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Variability in volatile constituents of *Cinnamomum tamala* leaf from Uttarakhand Himalaya

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ABSTRACT

Objective: To evaluate the variation of *Cinnamomum tamala* leaf essential oil in respect with months and tree size class. **Methods:** By fallowing standard laboratory methods using capillary GC-FID and GC-MS. **Results:** The oil samples were analyzed for two months and two different tree size classes. cinnamaldehyde, was the principal component, was higher in the both months i.e. October and January, highest in 30 cm girth class tree in January month (59.23%) and lowest in 60 cm girth class tree in a month of October (41.90%). Smaller size class tree contained greater amount of cinnamaldehyde as compared to higher size class. **Conclusions:** Consequences of the present study need to selection of proper, tree size and month for harsh economic potentials of such valuable resources

1. Introduction

Cinnamomum (Family Lauraceae) is represents about 350 species world wide[1]. In India it is represented by twenty species *Cinnamomum tamala* nees et Eberm is a medium size tree up to 8 M high communally occurs in northern western Himalaya, Sikkim, Assam, Mizoram and Meghalaya region[2,3]. Apart from this *C. tamala* is the sole species cultivated, for its Tejpat leaves in the whole region of Uttarakhand for the production of spices and related products[4]. The oil isolated from the leaves know as Tejpata oil is medicinally used carminative antiflatvent, diuretic, antibacterial[5-8]. Essential oil constituents of leaves have been extensively investigated and Four chemo types present in essential oil the species i.e. eugenol type, cinnamaldehyde-or cinnamaldehyde/ linalool type, trans-sabinene hydrate type reported from different region [9-12, 16]. Best of our knowledge no work has been reported so far monthly and tree girth size variability with relation to essential oil composition.

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2. Material and Methods

2.1. Collection of Plant material

Leaves of *Cinnamomum tamala* Fr, Nees collected from demonstration sites of our Centre situated at Selaqui Dehradun in the month of October 2010 and January 2011. The species authentication was very established and Identification done by Dr. Parshant Scientist Botanical Survey of India North circle Dehradun Voucher specimen (CAP/CT-103) has been kept in the herbarium of Centre for Aromatic Plants, Selaqui, Dehradun, Uttarakhand, India.

Isolation of the Essential oils: Dried leaves subjected to hydro distilled in a Clevenger apparatus for 6 hours to extract oil dried over anhydrous sodium sulphate and stored in freezer at 4 ℃. The essential oil content was determined as percentage on fresh weight basis as average of three independent extractions. The combined oil was used for further analysis.

2.2. GC

Analyses by GC were performed by using HP 6890 gas chromatograph equipped with a FID detector and a HP-5 fused silica column (30 m×0.32 mm×0.2 μm) the same font as in text. Nitrogen was used as a carrier gas during analysis. The injector and detector temperature were maintained at 210 ℃ and 230 ℃ respectively. The column oven temperature was programmed from 60 ℃ to 220 ℃ with an increase in rate of 3 ℃/min.

2.3. GC-MS

Analysis was carried out on a Perkin Elmer mass spectrometer (Model Claurus 500). Coupled to a Perkin Elmer Claurus 500 gas chromatograph with a 60 m×0.32 mm×0.2 μm film thickness column of restek make (Rt-5). Helium was used as the carrier gas (flow rate 1ml/min). The oven temperature programme range was 60 ℃ to 220 ℃ with an increase in rate of 3 ℃/min. Other conditions were the same as described under GC. The mass range was scanned from 40-600 Daltons. The identification of the oil components was performed by their retention index (RI) authentic reference, compound peak matching library search, as well as published mass spectra[13,14]. Retention index were calculated using an n-alkane series under the same condition. The relative composition of the individual components of the oils is expresses as percentage peak area relative to total peak area from the GC-FID analyzed of the oil sample.

3. Results

Present study yield of oil content vary among the tree girth class time of harvesting, in October vary (0.11-0.12%) in 30 cm, and 60 girth class tree, in month of January very oil contents (1.2-1.6%), maximum oil content found in January month and higher tree size class. Study of the chemical constituents revealed that a total fourteen components identified in 30 cm tree class and seventeen components identified in 60 cm tree class in a month of October. Similarly total fifteen components identified 30 and 60 tree garth classes in month of January constituted 95.14% and 92.34% of the oil respectively among the tree girth class cinnamaldehyde were found as a major compounds in both the months and both tree size class. In January ranging between 42.5-59.3%, and month of October also vary amount of cinnamaldehyde, among the season October possessed considerably higher amount of Cinnamaldehyde as compared to winter. Patterns of cinnamaldehyde fluctuated same in both the size class smaller girth class possessed higher amount Cinnamaldehyde as compared to higher size class shown table-1. Second major compound is cinnamylacetate vary ranging between in 34.86-35.27 % October, and (3.12-16.15%) in January months. Higher tree class have lesser amount of cinnamylacetate and decrease very promptanly. In October month components like P-cycmene, limonene, Boraneol, 3-oxo-5-phenyl pentanoic acid completely absent. Linalool found ranging between (0.16-5.30 %) in October and (5.8-30.0%) in January month it is contradictory in case of 1, 8 Cineol amount is higher in January month larger tree class.

Oil contents of the *C. tamala* reported from Kumaun Himalaya vary ranging 0.09-0.11%[4], recent reports from north East Himalaya it is vary 1.5- 5.6%[9] In context of the chemical constituents of essential oil earlier reports data set from Uttarakhand Himalaya resemble with our tune study cinnamaldehyde as a major components[4,10,15,16]. A study essential oil from *C. verum* grown in Madagascar cinnamaldehyde also major constituent was (41.3%)[17]. As contradictory study conducted North East region of Himalaya *C. tamala* showed that the leaf oil was rich in eugenol[9,11]. Similar results were reported market samples from Dehradun region[10]. Essential oil contents depend to organs and geographical identity and different eco climatic identity. It is concluded that variation in the essentials oil chemical due to geographical divergence and abiotic and biotic stress, seasons, sunlight, UV radiation *etc*. It is to recommend that for the harsh potential of *Cinnamomum tamala* essential oil selection of proper smaller size class, and winter seasons for maximum yield of cinnamaldehyde also need to further keen-full investigation of species oil composition in terms of attributes like, origin, age and season of the plants.

Conflict of interest statement

We declare that we have no conflict of interest.

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