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Panicle and bark oils of a variant of *Cinnamomum bejolghota* (Buch-Ham) Sweet. from North East India

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Abstract

Essential oils obtained by hydro-distillation of panicle and bark of *Cinnamomum bejolghota* (Buch-Ham) Sweet. Variant II, growing in Upper Brahmaputra valley region in Assam, India were investigated by GC and GC-MS. Twenty seven and 23 components accounting 98.52% and 81.60% in the oils of panicle and bark, respectively, were identified. Linalool (65.00%) was the major component in the panicle oil. The predominent components in the bark oil were α-terpineol (23.30%), linalool (14.40%) and p-cymene (13.90%). The chemical composition of the oils, on comparison with those reported for *C. bejolghota*, exhibited the natural existence of four chemotype sources for the species from North East India.

Key words: *Cinnamomum bejolghota*, essential oils, linalool, α-terpineol.

Cinnamomum bejolghota (Buch-Ham) Sweet. (syn. *C. obtusifolia* Nees.) under the family Lauraceae is a moderate to robust evergreen tree, distributed in the central and outer-eastern Himalayas, Andaman Islands (Chopra *et al.* 1956) and Myanmer (Kurz 1877). While conducting an ethnobotanic study on the members of *Cinnamomum* growing in North East India, during 1994-1997, the authors came across an interesting taxon of *C. bejolghota*, growing very rarely in evergreen to mixed deciduous forests in the upper Brahmaputra valley region of Assam. The plant as a whole is locally known as "pati-hunda", while its leaves are known as "tejpat" or "tejpat manbi" and stem-bark as "dalchini" or "naga-dalchini" and are being used by the local people as a substitute of tejpat and cinnamon spice, respectively. This taxon was identified as a variant of *C. bejolghota* and designated as Variant II, based on its morphology and foliar micro-morphology, as it was significantly different from that of the typical one, i.e. Variant I (RRLJ 1600) (Baruah & Nath 1998; 2000). The herbarium specimens of both the variants have been deposited in the Herbarium of Regional Research Laboratory (CSIR), Jorhat, Assam.

The occurrence of cinnamaldehyde upto 7% in the leaf and bark oils of *C. bejolghota* growing in Burma has been reported (Kya & Min 1970). However, there is no indication of the occurrence of other components of the oils in the report. Linalool is reported as a major component in the leaf and panicle oils, while α-terpineol and (E)-nerolidol as main components in the bark oil of *C. bejolghota* Variant

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I (RRLJ 1600) (Baruah *et al.* 1997). However, major components in panicle and bark oils varied in samples from Jorhat and Sivasagar areas (Choudhury *et al.* 1998a; 1998b).

In another study α-phellandrene followed by linalool were reported as the main components in the leaf oil of this taxon (Nath *et al.* 1999). In the present communication, the composition of panicle and bark oils of the variant II of *C. bejolghota* is reported.

The bark and panicle were collected from a single tree from Jorhat area of Assam during March 1995. Voucher specimens (RRLJ 1603) were deposited in the Herbarium of Regional Research Laboratory, Jorhat (Assam), India. Shade dried panicle and ground bark were separately hydro-distilled using a Clevenger-type apparatus for 3 hours and 5 hours, respectively. The oils thus obtained were dried over anhydrous Na_2SO_4 and stored in sealed vials under refrigeration prior to analysis. 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 m 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^{-1}. The column temperature was programmed as follows: 90°C (12 min), 90°-220°C (2°C min^{-1}) 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 mm film thickness). The temperature was programmed as follows: 75°C (5 min); 75°-200°C (5°C min^{-1}) 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.

The panicle oil (0.2% v/w) with a refractive index of 1.4771(25°C), was a pale yellow mobile liquid with a sweet odour. The bark oil (1% v/w) with a refractive index of 1.4852 (25°C), was a almost colourless mobile liquid with a spicy odour.

The components identified in the oils are presented in Table 1. Twenty seven and 23 components accounting 98.52% and 81.60% were identified in panicle and stem bark oils, respectively. Linalool (65.00%) is the major component in panicle oil, followed by α-phellandrene (8.90%), 1,8-cineole (3.96%), α-pinene (3.40%) and β-phellandrene (3.00%). The other components of above 1% concentration in the panicle oil were β-pinene

Table 1. Composition of essential oils (%) of *Cinnamomum bejolghota* Variant II

Component	Panicle	Stem bark
Benzaldehyde	0.25	-
α-pinene	3.40	5.30
Camphene	0.35	0.45
β-pinene	2.55	1.40
Myrcene	0.50	0.62
α-phellandrene	8.90	1.46
p-cymene	t	13.90
1,8-cineole	3.96	6.85
β-phellandrene	3.00	0.56
g-terpinene	0.40	t
Terpinolene	0.90	0.56
Linalool	65.00	14.40
Camphor	t	0.20
Borneol	0.06	0.45
Terpinen-4-ol	0.16	1.70
α-terpineol	0.80	23.30
Linalyl acetate	0.16	-
(E)-cinnamaldehyde	t	1.50
Eugenol	t	1.50
(E)-methyl cinnamate	0.52	3.06
Methyl eugenol	0.50	0.20
β-caryophyllene	2.55	2.85
(E)-ethyl cinnamate	t	-
(Z)-methyl isoeugenol	2.05	1.05
α-humulene	0.36	0.75
α-farnesene*	1.93	0.34
Caryophyllene oxide	0.22	-

*Correct isomer not determined

(2.55%), β-caryophyllene (2.55%), (Z)-methyl isoeugenol (2.05%) and α-farnesene (1.93%). Likewise, α-terpineol (23.30%) followed by linalool (14.40%) and p-cymene (13.90%) were the main components in the stem bark oil. The other components identified in stem bark oil in appreciable quantity were α-pinene (5.30%), 1,8-cineole (6.85%) and (E)-methyl cinnamate (3.06%), β-pinene (1.40%), α-phellandrene (1.46%), terpinen-4-ol (1.70%), (E)-cinnamaldehyde (1.50%), eugenol (1.50%), β-caryophyllene (2.85%) and (Z)-methyl isoeugenol (1.05%).

In a population from Jorhat area, Baruah *et. al* (1997) reported that linalool (62.82%), α-terpineol + (E)-nerolidol (18.20% + 15.30%) and linalool (57.41%) as main components in panicle, stem bark and leaf oils, respectively. While, in another population from Jorhat area, Choudhury *et. al* (1998a, 1998b) reported that α-pinene + β-pinene (42.90% + 24.90%), 1,8-cineole + α-terpineol + linalool (31.30% + 21.30% + 20.00%) and linalool (35.80%) as main components in the oils of respective plant parts. However, Choudhury *et al.* (1998a, 1998b) reported that the oils of panicle, bark and leaf from Sivasagar area of Assam, contained sabinene + α-pinene + caryophyllene oxide + linalool (17.20% + 14.60% + 10.10%), linalool + α-terpineol (19.90% + 12.70%) and linalool (52.20%), respectively.

The main components in the panicle (linalool) and bark (α-terpineol) oils were although similar in the Variant I (62.82% and 18.20%) and Variant II (65.00% and 23.30%) of *C. bejolghota*, but in leaf oils, they exhibited marked differences in their main components. The main component in the leaf oil of Variant I was linalool (57.41%), while in Variant II, the main components were α-phellandrene + linalool (32.82% + 24.25%). In contrast, the quantity of a-phellandrene in Variant I was only 1.20%.

The significant differences in essential oils of *C. bejolghota* in different populations show that North East Indian germplasm may have considerable natural variation in aromatic constituents of oils. The present findings together with those former reports revealed the natural existence of four chemotypes in *C. bejolghota* from North East India.

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