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CHEMICAL COMPOSITION OF *HYPTIS SUAVEOLENS* GROWN IN SAKI, SOUTH WESTERN NIGERIAN, FOR ITS RESOURCE RECOVERY

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ABSTRACT

This study determined oil recovery potential of *Hyptis suaveolens* for its beneficial use. Pulverized leaves (500 g) of *Hyptis suaveolens* was hydro-distilled for 3 hours using Clevenger apparatus set up. The percentage yield of the oil was 0.29 % (v/w). The GC-FID analysis of the extracted oil revealed 36 chemical components (99.99 %) of which 72.54 % is mono-terpenoids, 21.96 % is sesquterpenoids and 5.49 % is non-terpenoid constituents. The major constituents of the oil are Sabinene (25.0 %), α-terpinolene (13.64 %), β-caryophyllene (12.75 %), 1, 8-cineole (9.11 %), β-pinene (5.65 %), bicyclogermacrene (5.61 %) and limonene (5.40 %). This result showed a little variation to other leaves essential oils of the same plant that had been investigated previously in the country and beyond.

INTRODUCTION

Hyptis suaveolens (Lamiaceae) is an aromatic annual shrub distributed in tropical and subtropical regions. It is commonly regarded as a weed and called Bush mint. Chatterjee and Pakrashi (1997), reported that leaves of *H. suaveolens* has anti-inflammatory activity and it is also applied as an antiseptic in burns, wounds and various skin complaints. It is also used to treat respiratory tract infections, colds, pain, fever and skin diseases (Mabberley, 1990; Iwu, 1993). The ethanolic extract from its leaves exhibited healing properties with a supportive role of antioxidant enzymes (Annie, 2003). In the past, phytochemical screening of this plant has revealed the presence of di- and triterpenoids (Manchand, 1973; Misra 1983) and steroids. It has been reported that constituents of the same plant collected from different geographical locations varied. On this basis, we investigated leaf essential oil of South Western Nigerian grown *H. suaveolens* (Figure 1).

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MATERIALS AND METHODS

Hyptis suaveolens leaves were collected within the premises of The Polytechnic Ibadan, Saki Campus, Saki, Oyo State, Nigeria. Identification of the leaves was carried out at Herbarium of Botany Department University of Ibadan where specimen voucher were deposited. For oil extraction, pulverised leaves of *Hyptis suaveolens* (500g) was hydro distilled for 3hrs in a Clevenger type apparatus according to the British Pharmacopiea specification (British Pharmacopiea, 2014). The extracted oil was collected, preserved in a sealed sample bottle and stored under refrigeration until analysis. A GC-FID analysis was performed on an Orion Micromat 412 double-focusing chromatography system fitted with two capillary columns coated with Cpsil-5 and Cpsil-19(fused silica, 25 m × 0.25 mm i.d, 0.15 µm film thickness) and flame ionisation detector (FID). The volume injected was 0.2 µL and the split ratio was 1:30. The oven temperature was programmed from 50 to 230 °C at3°C/min using hydrogen as carrier gas while injection and detector temperatures were maintained at 200 and 250 °C respectively. In addition, Gas Chromatography–Mass Spectroscopy GC-MS) analysis was

Figure 1. ***Hyptis suaveolens (source: http://en.wikipedia.org/wiki/ Hyptis_suaveolens)***

carried out through Hewlett-Packard HP 5890A GC which was interfaced with a VG Analytical 70–250s double-focusing Mass spectrometer. Helium was used as the carrier gas.The MS operating conditions was maintained at an ionisation voltage of 70 e and ion source of 230 °C. The GC was fitted with a25 m × 0.25 mm i.d. fused capillary silica column coated with Cpsil-5. Also, GC operating parameters were identical with those of the GC analysis. Retention indices for all the compounds were determined according to the Kovats method relative to then-alkanes series. The identification of the compounds was done by comparison of Kovats indices and by matching their fragmentation patterns in mass spectra with those of standard compounds and published mass spectra data, along with mass spectra of authentic compounds in authors' library.

RESULTS AND DISCUSSION

Both qualitative and quantitative compositions of the oil are presented in Table 1. The retention time ranged between 7.120 and 27.756 mins. In terms of the percentage composition, the highest value was observed in Sabinene as shown above while the lowest value was found in Cis-ocimene (0.065 %). Compounds found in the leaf essential oil which were 36 altogether: Monoterpenoid compounds (2); sesquiterpenoid (9) while non-terpenoid compounds detected were 5. The percentage composition of the mono-terpenoid constituents was 72.54 %, sesquiterpenoids were 21.96 % and Non-terpenoid compounds were 5.49 %. The most abundant monoterpenoid was sabenene (25.0 %). Also, α- terpinolene (13.64 %), 1, 8-cineole (9.11 %), β-pinene (5.65 %) and limonene (5.40 %) were also detected as major monoterpenoids. Monoterpenoids found in appreciable amounts were: terpinen-4-ol (3.77 %), α-pinene (3.20 %) and pinene-2-ol (1.73 %). Those monoterpinoids detected in small quantities were: borneol Acetate (0.68 %), ʁ-terpinene (0.60 %), Ethyl cinnamate (0.54 %), neral (0.48 %), borneol (0.46 %), linalyl acetate (0.42 %), geranial (0.38 %), thymyl methyl ether (0.30 %), ʁ-terpineol (0.25 %), α-thujene (0.2 5 %), allo-ocimene (0.23 %), mycrene (0.19 %), linalool (0.19 %) and cis-ocimene (0.065 %). Beta-caryopyllene (12.75 %) and bicyclogermacrene (5.61 %) were the sesquiterpenoids found in large quantities. Alpha-bergamotene (1.84 %) was detected in appreciable amount. However, Sesquiterpenoids detected in small quantities were β-bisabolene (0.16 %), germacrene D (0.52 %), α-copaene (0.20 %), acetyleugenol (0.19%), β-elemene (0.13 %) and elemecin (0.11 %). Four aromatic non-terpenoid compounds were found in the oil that contained naphthalene (3.25%); phenathrene (1.09%); benzyl alcohol (0.55%) and benzyl benzoate (0.37%). Isoartemisia which is non- aromatic and non-terpenoid was also detected in small quantity (0.23 %). The percentage yield of the leaves essential oil was 0.29 % which is lower than that of Malaysian leaf essential oil which was 0.38 % (Manchand, 1973; Misra 1983). The qualitative composition of the oil shows some similarity to the one obtained at Forestry Research Institute of Nigeria (FRIN), Ibadan (Olayinka and Olusegun, 2000). For instance, the most abundant constituent of the oil, sabinene (25.0 %) was also detected in that of FRIN as 16.5 %. Terpinen-4-ol (3.77 %) was detected in this oil as 9.80 %; β-caryophyllene was detected as 12.75 % which is close to 19.8% detected in FRIN essential oil. When the oil of Benin Republic was compared with this oil, it was observed that there were both qualitative and quantitative differences between the two oils. The essential oil from Benin Rebublic revealed Caryophyllene oxide (4.40 %), trans-α-bergamotene (6.30 %), 6-hydroxycarvotan acetone (4.40 %) and (Z)- trans-α-bergamotol (3.90 %) as major constituents (Sanon et al. 2006; Kossouoh e Kossouoht al. 2010) which were not detected in this oil. The qualitative characteristics displayed by the oil obtained in this study to that of FRIN can be due to the same geographical location while the differences observed in the main components of the oil to that of Benin Republic oil components may be due to the soil nature, geographical location and age of the plants.

Table 1. Characteristics of oil extracted from *Hyptis suaveolens*

Compound	Retention time (min)	% Composition
Limonene	7.120	5.40
Sabinene	7.899	25.0
Naphthalene	8.502	3.25
α-pinene	9.678	3.20
β-pinene	11.297	5.65
Benzyl alcohol	11.661	0.55
Mycrene	12.820	0.19
Cis-ocimene	12.933	0.065
Alloocimene	13.286	0.23
Pine-2-ol	13.879	1.73
α-thujene	14.241	0.25
ʁ-terpinene	14.921	0.60
Neral	15.309	0.48
Geranial	15.309	0.38
Isoartemisia	16.369	0.23
1,8-Cineole	16.780	9.11
Borneol	17.863	0.46
α-terpinolene	18.133	13.64
Linalool	18.352	0.19
α-terpineol	19.102	0.25
Terpine-4-ol	19.519	3.77
Thyml Methyl Ether	19.789	0.30
Linalyl Acetate	20.788	0.42
Ethyl cinnamate	21.263	0.54
Borneol acetate	21.438	0.68
Phenanthrene	21.821	1.09
β-Bisabolene	22.231	0.61
β-Caryopyllene	22.602	12.75
β-Elemene	23.256	0.13
Germacrene D	24.105	0.52
Bicyclogermacrene	24.614	5.61
α-Copaene	24.728	0.20
α-Bergamotene	26.222	1.84
Acetyleugenol	26.839	0.19
Elemecin	27.063	0.12
Benzylbenzoate	27.756	0.37
Total		100%

Conclusion

From this study it is evident that *Hyptis suaveolens* contained some essential oils that can be recovered for beneficial uses. The oil composition varied from one location to others and various factors which include soil nature, geographical location and age of the plants accounted for this variation.

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