JAEFS

International Journal of Agriculture, Environment and Food Sciences

e-ISSN : 2618-5946 DOI: 10.31015/jaefs.18038 www.jaefs.com

Research Article

Int J Agric Environ Food Sci 2 (Special Issue 1):204-205 (2018)

The Fourth International Mediterranean Symposium on Medicinal and Aromatic Plants (MESMAP-4) 2018 Special Issue

Essential oil yield and compositions of endemic mountain tea (*Sideritis libanotica* Labill. ssp. linearis (Bentham) Borm. and *Sideritis bilgerana* P.H. Davis) cultivated in Konya ecological conditions of Turkey

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Abstract

In this study, it was investigated essential oil yield and compositions of endemic mountain tea (*Sideritis libanotica* Labill. and *Sideritis bilgerana* P.H. Davis) cultivated in Konya ecological conditions, Turkey. The essential oil yield of cultivated *Sideritis libonitica* Labill. flowers was 0.20 % while the essential oil yield of *Sideritis bilgerana* P.H. Davis flowers was 0.15%. The highest essential oil components were determined as 19.82 % β-pinene, 14.60 % α-pinene from *Sideritis bilgerana* P.H. Davis; 25.92 % hexadecanoic acid and 21.49% δ-cadinene from *Sideritis libonitica* Labill. According to the results of this study, it was determined that significant differences between essential oil yield and components of cultivated the endemic mountain tea species in Konya ecological conditions were determined.

Keywords: Mountain tea, *Sideritis*, Essential oil, Composition, Endemic

Received: 12.04.2018 Accepted: 16.05.2018 Published (online): 15.10.2018

Introduction

Sideritis L. belongs to the family of Lamiaceae (Labiatae) which is one of the most common and diverse plants of the world. Over 150 species of the genus Sideritis are mainly found in the Mediterranean area. The aerial parts of plants from the genus Sideritis, generally known as 'mountain tea', are widely used as a popular folk medicine in Spain, Greece and Turkey. The genus Sideritis is represented in the Turkish flora by 46 species, 31 of which are endemic (Demirtaş et al, 2011), including Sideritis libanotica Labill. ssp. linearis (Bentham) Borm. Sideritis species are used in the treatment of gastrointestinal ailments and common colds as well as a herbal tea in Turkish folk medicine (Baytop, 1999; Yesilada et al., 1995). Several studies have been conducted on various biological activities of Sideritis species such as antimicrobial, antioxidant, antiinflammatory, antispasmodic, antiulcerative, nervous system stimulant anticonvulsant, carminative, analgesic and sedative effects. Çarıkçı et al., 2012; Gümüşçü et al., 2011; İşcan et al., 2005; Tepe et al., 2006; Gonzales et al. 2011). Many chemical constituents have been identified in sideritis genus such as terpenes, flavonoids, essential oil, iridoids, coumarins, lignanes and sterols. Diterpenes, flavonoidts and essential oil ocur in almost every species. In fact, they are the main pesponsible for the pharmacological activity. Sideritis species grown in Turkey are has got a rich yield and compositions of essential oils.

This study was carried out to determine essential oil yields and compositions oil from two endemic mountain tea species cultivated in Konya, Turkey.

Materials and Methods

Plant material: Sideritis bilgerana and Sideritis libonitica were cultivated at the Medicinal Plant Farm, in Konya (Turkey). The species were identified by Dr. Hayri Duman, at Gazi University. Voucher specimens were deposited at the Herbarium of Faculty of Agriculture, Selçuk University, Konya, Turkey.

Essential oil yield (%): Plant samples to be used in the analysis of essential oil were harvested in flowering period. The essential oils were obtained by hydrodistillation using a Clevenger-type apparatus for 3 h, from aerial parts of the Sideritis libonotica and Sideritis bilgerana. The oil yields were calculated on a dry weight basis as 0.20 and 0.15%, respectively.

Determination of essential oil components: After the essential oil was obtained, essential oil was identified to the GC-MS to determine its components. The chemical composition of *Sideritis libanotica* and *Sideritis bilgerana* essential oil was performed by GC-MS. The composition of the essential oil was calculated as percentage. The identification of essential oil components was carried out by comparison of the obtained mass spectra with the NIST and Wiley library.

Results and Discussion

The essential oil yield of cultivated Sideritis libonitica Labill. flowers was 0.20 % while the essential oil yield of Sideritis bilgerana P.H. Davis flowers was 0.15%. The percentage constituents of essential oils from cultivated *Sideritis libanotica* and *Sideritis bilgerana* were given Table 1.

The essential oils of *S. bilgerana* and *Sideritis libonotica* were analyzed both by GC and GC/MS to determine their

Cite this article as : Kan, Y., Kan, A., Ayran, I., Celik, A.S. (2018). Essential oil yield and compositions of endemic mountain tea (*Sideritis libanotica* Labill. ssp. linearis (Bentham) Borm. and *Sideritis bilgerana* P.H. Davis) cultivated in Konya ecological conditions of Turkey. Int. J. Agric. Environ. Food Sci., 2 (Special Issue 1), 204-205. DOI: 10.31015/jaefs.18038

Available online at : www.jaefs.com - http://dergipark.gov.tr/jaefs

constituents (Table 1). As a result of GC and GC/MS analyses, 22 and 18 components were identified, representing 85.013 and 97.000 % of the total for both *S. bilgerana* and *S. libonotica* oils, respectively. GC/MS analyses of the oils have revealed the occurrence of β -pinene (19,82%) and α -pinene (14.40 %) as the main constituents of *S. bilgerana*. δ-cadinene (21.49%) and hexadecanoic acid (25,92%) was also characterized as a main component in the oil of *S.libonotica.* To the best of our knowledge, the literature contains no information on the essential oil from *S. libanotica* and *S. bilgerena* produced in the control of cultivation conditions. With it, Iscan et al. (2005) reported β -pinene (48.40 %) and α -pinene (31.90 %) as the main constituents of *S. bilgerana* collected from naturally growing in flora of Turkey. The essential oil yield and composition of is highly could be influenced by genetic and environmental factors, cultivation and ecological conditions.

Conclusion

According to the results of this study, it was determined that significant differences between essential oil yield and components of the endemic mountain tea species cultivated in Konya ecological conditions according to *Sideritis* spp. grown in natural flora.

Table 1. The composition of essential oils from *Sideritis bilgerana* and *S. libonotica* cultivated

RI	Components	Percentage	
		Sideritis bilgerana	***Sideritis libonotica***
1022	α-pinene	14.606	0.075
1111	β -pinene	19.028	0.284
1165	α -cubebene	1.841	-
1197	Limonene	1.126	0.108
1204	β-phellandrene	0.356	0.101
1206	Muurol-5-En-4-α-Ol (cıs)	1,348	-
1208	Muurola-4(14),5-Diene(Trans)	0,322	-
1210	2-hexenal	0.087	0.096
1289	Linalool	0,791	-
1549	Muurola-3,5-Diene(Cıs)	0,654	-
1599	Cadına-1(6),4-Diene(Trans)	0,61	-
1606	Caryophyllene	2.446	4.528
1665	β-farnesene	1.103	0.817
1669	γ-curcumene	2.022	0.872
1727	Zingiberene	3.075	2.207
1735	β -bisabolene	9.861	20.286
1748	Bicyclogermacrene	-	3.151
1781	Bisabolene	-	0.289
1783	α-curcumene	1.125	0.933
1869	δ-cadinene	7.932	21.49
1987	Caryophyllene oxide	4.326	7.409
2126	Pentadecanone	-	1.831
2142	3-hexen-1-ol	0.958	3.530
2224	α- bisabolol	5.437	3.073
2894	Hexadecanoic acid	5.959	25.92
	Total	85.013	97.000

References

Demirtas, I., Ayhan, B., Sahin, A., Aksit, H., Elmastas, M. Telci, I. (2011). Antioxidant activity and chemical composition of Sideritis libanotica Labill. ssp. linearis (Bentham) Borm. (Lamiaceae). Natural Product Research, 25 (16), 1512–1523.

Baytop, T. (1999). Therapy with medicinal plants in Turkey (past and present). Istanbul, Nobel Tip Publications.

Yesilada, E., Honda, G., Sezik, E., Tabata, M., Fujita, T., Tanaka, T., Takeda, Y., Takaishi, Y. (1995). Traditional medicine in Turkey V. Folk medicine in inner Taurus mountains. Journal of Ethnopharmacology, 46, 133–152.

Carikci, S., Kilic, T., Azizoglu, A., Topcu, G. (2012). Chemical constituents of two endemic sideritis species from turkey with antioxidant activity. Rec. Nat. Prod. 6 (2),101-109.

Gumuscu, A., Tugay, O., Kan, Y. (2011). Comparison of essential oil compositions of some natural and cultivated endemic sideritis species. Advances in Environmental Biology, 5(2), 222-226.

Iscan, G., Kirimer, N., Kurkcuoglu, M., Baser, K.H.C. (2005). Composition and antimicrobial activity of the essential oil of endemic species from Turkey: Sideritis cilicica and Sideritis bilgerana. Chemistry of Natural Compounds, 41(6), 679-82.

Tepe, B., Sokmen, M., Akpulat, H.A., Yumrutas, O., Sokmen, A. (2006). Screening of antioksidative properties of the methonolic exstracts of Pelargonium endlicherianum Fenzl., Verbascum wiedemannianum Fisch.&Mey., Sideritis libonotica Labill. Subsp. Linearis(Bentham) Borm., Centaurea mucronifera DC. and Hieracium cappadocicum Freyn from Turkish Flora. Food Chemistry, 98, 9-13.

Gonzales-Burgos, E., Carretero, M.E., Gomez-Serranillos M.P (2011). *Sideritis spp.*: uses, chemical composition and pharmacological activities-A review. J. Etnopharmacology, 135, 209-225.