





Volatile Oil Composition of Anzer Thyme

Anzer Kekiğinin Uçucu Yağ Bileşenleri

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Abstract	Özet

The Black Sea region belongs to one of the Karadeniz richest regions of Turkey regarding biological acisindan diversity. Totally 2239 species are distributed bölgelerinden in the East Black Sea region. 514 species are Bölgesi'nde toplam 2239 tür bulunmakta endemic and the endemism ratio is ca. 23 %. olup, bunların 514'ü endemiktir ve endemizm Rize displays more than half of the plants oranı yaklaşık %23' tür. Doğu Karadeniz distributed at the East Black Sea region. It bölgesinde can be stated that almost 70 % of these plants yarısından fazlası Rize ilinde bulunmakta are of medicinal and aromatic value. One of olup, bitkilerin yaklaşık %70'i tıbbi ve them is Anzer Thyme. Totally 24 volatile oil aromatik değere sahiptir. Bunlardan biri de components were detected corresponding to Anzer Kekiğidir. 99.88 % of total volatile oil. The biggest %99.88'ine tekabül eden toplam 24 uçucu yağ chemical group was monoterpenes (77.83 %). Specially thymol, kimyasal grup oksijenli monoterpenlerdir carvacrol and linalool were detected in high (%77.83). Özellikle thymol, carvacrol ve amounts (respectively 20.45 %, 14.83 % and linalool 13.89 %).

bölgesi biyolojik cesitlilik Türkiye'nin zengin en biridir. Karadeniz Doğu yayılış gösteren bitkilerin Toplam uçucu yağın oxygenated bileşeni tespit edilebilmiştir. En büyük yüksek miktarlarda (sırasıyla %20.45, %14.83 ve %13.89) tespit edilmiştir.

Keywords: Anzer thyme, Volatile oil, Anahtar kelimeler: Anzer kekiği, Uçucu Medicinal plant yağ, tıbbi bitki

1. INTRODUCTION

Medicinal and aromatic plants have use in in traditional and modern medicine. They are helpful in the prevention, improvement and maintenance of diseases. These plants have use in nutrition as nutritional supplements, herbal tea, spices and condiments. Besides their use

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inbody care products, perfumery and cosmetics, these plants are useful in the pesticide and brightening industry. Different parts of these plants (root, rhizome, tuber, stem or woody structure, bark, leaf, flower, fruit, seed and herb) are used as drug leaves. The use of medicinal plants as medicine for therapeutic purposes dates back to ancient times. In particular, Ibn Sina's work called El-Kanun Fi-t T1bb, which he wrote in 930-1037, contains a lot of information about the use of many plants as medicine, which organs and which diseases they have therapeutic properties. The mentions that thyme has dissolving and disintegrating properties, breaking even frozen blood, preventing shivering from cold when drunk in winter, destroying warts, expectorant, relieving rib pain, improving eyesight and appetite, its use as digestion facilitator, dewormer and diuretic can be seen in the literature (Kahya, 2017).

The genus *Thymus* represents one of the most important genera of the Lamiaceae family, containing over 100 species (Tohidi et al., 2017). This medicinal plant has perennial behaviour and is distributed naturally in different regions of the world. The origin of this plant was was assumed as the Mediterranean regions (Pirbalouti et al., 2013). In Turkey this genus is represented by 38 species and altogether 64 taxa, 24 of them are endemic (Manou et al., 1998).

The Black Sea region is one of the richest regions of Turkey concerning biodiversity. 2239 plant species are present in the East Black Sea region. The number of endemic species are 514 and the endemism ratio is ca. 23 %. Over 50 % of the plants present at the East Black Sea region can be seen also in the Rize province. The percent of plants with potential medicinal and aromatic value are about 70 % (Yurteri et al., 2017).

Thymus praecox Opiz subsp. *caucasicus* (Wild. ex Ronniger) Jalas var. *caucasicus* was collected from the Anzer Plateau in Rize and investigated regarding its volatile oil composition.

2. MATERIALS and METHODS

The Anzer Plateau, where the plant material was collected, is located in Rize. Rize is located in Northeastern Anatolia, East of the Eastern Black Sea coastline. It is surrounded by Of and Trabzon from the west, İspir of Erzurum from the south, Yusufeli and Arhavi of Artvin from the east, and the Black Sea from the north, and its area is 3922 km² excluding the lakes. The plant material *Thymus praecox* Opiz subsp. *caucasicus* (Wild. ex Ronniger) Jalas var. *caucasicus* was collected from the Anzer plateau and its active ingredients were investigated.

2.1.1. Sample Preparation and Volatile Oil Analysis

Sample preparation and volatile oil analysis using GC-MS was done as described by Yurteri et al. (2021).

3. RESULTS and DISCUSSION

The volatile oil composition of collected Anzer Thyme can be seen in Table 1. Totally 21 volatile oil components were detected corresponding to 99.88 % of total volatile oil. The biggest chemical group was oxygenated monoterpenes (77.83 %). Specially thymol, carvacrol and linalool were detected in high amounts (respectively 20.45 %, 14.86 % and 13.89 %). Also monoterpene hydrocarbons (5.17), sesquiterpene hydrocarbons (4.59 %) and oxygenated sesquiterpenes (1.77 %) were detected as chemical groups. Isovaleric acid (1.26 %), α -terpinyl acetate (5.18), myristic alcohol (2.35 %), isoeugenyl phenylacetate (0.41) and pentadecanolide (1.32) were constituents of investigated volatile oil.

Sekeroglu et al. (2007) detected thymol (47.45%), γ -terpinene (8.73%), p-cymene (8.30%), terpinyl acetate (4.88%) and carvacrol (4.66%) as major components in the same species. Yurteri et al. (2017) investigated the same species and detected 39-42.12 % thymol, 20.76-53.57 % carvacrol and 11.65-31.37 % α -terpinyl acetate in Anzer thyme populations collected from different altitudes.

The reason for the difference in terms of volatile components among given literature can be explained by ecological conditions of the region grown on volatile components, the harvest times of the plant, the maturation stage, the different plant parts, species diversity and genetic diversity (Hazzit & Baaliouamer, 2009; Lukas et al., 2015; Toncer et al., 2010; Tümen et al., 1995).

Table 1. Volatile Oil Composition of (*Thymus praecox* Opiz subsp. *caucasicus* (Wild. Ex Ronniger) Jalas var. *caucasicus* collected from Anzer/Rize

Monoterpene hydrocarbons p-Cymene 1025 $C_{10}H_{14}$ 0.75 γ -Terpinene 1067 $C_{10}H_{16}$ 4.42 Total 5.17 Oxygenated monoterpenes 5.17 Linalool 1099 $C_{10}H_{18}O$ 13.89 trans-Sabinene hydrate 1101 $C10H_{18}O$ 0.67 Eucalyptol 1032 $C_{10}H_{18}O$ 0.32 Menthone 1158 $C_{10}H_{18}O$ 6.74 a.Terpineol 1165 $C_{10}H_{18}O$ 1.41 Pulegone 1241 $C_{10}H_{18}O$ 1.41 Pulegone 1248 $C_{11}H_{10}O$ 4.35 Thymol 1304 $C_{10}H_{14}O$ 9.11 (Z)-Jasmone 1248 $C_{11}H_{10}O$ 4.35 Thymol 1304 $C_{10}H_{14}O$ 4.02 α -Himachalene 1449 $C1_{2}H_{24}$ 4.02 α -Humulene 1454 $C1_{2}H_{20}O$ 1.77 Total	Chemical Classes	RI	Chemical Formula	%
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Total 5.17 Oxygenated monoterpenes 5.17 Linalool 1099 $Cl_0H_{18}O$ 13.89 trans-Sabinene hydrate 1101 $Cl_0H_{18}O$ 0.67 Eucalyptol 1032 $C_{10}H_{18}O$ 0.32 Menthone 1158 $C_{10}H_{18}O$ 0.47 Isoborneol 1165 $C_{10}H_{18}O$ 1.41 Pulegone 1241 $C_{10}H_{16}O$ 1.27 Carvone 1246 $C_{10}H_{16}O$ 1.27 Carvone 1248 $C_{11}H_{10}O$ 4.35 Thymol 1304 $C_{00}H_{16}O$ 1.41 Zavacrol 1313 $C_{10}H_{14}O$ 9.11 (Z)-Jasmone 1248 $C_{11}H_{10}O$ 4.35 Thymol 1304 $C_{00}H_{14}O$ 14.86 Total 77.83 783 783 Sesquiterpene hydrocarbons - - 4.59 Oxygenated sesquiterpenes - - 1.77 Total 1587 Cl_3H_{24}O 1.77 Total 10.57 - -	p-Cymene	1025	$C_{10}H_{14}$	0.75
Oxygenated monoterpenes Linalool 1099 $C1_0H_{18}O$ 13.89 trans-Sabinene hydrate 1101 $C10H_{18}O$ 0.67 Eucalyptol 1032 $C_{10}H_{18}O$ 0.32 Menthone 1158 $C_{10}H_{18}O$ 4.76 Isoborneol 1165 $C_{10}H_{18}O$ 6.74 α -Terpineol 1187 $C_{10}H_{18}O$ 1.41 Pulegone 1241 $C_{10}H_{18}O$ 1.27 Carvone 1246 $C_{10}H_{18}O$ 9.11 (Z)-Jasmone 1248 $C_{11}H_{16}O$ 4.35 Thymol 1304 $C_{10}H_{14}O$ 20.45 Carvacrol 1313 $C_{10}H_{14}O$ 14.86 Total 77.83 5 5 Sequiterpene hydrocarbons 4.59 0.57 5 Total 1449 $C1_{5}H_{24}$ 0.57 5 Total 1.77 1.77 5 5 5 Oxygenated sesquiterpenes 1.77 1.77 5 </td <td>γ-Terpinene</td> <td>1067</td> <td>$C_{10}H_{16}$</td> <td>4.42</td>	γ-Terpinene	1067	$C_{10}H_{16}$	4.42
Linalool 1099 $C1_0H_{18}O$ 13.89 trans-Sabinene hydrate 1101 $C10H_{18}O$ 0.67 Eucalyptol 1032 $C_10H_{18}O$ 0.32 Menthone 1158 $C_10H_{18}O$ 6.74 Isoborneol 1165 $C_10H_{18}O$ 6.74 α -Terpineol 1187 $C_10H_{18}O$ 1.41 Pulegone 1241 $C_{10}H_{18}O$ 1.27 Carvone 1246 $C_{10}H_{14}O$ 9.11 (Z)-Jasmone 1248 $C_{11}H_{10}O$ 4.35 Thymol 1304 $C_{10}H_{14}O$ 20.45 Carvacrol 1313 $C_{10}H_{14}O$ 14.86 Total Total 77.83 Sesquiterpene hydrocarbons α 4.59 α -Humulene 1454 $C_{13}H_{24}O$ 4.02 α -Humulene 1454 $C_{13}H_{24}O$ 1.77 Total 1587 $Cl_{3}H_{24}O$ 1.77 Otypenated sesquiterpenes 1587 $Cl_{3}H_{24}O$ 1.26 α -Torpinyl acetate 1349 $Cl_{3}H_{10}O$ <td< td=""><td>Total</td><td></td><td></td><td>5.17</td></td<>	Total			5.17
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Menthone 1158 $C_{10}H_{18}O$ 4.76 Isoborneol 1165 $C_{10}H_{18}O$ 6.74 α -Terpineol 1187 $C_{10}H_{18}O$ 1.41 Pulegone 1241 $C_{10}H_{14}O$ 9.11 (Z)-Jasmone 1246 $C_{10}H_{14}O$ 9.11 (Z)-Jasmone 1248 $C_{11}H_{16}O$ 4.35 Thymol 1304 $C_{10}H_{14}O$ 20.45 Carvacrol 1313 $C_{10}H_{14}O$ 14.86 Total Total 77.83 Sesquiterpene hydrocarbons 4.59 0.57 α -Himachalene 1449 $C1_{5}H_{24}$ 4.02 α -Humulene 1454 $C_{15}H_{24}$ 0.57 Total 4.59 0.57 1.77 Oxygenated sesquiterpenes 1.77 1.77 Caryophyllene oxide 1587 $C1_{5}H_{10}O_{2}$ 1.26 α -Terpinyl acetate 1349 $C_{12}H_{20}O_{2}$ 5.18 Myristic alcohol 1380 $C_{14}H_{30}O$ 2.35 Isoeugenyl phenylacetate 1680 $C_{18}H_{18}O_{3}$	trans-Sabinene hydrate	1101	C10H ₁₈ O	0.67
Interview 1165 $C_{10}H_{18}O$ 6.74 a-Terpineol 1187 $C_{10}H_{18}O$ 1.41 Pulegone 1241 $C_{10}H_{18}O$ 1.27 Carvone 1246 $C_{10}H_{14}O$ 9.11 (Z)-Jasmone 1248 $C_{11}H_{16}O$ 4.35 Thymol 1304 $C_{10}H_{14}O$ 20.45 Carvacrol 1313 $C_{10}H_{14}O$ 14.86 Total 77.83 Sequiterpene hydrocarbons 4.02 a-Himachalene 1449 $C_{15}H_{24}$ 4.02 a-Humulene 1454 $C_{15}H_{24}$ 0.57 Total 4.59 Oxygenated sesquiterpenes 4.59 Caryophyllene oxide 1587 $C_{15}H_{24}O$ 1.77 Total 1.77 7 7 Others 1 1.340 2.35 Isovaleric acid 820 $C_{3}H_{10}O_2$ 1.26 a-Terpinyl acetate 1349 $C_{12}H_{20}O_2$ 5.18 Myristic alcohol 1380 $C_{14}H_{30}O$ 2.35 <td< td=""><td>Eucalyptol</td><td>1032</td><td>$C_{10}H_{18}O$</td><td>0.32</td></td<>	Eucalyptol	1032	$C_{10}H_{18}O$	0.32
a-Terpineol 1187 $C_{10}H_{18}O$ 1.41 Pulegone 1241 $C_{10}H_{16}O$ 1.27 Carvone 1246 $C_{10}H_{14}O$ 9.11 (Z)-Jasmone 1248 $C_{11}H_{16}O$ 4.35 Thymol 1304 $C_{10}H_{14}O$ 20.45 Carvacrol 1313 $C_{10}H_{14}O$ 14.86 Total 77.83 Sesquiterpene hydrocarbons 77.83 α -Himachalene 1449 $C_{15}H_{24}$ 4.02 α -Humulene 1454 $C_{15}H_{24}$ 0.57 Total 4.59 7 7 Oxygenated sesquiterpenes 1587 $C1_{3}H_{24}O$ 1.77 Total 1587 $C1_{3}H_{24}O$ 1.77 Others 1 1.77 7 Isovaleric acid 820 $C_{3}H_{10}O_{2}$ 1.26 α -Terpinyl acetate 1349 $C_{12}H_{20}O_{2}$ 5.18 Myristic alcohol 1380 $C_{14}H_{30}O$ 2.35 Isoeugenyl phenylacetate 1680 $C_{18}H_{18}O_{3}$ 0.41 Pent	Menthone	1158	$C_{10}H_{18}O$	4.76
Pulegone 1241 $C_{10}H_{16}O$ 1.27 Carvone 1246 $C_{10}H_{14}O$ 9.11 (Z)-Jasmone 1248 $C_{11}H_{16}O$ 4.35 Thymol 1304 $C_{10}H_{14}O$ 20.45 Carvacrol 1313 $C_{10}H_{14}O$ 14.86 Total 77.83 Sesquiterpene hydrocarbons 7 4.02 α -Himachalene 1449 $C_{15}H_{24}$ 4.02 α -Humulene 1454 $C_{15}H_{24}$ 0.57 Total 4.59 5 5 Oxygenated sesquiterpenes 1587 $C1_{5}H_{24}O$ 1.77 Total 1.77 1.77 5 5 5 Oxygenated sesquiterpenes 1587 $C1_{5}H_{24}O$ 1.77 Others 1.77 1.77 1.77 Others 1349 $C_{12}H_{20}O_2$ 5.18 Myristic alcohol 1380 $C_{14}H_{30}O$ 2.35 Isoeugenyl phenylacetate 1680 $C_{18}H_{18}O_3$ 0.41 Pentadecanolide 1827 $C_{15}H_{28}O_2$ 1.32<	Isoborneol	1165	$C_{10}H_{18}O$	6.74
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$\begin{array}{ccccc} (Z)-Jasmone & 1248 & C_{11}H_{16}O & 4.35 \\ Thymol & 1304 & C_{10}H_{14}O & 20.45 \\ \hline Carvacrol & 1313 & C_{10}H_{14}O & 14.86 \\ \hline \textbf{Total} & \textbf{77.83} \\ \hline \textbf{Sesquiterpene hydrocarbons} & & & & & \\ \hline \textbf{a}-Himachalene & 1449 & C1_5H_{24} & 4.02 \\ \hline \textbf{a}-Humulene & 1454 & C_{15}H_{24} & 0.57 \\ \hline \textbf{Total} & \textbf{4.59} \\ \hline \textbf{Oxygenated sesquiterpenes} & & & \\ \hline \textbf{Carvophyllene oxide} & 1587 & C1_5H_{24}O & 1.77 \\ \hline \textbf{Total} & \textbf{1.77} \\ \hline \textbf{Others} & & & \\ Isovaleric acid & 820 & C_5H_{10}O_2 & 1.26 \\ \hline \textbf{a}-Terpinyl acetate & 1349 & C_{12}H_{20}O_2 & 5.18 \\ Myristic alcohol & 1380 & C_{14}H_{30}O & 2.35 \\ Isoeugenyl phenylacetate & 1680 & C_{18}H_{18}O_3 & 0.41 \\ \hline \textbf{Pentadecanolide} & 1827 & C_{15}H_{24}O_2 & 1.32 \\ \hline \textbf{Total} & \textbf{10.52} \\ \hline \end{array}$	Pulegone	1241	$C_{10}H_{16}O$	1.27
Thymol 1304 $C_{10}H_{14}O$ 20.45 Carvacrol 1313 $C_{10}H_{14}O$ 14.86 Total 77.83 Sesquiterpene hydrocarbons α -Himachalene 1449 $C1_5H_{24}$ 4.02 α -Humulene 1454 $C_{15}H_{24}$ 0.57 0.57 Total 4.59 0.57 4.59 Oxygenated sesquiterpenes 1587 $C1_5H_{24}$ 0.57 Total 1.77 1.77 1.77 Others 1.77 1.77 Isovaleric acid 820 $C_5H_{10}O_2$ 1.26 α -Terpinyl acetate 1349 $C_{12}H_{20}O_2$ 5.18 Myristic alcohol 1380 $C_{14}H_{30}O$ 2.35 Isoeugenyl phenylacetate 1680 $C_{18}H_{18}O_3$ 0.41 Pentadecanolide 1827 $C_{15}H_{28}O_2$ 1.32 Total 10.52 10.52 10.52	Carvone	1246	$C_{10}H_{14}O$	9.11
Carvacrol 1313 $C_{10}H_{14}O$ 14.86 Total 77.83 Sesquiterpene hydrocarbons 77.83 α -Himachalene 1449 $C1_5H_{24}$ 4.02 α -Humulene 1454 $C_{15}H_{24}$ 0.57 Total 4.59 4.59 Oxygenated sesquiterpenes 4.59 Caryophyllene oxide 1587 $C1_5H_{24}O$ 1.77 Total 1.77 1.77 Others 1.77 1.77 Isovaleric acid 820 $C_5H_{10}O_2$ 1.26 α -Terpinyl acetate 1349 $C_{12}H_{20}O_2$ 5.18 Myristic alcohol 1380 $C_{14}H_{30}O$ 2.35 Isoeugenyl phenylacetate 1680 $C_{18}H_{18}O_3$ 0.41 Pentadecanolide 1827 $C_{15}H_{28}O_2$ 1.32 Total 10.52 10.52	(Z)-Jasmone	1248	$C_{11}H_{16}O$	4.35
Total 77.83 Sesquiterpene hydrocarbons α -Himachalene 1449 $C1_5H_{24}$ 4.02 α -Himachalene 1454 $C_{15}H_{24}$ 0.57 α -Humulene 1454 $C_{15}H_{24}$ 0.57 Total 4.59 Oxygenated sesquiterpenes 4.59 Caryophyllene oxide 1587 $C1_5H_{24}$ O 1.77 Total 1.777 1.77 1.77 Others 1.77 1.77 Isovaleric acid 820 $C_5H_{10}O_2$ 1.26 α -Terpinyl acetate 1349 $C_{12}H_{20}O_2$ 5.18 Myristic alcohol 1380 $C_14H_{30}O$ 2.35 Isoeugenyl phenylacetate 1680 $C_{18}H_{18}O_3$ 0.41 Pentadecanolide 1827 $C_{15}H_{28}O_2$ 1.32 Total 10.52 10.52 10.52	Thymol	1304	$C_{10}H_{14}O$	20.45
Sesquiterpene hydrocarbons 1449 $C1_5H_{24}$ 4.02 α -Himachalene 1454 $C1_5H_{24}$ 0.57 α -Humulene 1454 $C_{15}H_{24}$ 0.57 Total 4.59 Oxygenated sesquiterpenes 1587 $C1_5H_{24}O$ 1.77 Total 1587 $C1_5H_{24}O$ 1.77 Total 1587 $C1_5H_{24}O$ 1.77 Others 1.77 1.77 Isovaleric acid 820 $C_5H_{10}O_2$ 1.26 α -Terpinyl acetate 1349 $C_{12}H_{20}O_2$ 5.18 Myristic alcohol 1380 $C_{14}H_{30}O$ 2.35 Isoeugenyl phenylacetate 1680 $C_{18}H_{18}O_3$ 0.41 Pentadecanolide 1827 $C_{15}H_{28}O_2$ 1.32 Total 10.52 10.52 10.52	Carvacrol	1313	$C_{10}H_{14}O$	14.86
α-Himachalene1449 $C1_5H_{24}$ 4.02α-Humulene1454 $C_{15}H_{24}$ 0.57Total4.59Oxygenated sesquiterpenes1587 $C1_5H_{24}O$ 1.77Caryophyllene oxide1587 $C1_5H_{24}O$ 1.77Total1.771.77Others1.77Isovaleric acid820 $C_5H_{10}O_2$ 1.26α-Terpinyl acetate1349 $C_{12}H_{20}O_2$ 5.18Myristic alcohol1380 $C_{14}H_{30}O$ 2.35Isoeugenyl phenylacetate1680 $C_{18}H_{18}O_3$ 0.41Pentadecanolide1827 $C_{15}H_{28}O_2$ 1.32Total10.5210.5210.52	Total			77.83
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Total 4.59 Oxygenated sesquiterpenes 1587 $C1_5H_{24}O$ 1.77 Caryophyllene oxide 1587 $C1_5H_{24}O$ 1.77 Total 1.77 1.77 Others 1.77 Isovaleric acid 820 $C_5H_{10}O_2$ 1.26 α -Terpinyl acetate 1349 $C_{12}H_{20}O_2$ 5.18 Myristic alcohol 1380 $C_{14}H_{30}O$ 2.35 Isoeugenyl phenylacetate 1680 $C_{18}H_{18}O_3$ 0.41 Pentadecanolide 1827 $C_{15}H_{28}O_2$ 1.32 Total 10.52	α-Himachalene	1449	$C1_{5}H_{24}$	4.02
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	α-Humulene	1454	$C_{15}H_{24}$	0.57
$\begin{array}{c c} Caryophyllene oxide & 1587 & C1_5H_{24}O & 1.77 \\ \hline {\bf Total} & & 1.77 \\ \hline {\bf Others} & & & & \\ Isovaleric acid & 820 & C_5H_{10}O_2 & 1.26 \\ \alpha-Terpinyl acetate & 1349 & C_{12}H_{20}O_2 & 5.18 \\ Myristic alcohol & 1380 & C_{14}H_{30}O & 2.35 \\ Isoeugenyl phenylacetate & 1680 & C_{18}H_{18}O_3 & 0.41 \\ Pentadecanolide & 1827 & C_{15}H_{28}O_2 & 1.32 \\ \hline {\bf Total} & & 10.52 \\ \end{array}$	Total			4.59
Total 1.77 Others 1 Isovaleric acid 820 $C_5H_{10}O_2$ 1.26 α -Terpinyl acetate 1349 $C_{12}H_{20}O_2$ 5.18 Myristic alcohol 1380 $C_{14}H_{30}O$ 2.35 Isoeugenyl phenylacetate 1680 $C_{18}H_{18}O_3$ 0.41 Pentadecanolide 1827 $C_{15}H_{28}O_2$ 1.32 Total 10.52	Oxygenated sesquiterpenes			
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Isovaleric acid820 $C_5H_{10}O_2$ 1.26 α -Terpinyl acetate1349 $C_{12}H_{20}O_2$ 5.18Myristic alcohol1380 $C_{14}H_{30}O$ 2.35Isoeugenyl phenylacetate1680 $C_{18}H_{18}O_3$ 0.41Pentadecanolide1827 $C_{15}H_{28}O_2$ 1.32Total10.52	Total			1.77
α -Terpinyl acetate1349 $C_{12}H_{20}O_2$ 5.18Myristic alcohol1380 $C_{14}H_{30}O$ 2.35Isoeugenyl phenylacetate1680 $C_{18}H_{18}O_3$ 0.41Pentadecanolide1827 $C_{15}H_{28}O_2$ 1.32Total10.52	Others			
Myristic alcohol 1380 $C_{14}H_{30}O$ 2.35 Isoeugenyl phenylacetate 1680 $C_{18}H_{18}O_3$ 0.41 Pentadecanolide 1827 $C_{15}H_{28}O_2$ 1.32 Total 10.52	Isovaleric acid	820	$C_{5}H_{10}O_{2}$	1.26
Isoeugenyl phenylacetate 1680 $C_{18}H_{18}O_3$ 0.41 Pentadecanolide 1827 $C_{15}H_{28}O_2$ 1.32 Total 10.52	α-Terpinyl acetate	1349	$C_{12}H_{20}O_2$	5.18
Pentadecanolide 1827 C ₁₅ H ₂₈ O ₂ 1.32 Total 10.52	Myristic alcohol	1380	$C_{14}H_{30}O$	2.35
Total 10.52	Isoeugenyl phenylacetate	1680	$C_{18}H_{18}O_3$	0.41
		<u>1</u> 827	$C_{15}H_{28}O_2$	1.32
Totally 99.88	Total			10.52
	Totally			99.88

4. CONCLUSION

Lamiaceae species are very popular in folk medicine to treat various health problems such as throat infections, stomach disorders, ulcer, spasm, cold, hemorrhages and skin problems. The family is also famous for the presence of essential oils. Their constituents have been found to

be anti-inflammatory, hemostatic, cicatrizing, stomachic, sedative, spasmolytic, diuretic, expectorant, cardiac, hypotensive.

Medicinal and aromatic plants form a numerically large group of economically important plants which provide basic raw materials for medicines, perfumes, flavours and cosmetics. These plants and their products not only serve as valuable source of income for small landholders farmers and entrepreneurs but also earn valuable foreign exchange by way of export facilities. Anzer Thyme was investigated regarding its valuabe volatile oil composition during this study.

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REFERENCES

Toncer, O., Karaman, S., & Diraz, E. (2010). An annual variation in essential oil composition of Origanum syriacum from Southeast Anatolia of Turkey. *Journal of Medicinal Plants Research*, 4(11), 1059-1064. <u>https://doi.org/10.5897/JMPR09.514</u>.

Kahya, E. (2017). *El-Kanun Fi't-Tıbb*. (2nd ed.). Atatürk Culture Center, Ankara.

Lukas, B., Schmiderer, C., & C. Novak, J. (2015). Essential oil diversity of European Origanum vulgare L. (Lamiaceae). *Phytochemistry*, 119, 32-40. <u>https://doi.org/10.1016/j.phytochem.2015.09.008.</u>

Manou, I., Bouillard, L., Devleeschouwer, M. J., & Barel A. O. (1998). Evaluation of the preservative properties of Thymus vulgaris essential oil in topically applied formulations under a challenge test. *Journal of Applied Microbiology*, 84, 368–376. https://doi.org/10.1046/j.1365-2672.1998.00353.x.

Sekeroglu, N., Deveci, M., Buruk, K., Gürbüz, B., & İpek, A. (2007). Chemical composition and antimicrobial activity of Anzer tea essential oil. *Journal of the Science of Food and Agriculture*, 87, 1424-1426.<u>https://doi.org/10.1002/jsfa.2847.</u>

Tohidi, B., Rahimmalek, M., & Arzani, A. (2017). Essential oil composition, total phenolic,flavonoid contents, and antioxidant activity of *Thymus* species collected from differentregionsofIran.FoodChemistry,220,153–161.https://doi.org/10.1016/j.foodchem.2016.09.203.

Tümen, G., Kirimer, N., & Başer, K. (1995). Composition of the essential oils of Thymus species growing in Turkey. *Chemistry of Natural Compounds*, 31(1), 42-47. <u>https://doi.org/10.5897/JMPR09.514</u>.

Yurteri, E., Özcan, A., Seyis, F., & Kevseroglu, K. (2017). Characterisation of some Laimaceae Species Distributed in the Rize Province, Turkey. *International Journal of Plant Breeding and Crop Science*, 4(3), 300-307.

Yurteri, E., Makbul, S., Coskuncelebi, K., & Seyis F. (2021). Essential Oil Composition in different plant parts of Scorzonera acuminata. In: Özyazici, G. (Eds.), New Development onmedicinal and aromatic plants. Chapter 11, 243-263. İksad Publications.