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Essential oil yield and compositions of chamomile (*Matricaria Chamomilla* L.) cultivated in different province Turkey

Irem Ayran[1,*] **Sadiye Ayse Celik**[1] **Asuman Kan**[2] **Yuksel Kan**[1]

[1]Department of Medicinal Plants, Faculty of Agriculture, Selcuk University, Konya, Turkey,
[2]Department of Food Processing Vocational School of Technical Sciences, Selcuk University, Konya, Turkey

[*]Corresponding Author: irem.ayran@gmail.com

Abstract

In this study, it was investigated essential oil yield and compositions of Chamomile (*Matricaria chamomilla* L.) cultivated in Konya and Karaman ecological conditions, Turkey. Essential oil yield of chamomile was determined as 0.73 % in Konya and 0.62 % in Karaman. The most important essential oil component of chamomile, chamazulene content is 1.13 % in Konya location and 1.36 % in Karaman location. Alpha-bisabolol content from the essential oil components in the Konya and Karaman province was determined as 38.60% and 27.36%, respectively. The aim of this research attempts to contribute to knowledge of differences between essential oil yield and components of Chamomile (*Matricaria chamomilla* L.) cultivated in Konya and Karaman ecological conditions, Turkey.

Keywords: Chamomile, *Matricaria chamomilla* L., Essential oil, Composition, Chamazulene

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Introduction

Chamomile (*Matricaria chamomilla* L.) is annual, herbaceous that is plant belongs to Asteraceae family. The origin of chamomile is in eastern Europe and Asia Minor and it has been almost every flora of Turkey and all over the word. Chamomile is one of the important medicinal herb that has been used in herbal remedies for thousands of years. The parts of the plant used for medical purposes are flowers and the blue-green essential oil obtained from the flowers.

The most important essential oil contents of chamomile are chamazulene, bisabolol (Kazemi, 2014; Singh et al., 2011), bisabololxyzd, bisabololonoxid and parneson (Ceylan, 1983). This plants contains seconder metabolite actived. The most important of them are sesquiterpenes, flavonoids, coumarins, polyacetylenes and essential oil. This plant use as food, cosmetics, pharmaceutical application, sanitary, ornamental plant and the treatment of many diseases in traditional medicine applications (Sharafzadeh et al., 2011). It has been determined that studies on Chamomile (*Matricaria chamomilla* L.) have antiseptic, antiallergic and anti-inflammatory, antimicrobial, fungusid, antispasmodic, gastroprotective, allergic reaction, carminative and sedative activities (D' Andrea, L., 2002; Gruenwald, 2004; Lopez et al., 2016;Kazemi, 2014; Zeybek et al., 2011).

The aim objective of the work presented was to determine the effects differences between essential oil yield and components of Chamomile (*Matricaria chamomilla* L.) cultivated in Konya and Karaman ecological conditions, Turkey.

Materials and Methods

Plant materials

The seed used in the study were obtained from Selçuk Universty, Faculty of Agriculture, Medicinal Plants Research and Application Farm, Turkey. The plant material used in the trial, is chamomile (*Matricaria chamomilla* L.). This study was carried out to essential oil yield and components of chamomile cultivated in Konya and Karaman ecological conditions. The harvested flower of this plant were dried at the shade.

Essential oil distillation and analysis

The air-dried flowers of chamomile were subjected to hydrodistillation for 3h using a Clevenger-type apparatus to produce essential oil. The essential oils were stored at -20^{0}C until analyzed. The GC-MS analysis was carried out with Agilent 7890 GC-MS system. The relative percentages of the separated compounds were calculated from total ion chromatograms. The identification of the oil components was based on the Wiley and NIST mass spectral library. The GC conditions were; column, DB Waxe tr; 60.0m x 0.25mm x 0.25µm; oven temperature programme: The column held initially at 60^{o}C for 10 min after injection, then increased to 220 ^{o}C with 4^{o}C/min heating ramp for 10 min and increased to 240^{o}C with 10^{o}C/min heating ramp without hold; inject or temperature 250^{o}C; carrier gas; He; in let pressure, 9.60psi; linear gasvelocity, 7 cm/sec; initial flow 0.3 ml/min; split ratio, 65.0:1; injected volume 1.0µl (EP6, 2007).

Results and Discussion

Essential oil components of Chamomile cultivated in Konya and Karaman were given Table 1. According to the results obtained this study; The highest essential oil yield was determined from in Konya location (0.73%), while the lowest essential oil yield was determined in Karaman location(0.62%). It can be said that the essential oil yield of Konya location is effective in this study. At the same time, it is known that effect of plant genetic structure, ecological and

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cultivated conditions are important in the yield of essential oil. Pirzad et al.(2008) reported that essential oil yield of Chamomile varied from 0.626- 0.754%. The other study conducted that the oil yield of Chamomile varied from 0.5 -1.5 % (Ceylan, 1983). The results obtained from this study were found to be appropriate when compared to this research.

It was identified commonly total 8 chemical components of major essential oils from *Matricaria chamomilla* L. that cultivated in Konya and in Karaman ecological conditions. (Figure 1; Figure 2) A total of 8 commonly compounds, accounting for 91.37 and 80.06 % of the total oil, were identified the essential oil of *Matricaria chamomilla* L. that cultivated in Konya and in Karaman ecological conditions, respectively. These components are β-ocimene, β-farnesene, Germancrene D, Bisabololoxide, Bisaboloneoxide, Alpha-bisabolol, Chamazulene, Alpha-bisabololoxide.

The most important essential oil component of chamomile, Chamazulene content was 1.13% in Konya location and 1.36 % in Karaman location. Alpha-bisabolol content from the essential oil components in the Konya and Karaman province was determined as 38.60% and 27.36%, respectively. The yields of β-farnesene content of essential oil was 30.15% in Konya and 25.05 % in Karaman. According to our results, Chamomile cultivated in Konya is higher than in Karaman on account of both the yield of essential oil and the amount of the important essential oil contents. Lopez et al.(2016) reported that chamomile flowers have large amount of the sesquiterpene hydrocarbon *trans*-beta-farnesene (38.22%) followed of alpha-bisabolol oxide A (16.74%) were found in the chamomile essential oil and chamazulene was found 1.5-4.44%. According to monographs of European Pharmacopoeia are chamazulene (≥1.0%), bisabolol oxides (29-81%).

Table 1. Essential oil components of chamomile in Konya and Karaman (%)

RI	Components	Percentage (%)	
		Konya location	Karaman location
20.536	β-ocimene	0.41	1.05
35.711	β-farnesene	30.15	25.05
37.260	Germancrene D	6.11	4.35
48.026	Bisabolol oxide	1.30	5.61
49.050	Bisabolone oxide	0.17	1.35
49.926	α-bisabolol	38.60	27.36
54.937	Chamazulene	13.50	13.93
56.156	α-bisabolol oxide	1.13	1.36
	Total	91.37	80.06

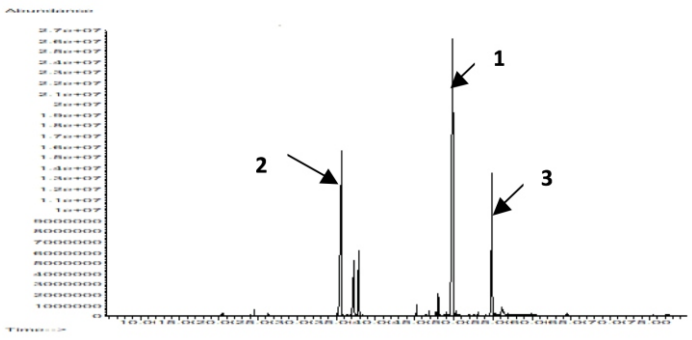

Figure 1. Essential oil composition choromatogram in Konya location 1. α-bisabolol, 2. β-farnesene 3. Chamazulene

Conclusion

According to the results of this study, it was determined that has differences between essential oil yield and components of chamomile (*Matricaria chamomilla* L.) produced in different province of our country were determined. Compared with these results, it was determined that yields of essential oil composition obtained from Chamomile cultivated in Konya and Karaman were appropriated to European Pharmacopedia.

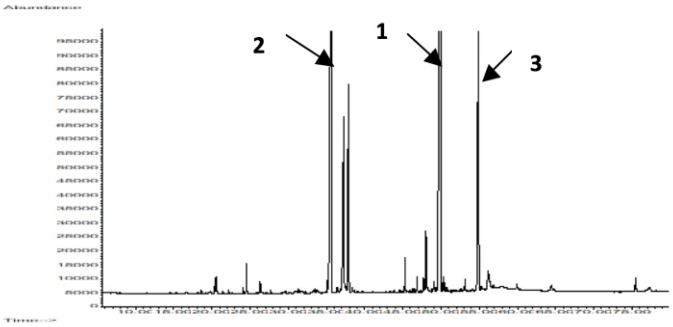

Figure 2. Essential oil composition choromatogram in Karaman location 1. α-bisabolol, 2. β-farnesene 3. Chamazulene

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