophyllene (1.14) (Table 1).

The present finding thus indicates the natural existence of one more chemotype source for stem bark oil of *C. tamala*, having aterpineol as major component, in contrast to the reported one (Baruah *et al.*, 2005), where linalool alone constituted 75.50% of the oil.

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Table 1: Percentage composition of the essential oils of *Cinnamomum tamala* (RRLJ 1499)

Component	Leaf	Stem bark
Benzaldehyde	1.09	0.71
α-Pinene	2.32	3.80
Camphene	0.25	0.60
Sabinene	--	0.33
β-Pinene	0.45	1.60
Myrcene	0.45	1.09
α -Phellandrene	14.92	6.62
p-Cymene	2.45	9.66
1,8-Cineole	1.26	6.80
ß-Phellandrene	0.30	0.26
?-Terpinene	0.25	1.14
Terpinolene	t	--
Linalool	1.09	1.16
Camphor	--	0.09
Borneol	0.08	0.70
Terpin-4-ol	0.10	3.16
α -Terpineol	0.47	47.16
3-Phenyl propanal	0.09	--
Cinnamaldehyde	0.23	0.35
Eugenol	70.63	0.44
Methyl cinnamate	t	0.72
Methyl eugenol	--	0.23
Caryophyllene	0.26	1.14
Ethyl cinnamate	--	0.08
Isoeugenol	0.17	--
Methyl isoeugenol	0.31	0.75
Eugenyl acetate	1.23	--
α -Humulene	--	0.25
Caryophyllene oxide	0.94	0.70
Total	99.34	89.54

t = <0.05%