JAP&T
TPA-Timişoara

Available online at http://journal-of-agroalimentary.ro

Journal of Agroalimentary Processes and Technologies 2019, *25* (3), 153-156

Journal of Agroalimentary Processes and Technologies

The chemical composition of essential oil of mountain Mint (*Cyclottrichium niveum* L.) leaves

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Abstract

The air dried part of *Cyclottrichium niveum* L plant was subjected to hydrodistillation for 4 h using a Clevenger type apparatus to give yellow oils in 0.8 %. The constituents of mountain mint essential oil was determined via gas chromatography-mass spectrometry (GC-MS). Thirty-one constituents were identified in the oil, representing 98.53% of the total oil. Pulegone (49.23%), isomenthone (15.52%), neo-iso-menthol (12.67%), menthone (3.32%), β-pinene (3.31%), cis-isopulegone (3.13%) and menthol (3.0%) were established as major constituents of mountain mint. According to these reports, isomenthone and pulegone are the main compounds of *Cyclotrichium niveum* essential oil.

Keywords: mountain mint, *Cyclottrichium niveum*, essential oil, pulegone

1.Introduction

Cyclottrichium a member of the family Labiatae, is a perennial plant endemic to Turkey. The local name of this plant is "dağnanesi" in Turkish. *Cyclottrichium* is growing in Eastern Anatolia [1] (Başer et al. 1994). Labiatae, which also includes the mints, many species and varieties of which grow wild were cultivated in many parts of the world [2,3]. The herbs and/or their essential oils are used commonly in the food, drug and perfumery industries [4]. The essential oils of the plants have been of great interest for their potential uses as alternative remedies for the treatment of many infectious diseases and pharmaceutical alternative medicine and natural therapies [5,6]. The essential oils which were utilised centuries ago in cosmetics usually show interesting biological features. The oils also help increase the flow of digestive fluids, improve digestion and eliminate gas and stomach cramping [7]. The family of Lamiaceae contains an extremely wide variety of aromatic plants mainly in temperate countries [8].

Essential oils are valuable natural products used as raw materials in many fields, including perfumes, cosmetics, aromatherapy, phototherapy, spices and nutrition [9]. Also the essential oils are used in traditional medicine for their antiseptic action, are constituted 1% of plant secondary metabolites and are mainly represented by terpenoids, phenypropanoids or benzenoids, fatty acid derivatives and amino-acid derivatives [10]. Plant essential oils and their components have been known to exhibit biological activities, especially antimicrobial [11]. The aim of current study was to determine the chemical compositions of *Cyclottrichium niveum* L. leaves collected from Konya, Turkey.

2.Material and Methods

2.1.Material

*Cyclottrichium niveum*L. leaves were collected from Konya (Bozkır). A voucher specimen (OTugay-7113) was kept in the herbarium of the Department of Food Engineering, Faculty of

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Agriculture, University of Selçuk, and identified by O Tugay.

2.2. Recovery of the essential oils

Dried aerial parts of the plant (200 g) were ground and submitted to hydrodistillation for 4 h using a Clevenger-type apparatus and the oils obtained were dried over anhydrous sodium sulfate. The essential oils were light yellow with yield of 0.8% v/w, on dry basis.

2.3.Idendification of components

GC analysis: The essential oil were analysed on a Agilent Gas Chromatograph Model 6890, equipped with a DB5 MS column (30 m X 0.25 mm, 0.25 µm), programming from 50°C (5 min) to 300°C at 5°C/ mn, 5 min hold. Hydrogen as carrier gas (1,0 ml/min) ; injection in split mode (1 : 60) ; injector and detector temperature, 280 and 300°C respectively. The essential oil is diluted in hexane : 1/30.

GC-MS Analysis: The essential oil were analysed on a Agilent gas chromatograph Model 7890, coupled to a Agilent MS model 5975, equipped whith a DB5 MS column (30 m X 0.25 mm, 0.25 µm), programming from 50°C (5 min) to 300°C at 5°C/ mn, 5 min hold. Helium as carrier gas (1,0 ml/ min) ; injection in split mode (1: 100); injector and detector temperature, 250 and 280°C respectively. The MS working in electron impact mode at 70 eV; electron multiplier, 1200 V; ion source temperature, 230°C; mass spectra data were acquired in the scan mode in *m/z* range 33-450. The essential oil is diluted in hexane : 1/30. The components were identified by comparing linear Kovats indices, their retention times and mass spectra with those obtained from the authentic samples and/or the MS library. The library search was carried out using a Wiley GCMS Library of Essential Oil Constituents. The percentage composition of the essential oil was computed from GC peak areas without correction factors. Qualitative analysis was based on a comparison of retention times and mass spectra with corresponding data in the literature [12].

3.Results and Discussion

Chemical composition of essential oils of mountain mint are given in Table 1. The air dried plant materials were subjected to hydrodistillation for 4 h using a Clevenger type apparatus to give yellow oils in 0.8% (*Cyclottrichium niveum*).

The plant's air-dried aerial parts of *Cyclotrichium depauperatum* contained 0.3 percent of a yellowish oil with an aromatic odor, and pinocamphone is the major components of the plant's essential oil (Sajjadi and Mehregan, 2006) [5]. In previous studty, dried leaves of *C. niveum* contained 5.6% essential oil (Baytop, 1984). The constituents of mountain mint essential oil was determined via gas chromatography-mass spectrometry (GC-MS). Thirty-one constituents were identified in the oil, representing 98.53% of the total oil. β-pinene (3.31%), menthone (3.32%), isomenthone (15.52%), menthol (3.0%), neo-iso-menthol (12.67%), pulegone (49.23%) and cis-isopulegone (3.13%) were established as major constituents of mountain mint. The obtained results show that there are clear differences in the quantity of essential oil (2.1% for *Cyclottrichium niveum*) [6]. Among the constituents identified, pulegone (50.46%) and isomenthone (34.53%) were the major ones of *Cyclottrichium niveum* essential oil [6]. Başer et al. [1] reported that the identified components constituted 97.3-98.4 of the oils obtained from the aerial parts, leaves and leafless stems of *Cyclottrichium niveum*, and major components were pulegone (32.5-56.4%) and isomenthone (34.2-35.4%). Cetinus et al. [13] reported that the essential oil extracted from the upper section of *C. niveum* plants contained 76.84% pulegone and 6.65% isomenthone. In another study, *Cyclottrichium niveum* contained 2.1% essential oil, and 26 leading components were determined in essential oil of *C. niveum* plants picked in full blossoming period, and this oil contained 50.46% pulegone, 34.53% isomenthone, 2.11% limonene, 1.91%1,8-cineole, 1.53% Yelement, 1.46% gama-pentene [6]. The analysis of *Cyclotrichium niveum* essential oil extracted included 42 components and pulegone was the main component among these. Whereas the lowest pulegone rate was determined as 59.9% at 890 m altitude, the highest value (68.12%) was determined at 1605 m [14]. When the results were compared with the literature, the oil showed significant differences or climatological factors or development stages or plant parts analysed. The fact that the contents of substances identified in the present study and those cited in the Literature are different is in aggreement with Başer *et al.* [1] and Alim *et al.* [6], who proposed that plants developed under different conditions contain oils with different characteristics.

Table 1. Chemical composition of essential oil of *Cyclottrichium niveum* L. leaves[a]

RT	Constituents	%
10.25	α- pinene	0.45[b]
11.67	Sabinene	0.16
11.84	β- pinene	3.31
12.27	Myrcene	0.16
12.58	3-octanol	0.17
13.48	p-cymene	0.09
13.63	Limonene	0.33
13.75	Eucalyptol	0.10
15.97	Linalol	0.14
17.26	Trans-Pinocarvol	0.19
17.49	Isopulegol	0.14
17.55	Manth—3-ene-8-ol para	0.67
17.73	Menthone	3.31
18.04	Isomenthone	15.52
18.14	Neo-Menthol	1.58
18.31	Cis-Isopulegone	2.81
18.39	Menthol	3.01
18.46	Terpinene-4-ol	0.16
18.70	Iso-menthol	1.27
18.84	Neo-iso-Menthol	12.67
20.22	Pulegone	49.23
21.50	Acetate de menthyle	0.37
21.93	Acetate d'iso-menthyle	0.22
22.00	Acetate d'isopulegyle	0.28
22.84	Piperitenone	0.29
28.65	Spathulenol	0.17
28.79	Oxyde de caryophyllene	0.24
35.84	Palmitate de methyle	0.31
38.94	Linoleate de methyle	0.29
39.07	Oleate de methyle	0.79
39.55	Stearate de methyle	0.10

[a]Compound listed in the order of elution from a HP-5MS column.
[b]Each compound is mean of two values

According to these reports, isomenthone and pulegone are the main compounds of *Cyclotrichium niveum* essential oil. When the results were compared with the literature, the oil showed significant differences or climatological factors or development stages or plant parts analysed. The fact that the contents of substances identified in the present study and those cited in the Literature are different is in aggreement with Başer et al. [1] and Alim *et al*. [6], who proposed that plants developed under different conditions contain oils with different characteristics.

Acknowledgements: This study was supported by Selcuk University Scientific Research Project (S.Ü.-BAP, Konya-Turkey). The authors wish to thank BAP Staffs.

Compliance with Ethics Requirements. Authors declare that they respect the journal's ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human / or animal subjects (if exist) respect the specific regulation and standards.

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