Composition and Comparison of Essential Oils of *Pogostemon cablin* (Blanco) Benth. (Patchouli) and *Pogostemon travancoricus* Bedd. var. *travancoricus*

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Abstract

Comparative study on the essential oil constituents of *Pogostemon cablin* (Blanco) Benth. (Patchouli) and *P. travancoricus* Bedd. var. *travancoricus* were investigated using GC and GC/MS analysis. Eleven compounds from *P. cablin* oil (Patchouli) and 13 from *P. travancoricus* var. *travancoricus* oil were identified. Both species shared compounds like α- and β-patchoulene, patchouli alcohol (patchoulol), β-caryophyllene, α-guaiene, seychellene and selinene, although quantitatively less in *P. travancoricus* var. *travancoricus*.

Key Word Index

Pogostemon travancoricus var. *travancoricus*, *Pogostemon cablin*, Lamiaceae, patchouli, essential oil composition, α-guaiene, patchouli alcohol, calamenene, cadina-1,4-diene.

Introduction

Pogostemon Desf. is an important genus of Lamiaceae, a family comprising ca. 250 genera world wide (1). In India it is represented by ca. 64 genera and 340 species (2). *Pogostemon cablin* commonly called "patchouli" is known for its essential oil. Patchouli oil, though rarely used as dominant source of fragrance, is a basic ingredient of high value perfumes because of its oriental notes and strong fixative properties (3). The oil of patchouli is known to possess antifungal properties and is used in skin infections, dandruff and eczema (3). The oil is also used in aromatherapy for its antidepressant, anti-inflammatory, cytophylactic, deodorant and fungicidal properties (3). It is being cultivated in tropical and subtropical regions of the world especially in southeast Asia. The important oil components which are considered for the fragrant and medicinal activities of the oil are patchouli alcohol, α-bulnesene, α- and β-patchoulene (4). There are several reports on the chemical composition of patchouli oil using GC/MS. The composition of Indian patchouli oils were studied by Akhila and Nigam (5) and Akhila and Tewari (6). Srinivas studied the Indonesian patchouli oil (7) by using relative retention times on a packed GC column and also by a combination of GC/MS and Retention Indices. Lawrence examined the chemical composition of commercial Sumatran oil, Commercial Javan oil, West Indian oil and Costa Rican oil (8). The sesquiterpene hydrocarbons of patchouli oils were also studied by different authors (9,10). Recently Bure and Sellier analyzed a commercial sample of patchouli oil by using GC and GC/MS (11).

The other *Pogostemon* species included in the study was *P. travancoricus* Bedd. var. *travancoricus* (Figure 1), a rare endemic species collected from Western Ghats, India. The species has been included in Red Data Book of India (12) for its narrow distribution. In the present study, comparison is made between an oil of the rare endemic plant *P. travancoricus* var. *travancoricus* with the oil of the cultivated *P. cablin* (patchouli).

Experimental

Plant name:

Pogostemon cablin (Blanco) Benth., Family: Lamiaceae, Local name: Patchouli.

Pogostemon travancoricus Bedd. var. *travancoricus,* Family: Lamiaceae.

Source: For both the species, leaf materials were used to isolate essential oils. *Pogostemon cablin* leaves were collected from the field gene bank of Central Institute of Medicinal and Aromatic Plants, (CIMAP) Lucknow, India, and *P. travancoricus* var. *travancoricus* was collected from Agasthiamalai, Western Ghats, India. The identity of the plant was confirmed with the Flora of Presidency of Madras (13) and the specimen checked with of Madras Herbarium (MH), Botanical Survey

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of India, Southern Circle, Coimbatore where the specimens have been deposited.

The fresh biomasses (100 g) of each species were subjected to separate hydrodistillation by the use of a Clevenger-type apparatus for 8 h. The oil yield was 0.3% for *P. cablin* and 0.2% for *P. travancoricus* var. *travancoricus*.

Analysis: GC analysis of the oils was performed on a Varian gas chromatograph, CX-3000 where the carrier gas was H, the injector temperature was 225°C, and detector temperature was 250°C using a capillary column PE-5, 50m × 0.32mm, 0.20µm film thickness. The oven temperature was programmed at 50–150°C at 3°C/min and then 150–215°C at 5°C/min. The peak area percentage was obtained on a Varian 4400 integrator.

GC/MS analysis was carried out in EI mode using Perkin-Elmer Auto System XL GC and turbo mass spectrometer fitted with Supelcowax-10 capillary column of dimension 30 m × 0.3 mm, 0.25 µm film thickness. Oven temperature was programmed from 50–210°C at 5°C/min with an initial hold of 2 min. Helium was used as a carrier gas at a flow rate of 2 mL/min with a split ratio of 1:20. Mass spectral data were analyzed by Wiley Library search and compared with standard published data.

Table I. Percentage composition and comparison of oil profiles of Patchouli (*Pogostemon cablin*) and *Pogostemon travancoricus* var. *travancoricus*

Components	*P. cablin* (%)	*P. travancoricus* var. *travancoricus* (%)
α-pinene	0.2	-
sabinene	-	-
β-pinene	0.4	-
isoledene	-	2.6
α-copaene	-	1.7
β-patchoulene	4.2	0.3
β-caryophyllene	4.5	2.0
α-guaiene	14.6	1.9
α-humulene	0.7	-
seychellene	5.6	5.3
α-patchoulene	3.3	3.4
germacrene D	-	7.8
selinene*	3.9	3.2
calamenene*	-	10.7
ledene	-	8.6
cadina-1,4-diene	-	11.2
patchouli alcohol	23.2	2.7

* correct isomer not identified

Results and Discussion

The oil profiles of both the species studied is given in Table I. Eleven compounds from *P. cablin* oil (Patchouli) and 13 from *P. travancoricus* var. *travancoricus* oil were identified. Both species shared compounds like α- and β-patchoulene, patchouli alcohol (patchoulol), β-caryophyllene, α-guaiene, seychellene and a selinene isomer, although quantitatively less in *P. travancoricus* var. *travancoricus*. The oil of *Pogostemon cablin* was rich in α-patchoulene (3.3%), β-patchoulene (4.2%), patchouli alcohol (23.2%) and α-guaiene (14.6%). *Pogostemon travancoricus* var. *travancoricus* oil also possessed the same compounds but they were represented in meager amounts (< 55%). The maximum representative compounds from *P. travancoricus* var. *travancoricus* were germacrene D, a calamenene isomer, cadina-1,4-diene and ledene.

Acknowledgments

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Figure 1. *Pogostemon travancoricus* Bedd. var. *travancoricus* in wild habitat

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Composition of the Essential Oil of *Salvia compressa* Vent. and *Cyclotrichium leucotrichum* (Stapf. ex Rech.f.) Leblebici From Iran

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Abstract

The water distilled oils from the aerial parts of *Salvia compressa* Vent. collected from two different localities and *Cyclotrichium leucotrichum* (Stapf. ex Rech.f.) were analyzed by GC and GC/MS. The main components found in the oil of *S. compressa* collected at Tange Malavi, 751 m (sample A) were β-caryophyllene (21.4%), α-pinene (18.4%) and caryophyllene oxide (13.2%), while in the oil of the plant collected at Mamolan to Pole Dokhtar, 927 m (sample B), β-caryophyllene (21.1%), 3-thujopsanone (15.3%), germacrene D (12.6%), bicyclogermacrene (11.6%) and nerol (10.7%) were the most abundant constituents. Both oils were richer in sesquiterpenes than monoterpenes. Linalool (38.7%), limonene (15.4%) and spathulenol (12.6%) were the predominant compounds in the oil of *Cyclotrichium leucotrichum*. The oil of the plant consisted mainly of monoterpenes.

Key Word Index

Salvia compressa, Cyclotrichium leucotrichum, Labiatae, essential oil composition, β-caryophyllene, α-pinene, caryophylleneoxide, 3-thujopsanone, germacrene D, bicyclogermacrene, nerol, linalool, limonene, spathulenol.

Introduction

Within the Lamiaceae family, the oil rich genera are mainly in the subfamily Nepetoideae. The genera classified in tribe Mentheae of subfamily Nepetoideae are usually characterized with one specific major terpenoid compound or a class of compounds in their essential oils (1). *Salvia* is one of the members of tribe Menthae with about 700 species distributed

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