Thymol/Carvacrol Containing Labiatae Species And Volatile Composition Of Essential Oil Of Thymbra Spicata

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SUMMARY

Origanum, Satureja and Thymus genus are characterized by their thymol and carvacrol odour generally.

Thymol and carvacrol containing are changed from region to region and from species to species.

The essential oil of **Thymbra spicata** growing wild in Turkey, from three different locations were investigated by GC. 18 components were identified, the main ones being carvacrol, 8-terpinene, p-cymene, thymol and caryophyllene.

ÖZET

Bu literatür ve **Thymbra spicata** (Karabaş kekik, Zahter) uçucu yağı üzerinde yapılan çalışmalarda, Labiatae familyasının çeşitli türlerinden bazı bitkilerin en etkili veya onları kokularıyla karakterize eden timol ve karvakrol oranları özetlenmiş ve araştırıcılara toplu bir bilgi sunulmaya çalışılmıştır.

Daha sonra, halk arasında Karabaş kekik veya Zahter olarak bilinen **Thymbra Spicata** L. uçucu yağı Gaz Kromatoğrafide ve daha önce yapılan IR ve MS çalışmalarıyla analiz edilerek kompozisyonu belirlenmiştir. Belirlenen 18 bileşen içinde en çok karvakrol, 8 - terpinen, p - simen, timol ve karyofillen bulunmuştur.

INTRODUCTION

The essential oils from many Labiatae plants contain thymol and/or carvacrol as the main components, generally. **Origanum, Satureja, Thymus** genus are used for their essential oils containing thymol and/or carvacrol, but in different quantities. The investigations carried out so far on the chemical composition of thymol and carvacrol containing oils of various plant genus and species from Labiatae family (Table I). It should be cited that these oils were not easily differentiated with their thymol - carvacrol content. In addition, the other probable sources of essential oils with thymol - carvacrol at considerable extent also occur. **Thymbra spicata** L. (Labiatae) is one of these sources; however the quantitative data is not present about its essential oil composition. The plant grows in the coasts of Western and Southern regions of Turkey (1). This paper is a report of the essential oil composition of **Thymbra spicata** (in Turkish : Zahter) from three different provinces.

Table 1. Thymol and carvacrol contents of Labiatae essential oils

Essential Oil	Thymol (%)	Carvacrol (%)	Ref.
Coridothymus capitatus	0.1-39.3	4.56-67.0	2-7
Marjorana hortensis	0.0-17.3	0.0-25.2	8,9
Origanum compactum	0.0-43.4	3.8 -71.0	10
Origanum gracile	59.90	9.33	4
Origanum glaucum	20.0	37.0	11
Origanum heracleoticum	5.9-18.7	40.9-74.90	5,12
Origanum smyrnaeum	0.4-0.86	64.0-83.10	4,12
Origanum syriacum	30.9-41.1	15.6-43.7	2,13
Satureja hortensis	t-27.5	2.5-52.5	14-16
Satureja montana	0.0-48.7	t-80.0	17-20
Satureja thymbra	6.7	11.8	2
Saturea obovata	7-65	1-5	17
Saturea vulgaris	0.0	0.05	21
Thymus vulgaris	0.0-61.5	0.0-44.3	22-25
Thymus serpyllum	0.2-52.68	t-78.2	7,26-28
Thymus zygis	0.1-61.1	t-43.9	25,29,30
Thymus mastichina	1,9	0.0	31
Thymus satureioides	19.23	4.25	32
Thymus hiemalis	3.08	0.99	33
Thymus rariflorus	39.48	11.06	34
Thymus parviflorus	36.26	26.10	7
Thymus migricus	13.28	35.67	35
Thymus squarrosus	48.60	0.0	36
Thymus sipyleus	0.0	0.0	37

t = trace

MATERIAL AND METHOD

Plant Material : The plants were collected in June in full bloom from three different provinces Çanakkale, Hatay and Muğla, and identified. The aerial parts were dried in the shade at room temperature.

Isolation of the Essential Oil : The plant material was submitted to hydrodistillation for 4 h in a Clevenger apparatus. The oils were dried over water-free sodium sulphate. Respectively, yields : 1.3 %, 1.5 %, 1.5 % (v/w); d_{20}^{20} : 0.9167, 0.9134, 0.9173; α_D^{20} : +5°2', + 5°3', +5°4'; n_D^{20} : 1.4963, 1.4978, 1.4975. All the samples were with a yellowish tint and smell of thymol/carvacrol.

Chromatographic Analysis : The identity of components was assigned by comparing their retention times with those of authentic samples which were identified during previous studies by IR and Mass Spectrometry. The following analysis conditions were conducted: gas chromatograph, Varian Model 3700; stationary phase, 10 % Carbowax 20 M on Chromosorb W/AW (80 - 100 mesh); column, stainless steel 4 m x 1/8 inch; temperatures, column 80 - 195°C (2°C/min) 15 min, injector and detector 200°C; flow rates, N_2 15 ml/min, H_2 40 ml/min, dry air 300 ml/min; detector, FID; integrator, Varian Model CDS 111; recorder, Varian Model 9176; chart speed, 0.25 cm/min; injected sample, 0.2 µl.

RESULTS AND DISCUSSION

18 components which account for about 94 - 96 % of the essential oils were identified. The GC pattern was similar in the three oils. The oxygenated components constituted the major part of all the oils : 58.75 %, 53.00 %, 64.71 % respectively (Table II).

Carvacrol was found to be the main component (43.94 %, 48.47 %, 55.68 %) in the samples; however its amount in Muğla sample was higher. The percentage of δ - terpinene, the second major component, was 14.35 % in Çanakkale sample and 22.22 % in Hatay sample,

Table II. Main constituents of essential oils of Thymbra spicata L. (% of oil)

Component	Çanakkale	Hatay	Muğla
α - pinene	1.28	0.19	1.23
Camphene	0.30	0.33	0.27
β - pinene	0.73	0.60	0.13
Δ^3 - carene	0.13	0.15	0.17
Myrcene	2.73	2.56	3.04
α - phellandrene	1.07	0.83	0.85
Limonene	0.77	0.70	0.53
1,8 - cineole	0.40	0.62	0.18
δ - terpinene	14.35	22.22	10.05
p - cymene	11.93	10.25	10.74
Camphor	0.28	0.27	0.38
Linalool	1.18	0.34	1.28
Terpinen - 4 - ol	3.83	0.73	2.29
Caryophyllene	4.12	3.84	4.25
α - terpineole	2.03	1.14	0.71
Borneol	0.39	0.48	0.08
Thymol	6.70	0.95	4.11
Carvacrol	43.94	48.47	55.68

while in Muğla sample it was 10.05 %. The other important components, p - cymene (11.93 %, 10.25 %, 10.74 %) and caryophyllene (4.12 %, 3.84 %, 4.25 %) were found to be similar percentage for all the oils. Thymol which is responsible, together with carvacrol, for the phenolic character of the oil was found in higher percentage in Çanakkale and Muğla samples, 6.70 % and 4.11 %, than in Hatay one, 0.95 %. Myrcene, terpinen - 4 - ol and α - terpineole also were in considerable amounts at various degrees.

The investigations were not present about the essential oil components of **Thymbra spicata.** However, it reported only that two Turkish samples of the plant contained 46 - 47 % (36) and 66 % (38) of carvacrol. More recently, the essential oils obtained from **Satureja hortensis, S. montana, Thymus satureioides** and large leaved or Senegal savory (probable identification as **Thymbra spicata)** were analysed. Although any quantitative date did not present, it could be determined that oils obtained from summer savory and Senegal savory were both found to contain similar com-

ponents (39, 40). In conclusion, it seems that the essential oil of **Thymbra spicata** is a good source of carvacrol, and the dried herb can be used like thyme as already been in Turkey.

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