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Essential Oil Composition of *Teucrium polium* L. Grown in Aydın/Turkey

Aydın/Türkiye'de Yetişen *Teucrium polium* L. Türünün Uçucu Yağ Kompozisyonu

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Abstract

Teucrium L. (Lamiaceae) is a polymorphic and wide spreading genus which is commonly grown in Europe, North Africa and in the temperate parts of Asia. In this study, essential oil composition *Teucrium polium* L. were investigated. Extraction was carried out with clevenger apparatus and essential oil composition was determined by Gas Chromatography-Mass Spectrometry (GC-MS). Specifically, *T. polium* was found to be rich in germacrene D (8.10%), carvacrol (5.41%), β-pinene (4.63%), α-copaene (3.40%), spathulenol (3.32%) at most.

Keywords: *Teucrium polium*, essential oils, GC-MS, Aydın/Turkey

Öz

Teucrium L. (Lamiaceae), Avrupa, Kuzey Afrika ve Asya'nın ılıman bölgelerinde yaygın olarak yetişen polimorfik ve geniş yayılım gösteren bir cinstir. Bu çalışmada, *Teucrium polium* türünün uçucu yağ bileşimi araştırıldı. Ekstraksiyon işlemi, clevenger cihazı ile gerçekleştirildi ve uçucu yağ bileşimi, Gaz Kromatografisi-Kütle Spektrometresi (GC-MS) ile belirlendi. Özellikle, *T. polium* bitkisinin uçucu yağında en fazla germakren D (% 8.10), karvakrol (% 5.41), β-pinen (% 4.63), α-copaene (% 3.40) ve spathulenol (% 3.32) maddeleri bulunmuştur.

Anahtar Kelimeler: *Teucrium polium,* Uçucu yağ, GC-MS, Aydın/Türkiye

1. Introduction

Lamiaceae family, spreading on a large area in the world, consists of 236 genus and 7133 species. Lamiaceae exists especially in tropical and mild regions like Mediterranean region; on tropical high plains having seasonal climate (Yılar et al. 2015). Turkey is regarded as an important gene-center for the family Lamiaceae (Baydar et al. 2004). This family is represented by approximately 574 species of 45 genus in Turkey. This family, which has around 44.5% endemism rate in Turkey, is the third richest family of the country in terms of taxon amount included (Koyuncu et al. 2010). Lamiaceae family is of great importance in a variety of fields such as medical, food, cosmetic and perfumery since most members of this family are rich in essential oil, aromatic oils and similar secondary metabolites (Başer 1993; Kahraman et al. 2009). On the other hand, ethnobotanical use of this family members are widespread in Turkey (Baytop, 1999; Tuzlacı and Erol 1999; Yeşilada et al. 1999; Sezik et al. 2001; Başer et al. 2012; Kargıoğlu et al. 2008). *Teucrium* L. (Lamiaceae) is a polymorphic and wide spreading genus which is commonly grown in Europe, North Africa and in the temperate parts of Asia. *Teucrium* genus comprises 32 species, 10 subspecies, 2 variety, totally 44 taxa belonging to 8 sections in Turkish flora (Dinç et al. 2011). *T. polium* aerial parts are used in some traditional medicines as diuretic, diaphoretic, tonic, antipyretic, antispasmodic and coagolic (Sabzeghabaie and Asgarpanah 2016). Significant hypoglycemic, insulinotropic, anti-inflammatory, hypolipidemic, antinociceptive and antioxidant potentials of *T. polium* aerial parts have also been identified (Couladis et al. 2003; Esmaeili and Yazdanparast 2004). Antioxidant (Mahmoudi and Nosratpour 2013), anti-inflammatory (Tariq et al. 1989), analgesic and antinociceptive (Abdollahi et al. 2003), anticonvulsant (Khoshnood-Mansoorkhani et al. 2010), and antimicrobial activities (Raei et al. 2014) have been reported from *T. polium* aerial parts essential oil.

The aim of the present study was to determine the essential oil contents of Lamiaceae family belonging to plant, *Teucrium polium* growing in West Anatolian ecological conditions.

2. Materials and Methods

2.1. Plant materials

T. polium aerial parts of the plants were collected as study materials in July 2015, which are their blooming periods from Aydın its surroundings (Fig. 1). The collected

samples were placed in fabric bags and kept in a room with no sunlight.

Figure 1. Location of Aydın region

2.2. Isolation of essential oils

Approximately, 200 g of plant samples were used for the essential oil extraction process. Extraction was performed with Clevenger apparatus (Basaran cam, Turkey and Misung Scientific Co., Korea) using water distillation.

2.3. GC-MS analysis

Qualitative and quantitative essential oil analysis were conducted at Eskisehir Anadolu University Medicinal Plants, Drugs and Scientific Research Center (AUBİBAM) by Hewlett Packard 5973 Mass Selective Detector System and GC-MS 6890 instrument equippped with an Agilent HP-Innowax colon (60m X 0.25 mm film, 0.25 µm thickness). Hellium was used as a carrier gas. Conditions were as follows; from 50 ºC to 240 ºC by an increase of 4 ºC / minutes. At 240 °C, 40 minutes of waiting time were implemented. Injection port and detector temperature were 250ºC and 280ºC respectively. Chracterization of essential oil components was based on the library (Wiley and NIST) comparision with the mass spectra of the injected essential oil samples.

3. Results and Discussion

In our study, totaly 211 component were detected as *T. polium* aerial parts essential oil composition. 64% of the total essential oils in 42 components (components which are ≥0.4% in total ratio) were given in Table 1. The essential oils obtained from the *T. polium* plant were detected to contain germacrene D (8.10%), carvacrol (5.41%), β-pinene (4.63%), α-copaene (3.40%), spathulenol (3.32%) at most (Table 1). This study detected germacrene D (8.10%) as the highest amount in essential oils obtained from *T. polium* plant. Previous studies detected the highest amounts obtained from essential oils as follows; germacrene D (25.81%) (Belmekki et al. 2013), α-pinene (12.52%) (Moghtader 2009), α-pinene (18.02%) (Sabzeghabaie and Asgarpanah 2016), (Z)-b-farnesene (15.49%) (Sevindik et al. 2016), and β-Caryophyllene (29%) (Raei et al. 2014).

Table 1. Essential oil composition of *T. polium*

T. polium		
RT	**Component**	**Percent (%)**
11.603	α- pinene	1.56
11.862	α- thujene	1.14
16.144	β- pinene	4.63
16.771	sabinene	0.95
19.056	β- myrecene	0.61
20.823	limonene	1.75
24.348	benzene	1.58
31.578	1-octen-3-ol	0.53
33.568	α- copaene	3.40
34.527	β- bourbonene	1.24
35.132	linalool	0.73
36.473	pinacarvone	0.75
36.978	β- elemene	0.78
37.360	caryophyllene	1.51
38.578	γ- elemene	1.82
39.219	trans-pinecarveol	0.91
39.328	trans- β- farnesene	1.32
39.832	α- caryophyllene	0.64
40.438	α- terpineol	1.11
40.668	Isoborneol	0.42
41.296	germacrene D	8.10
41.454	α-muurolene	0.68
41.937	bicyclogermacrene	1.88
42.528	δ-cadinene	2.72
42.658	α- amorphene	0.56
43.328	naphthalene	0.58
43.444	myrtenol	1.09
44.496	germacrene B	1.69
48.353	pyridinium	0.65
49.420	caryophyllene oxide	0.57
50.249	endo-1-bourbonanol	0.54
51.482	cyclohexanemethanol	0.49
52.472	2-pentadecanone	1.72
52.873	spathulenol	3.32
53.464	nonanoic acid	0.82
53.990	α-cadinol	0.99
54.963	carvacrol	5.41
55.497	isospathulenol	0.61
56.384	selin-11-en-4-α-ol	0.64
56.845	oxo-α-ylangene	0.79
62.043	dodecanoic acid	0.68
79.437	hexadecanoic acid	1.89

4. Conclusion

According to the results obtained in this study, these findings may be a valuable resource for further biotechnological, pharmaceutical and medicinal studies.

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