Journal of
Pharmacognosy & Natural Products

Arega, J Pharmacogn Nat Prod 2018, 4:1
DOI: 10.4172/2472-0992.1000146

Research Article Open Access

The Essential Oil Analysis of the Fruit of *Piper capense*

Eyob Debebe Arega*

Traditional and Modern Medicine Research, Ethiopian Public Health Institute, Addis Ababa, Ethiopia

***Corresponding author**: Eyob Debebe Arega, Directorate of Traditional and Modern Medicine Research, Ethiopian Public Health Institute, Addis Ababa, Ethiopia, Tel: +251911806532; E-mail: wisdom.eyob@gmail.com

Received date: Jan 03, 2018; **Accepted date:** Jan 08, 2018; **Published date:** Jan 12, 2018

Abstract

Piper capense is used traditionally as spice and for the treatment of infectious diseases in different parts of the world. It is among the species piper which adapted to the climate of Ethiopia. Assessment tells that the plant is used for the remedy of various ailments in different parts of the country. The essential oil obtained by hydrodistillation of the fruit of *Piper capense* grown in Ethiopia was analyzed using GC&GC-MS which showed the presence of 32 predominant constituents like safrole, α-cubebene, α-copaene, β-caryophyllene, germacrene D, β-bisabolene, isoshyobunone.

Keywords: *Piper capense*; Hydrodistillation; GC-MS; Essential oil; Monoterpene

Introduction

Piper capense is among the genus *Piper* which is found in tropic and sub tropic regions in both hemisphere. It is classified under the family of piperaceae [1]. It is an erect or scandent herbs, shrubs or infrequently trees Shrubby herb 1-2 m high, base semi-woody, much branched above, stems glabrouse [2]. In Ethiopia *P. capense* is mostly cultivated and also found in natural forest of Keffa zone of the SNNPR, Bonga's coffee forest of the South West of Ethiopia and in Jimma zone. It is known by different local names including Turfo (Afan Oromo and Kefinya), Timiz (Amharic) and Tonjo (Tigrinya) [3]. It is well known in Ethiopia spice market by its name "abesha timiz". The powdered leaves and stem barks of *P. capense* are used to treat urinary disorder in northern Ethiopia. Leaves are used as a remedy for fever, to improve appetite and stomach-ache. It can be used to cure both human and animal diseases like 'curtomat' (pins and needles in one's legs) 'wugat' (breathing problems), 'kurtat' (digestive problems). The fruit has also some importance for cooking purpose in Ethiopia [4,5]. Various studies have been done on the chemical constituent of different parts of the essential oil of *Piper capense*, for instance; the essential oils from the fruit of *Piper capense*, from S. Tomé e Príncipe were analysed by GC, GC-MS and ^{13}C NMR. Monoterpene hydrocarbons were the main group of constituents in the sample of *P. capense*. β -Pinene (32.5%) and β-caryophyllene (12.6%) were the major compounds in the volatile oil of *P. capense*. The oil was found to be rich in hydrocarbons (>58%) [6]. The GC and GC-MS analysis of the essential oils from the fruits of *Piper capense*, grown in Cameroon were rich in α-pinene (5.6 - 12.3%) and β-pinene (6.7 - 59.3%). The essential oil obtained from the leaves of *P. capense* was largely composed of α-pinene (12.8%), β -pinene (50.1%) and β-caryophyllene (12.4%). The oil from the stems of *P. capense* contained mostly α-pinene (14.3%) and β-pinene (61.4%) [7]. Phytochemical analyses have shown that terpenoids are the most frequently chemical composition of the essential oils from *P. capense* and it was reported that these compounds could be responsible for the antimicrobial activity [8].

Material and Methods

Plant materials

The fresh fruit of *P. capense* was collected from Bonga's coffee forest of the South West of Ethiopia, on September, 2016. The plant material was identified by plant taxonomist Mr. Melaku Wendafrash of the Biology Department of Addis Ababa University, Addis Ababa, Ethiopia. Specimens has been deposited at National Herbarium of Addis Ababa University with Voucher number Eyob D.1.

Isolation of the essential oil

The cleaned and dried fruits of *P. capense* (50 g) was powdered and placed in a round bottom flask fitted with condenser then hydro distilled using Clevenger apparatus for 3 h to yield (0.324 g, 0.64 %).

GC and GC-MS

GC was performed on HP 6890 GC series using HP-5 fused silica capillary column (30 m × 0.25 mm i.d.) The oven was programed at 60-210°C at a rate of 10°C/min using N_2 as a carrier gas), injector and detector (FID) temperature were 220°C-270°C, respectively. GC-MS was performed on fisons GC model 8000 series chromatograph coupled to MD 800 quadrupole analyzer mass spectrometer at 70 eV. The capillary column type was DB-17 (30 m × 0.25 mm i.d.) and GC parameters were the same as above. The constituents were identified by matching their 70 eV mass spectra with NIST, Wiley database and user generated mass spectra libraries and also confirmed by comparison with GC retention times of some authentic samples (Table 1) [9].

Result and Discussion

Essential oils constituents of the fruits of *P. capense*

The result of the analysis is given in Table 1 and Figure 1 below with reference to [9]. A total of 32 predominant components accounting for 98 to 100% of the constituents of were identified from the essential oil.

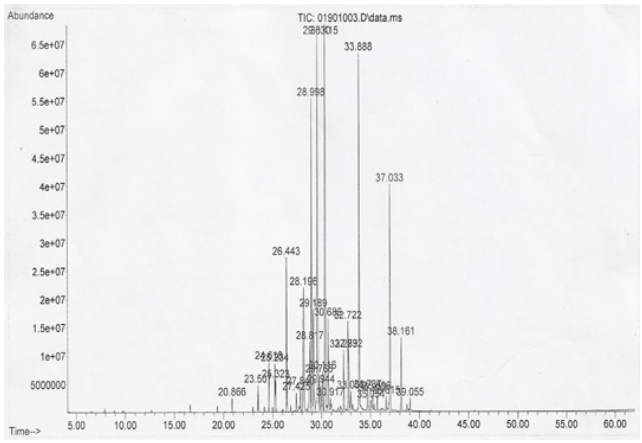

Figure 1: GC-MS profile of an essential oil of the fruit of *P. capense.*

Peak#	Rt	Area %	Compound
1	20.866	0.37	Safrole
2	23.507	0.70	α-cubebene
3	24.618	1.34	α-copaene
4	25.234	1.27	Bicyclosesquiphellandrene
5	25.323	0.83	Cyclohexane,1-ethenyl-1-methyl-2,4-bis(1-methylethenyl)-,[1s-(1 α, 2β,4β)]
6	26.443	4.22	β –Caryophyllene
7	27.425	0.54	(1R,3as,8as)-7-isopropyl-1,4-dimethyl,12,3,3a,6,8a- hexahydrozulene
8	27.840	0.68	Humulene
9	28.196	6.09	(1R,1aR,2aS,6R,6aS,7aS)-1,6,6a-Trimethyldecahydro-1,2a- methanocyclopropa[b]naphthalene
10	28.817	3.33	γ-Muurolene
11	28.998	9.30	GermacreneD
12	29.189	3.47	Naphtalene, decahydro-4a-methyl-1-methylene-7-(1-methylethenyl)-,[4aR(4a.alpha., 7.alpha.,8a.beta.)]
13	29.630	15.32	(1S,2E,6E,10R)-3,7,11,11-Tetramethylbicyclo[8.1.0]undeca-2,6-diene
14	29.760	1.09	γ- Muurolene
15	29.944	0.74	1,5,9-cyclododecatriene
16	30.166	1.23	β-Bisabolene
17	30.415	15.53	Cis-muurola-3,5-diene
18	30.686	2.61	1-Isopropyl-4,7-dimethyl-1,2,3,4,5,6,8a-Hexa hydronaphthalene
19	30.917	0.26	Isoshyobunone
20	32.283	1.66	β-myrcene
21	32.722	2.73	(+)-epi-Bicyclosesquiphellandrene
22	32.792	1.56	1H-cycloprop[e]azulen-7-ol,decahydro-1,1,7-trimethyl-4- methylene-,[1aR-(1a.alpha.,4a.alpha.,7.beta., 7a.beta.,7b.alpha.)]

23	33.003	0.72	Aromandendrene
24	33.888	11.26	Dihydroxy-isocalamendiol
25	34.737	0.85	1,5-Hexadiene
26	35.054	0.54	((4aS,8S,8aR)-8-Isopropyl-5-methyl-3,4,4a,7,8,8a-hexahydronaphthalen-2-yl)methanol
27	35.232	0.63	Bicyclo[4.4.0]dec-1-ene
28	35.696	0.60	α-Cadinol
29	36.615	0.41	(1R,1aR,2aS,5R,6R,6aS,7aS)-1,6,6a-trimethyldecahydro-1-2a-methanocyclopropa[b]naphthalene-5-ol
30	37.033	7.22	γ-Muurolene
31	38.161	2.53	3-Tetradecen-5-yne
32	39.055	0.39	Bicyclo[6.1.0]non-1-ene

Table 1: Chemical composition of the essential oils of the fruit of *P. capense.*

Conclusion

The results obtained from GC-MS Table 1 and Figure 1 showed that the fruits of *P. capense* contains a large proportions of mono and sesquiterpenes. These findings suggested that the essential oil of the fruit of *P. capense* contain numerous compounds having medicinal property. Further study is required to explore other chemical constituents of the solvent extracts of the fruits of *P. capense*. Furthermore it is also necessary to study the antioxidant and antimicrobial activity of the extract and essential oil of the fruits of *P. capense*.

Acknowledgement

My acknowledgement goes to Mr. Melaku Wendafrash for the identification of *P. capense* and my friends who are advising me while I was writing this paper. I am also grateful to Ethiopian public Health Institute and Adama Science and Technology University that provides me with different facilities for the laboratory work.

References

1. Kochhar SL. Economic botany in the tropics second edition (1998) Departùent of Botany, Sri Guru Tegh Bahadur Khalsa College, University of Delhi; 604.
2. Jaramillo MA, Manos PS (2001) Phylogeny and patterns of floral diversity in the Genus Piper (Piperaceae). Am J Bot 88: 706-716.
3. Edwards S, Tadesse M, Demissew S, Hedberg I. Flora of Ethiopia and Eritrea, Vol. 2, Part 1: Magnoliaceae to Flacourtiaceae. The National Herbarium, Addis Ababa and the Department of Systematic Botany, Uppsala 2000: 59-64.
4. Habetewold KA (2014) Morphological Characterization of Two Species of Piper, *Piper umbellatum* and *Piper capense* in Tepi, Ethiopia. Greener J Plant Breeding and Crop Sci 2: 27-33.
5. Briggs P. Ethiopia the bradt travel guide. 4th edn England.
6. Martins AP, Salgueiro L, Vila R, Tomi F, Canigueral S, et al. (1998) Essential oils from four Piper species. J Phytochemistry 49: 2019-2023.
7. Tchoumbougnang F, Fombotioh N (2009) Comparative essential oils composition and insecticidal effect of different tissues of *Piper capense* L, *Piper guineense* Schum. et Thonn, *Piper nigrum* L and *Piper umbellatum* L grown in Cameroon. Afr J Biotechnol 8: 424-431.
8. Steenkamp V, Fernandes AC, Van Rensburg CE (2007) Antibacterial activity of Venda medicinal plants. Fitoterapia 78: 561-564.
9. Adams RP (2007) Identification of Essential Oil Components by Gas Chromatography/Mass Spectrometry, 4th edn. Allured Publishing Corp, Carol Stream, Illinois.