

**EFFECTS OF DIFFERENT DRYING METHODS ON COMPONENTS OF  
THYMBRA SPICATA L. ESSENTIAL OIL FROM FLORA OF HATAY  
(TURKEY)**

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Zahter (*Thymbra spicata*), a perennial member of the *Labiatae* family is one of the most important spices in Hatay's cuisine. Its dry leaves are mixed with red pepper, sesame and çökelek (a special cheese in the region) and is heavily used in sürk (a dish made with çökelek) and pastries. This study aims to determine the effects of various drying methods on the essential oil content of *thymbra spicata*, a naturally growing plant in Hatay. The plant material was harvested from Hatay's flora on May 4, 2015 and dried in the shade, in an oven at 30°C. The essential oil was obtained with vapor distillation, and its contents were determined using GC/MS. The study determined that the ratio of carvacrol, the main component of *Thymbra spicata* essential oil changes between %51.14 and 72.54.

Keywords: *Thymbra*, Drying, GC-MS

## **INTRODUCTION**

Zahter (*Thymbra spicata*) is a member of the *Labiatae* family and is spread around the Eastern Mediterranean countries. In our country, it is widely found in the Thracian, Aegean, Mediterranean coasts and the South-Eastern Anatolia region. *Thymbra spicata* is an evergreen shrub that is approximately 50 cm high (Kızıl *et al.*, 2009). Its essential oil content is reported to vary between 4.016 and 4.700% (Mert and Türkmen, 2015). 70-80% of *T. spicata* essential oil consists of Carvacrol (Kızıl *et al.*, 2009). Zahteri (*Thymbra spicata*) has an economic value in Antakya region. About 10-12 tons of thyme is sold every year (Da istan and Sarihan, 2000). Thyme is one of the famous spices in Hatay cuisine. Fresh *Thymbra spicata* is basically used to make salad. Dry leaves were mixed with pepper, sesame and çökelek to make sürk and bakery products. Thyme tea is popular drunk in houses and cafes (Mert and Ark, 2007).

This study aims to determine the effects of various drying methods on the essential oil content of *Thymbra spicata*, a naturally growing plant in Hatay.

## **MATERIALS AND METHODS**

### **Materials**

The plant materials were collected from Hatay flora on May 4, 2015.

### **Methods**

Thyme leaves treated with different drying methods which is given below.

Treatments:

- At shade
- At sunshine
- At 30°C temperature in the oven

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(Dry leaves were used for extraction of essential oil of thyme leaves with water steam distillation (Neo-Clevenger) in each treatment.)

### Gas Chromatography - Mass Spectrometry (GC-MS)

The components of the *Thymbra spicata* essential oils used in the study were determined using gas chromatography-mass spectrometry in the Medical and Aromatic Plants Analysis Laboratory of the Mustafa Kemal University Faculty of Agriculture Department of Field Crops. The identification of essential oil components was made using a Thermo Scientific ISQ Single Quadrupole gas chromatography device; using TG-Wax WS model (5% Phenyl Polysilphenylene-siloxane, 0,25 mm internal diameter \* 30 m length, 0.25 µm film thickness) column. The ionization energy was set to 70 eV and the mass interval m/z was set to 1.2-1200. Scan mode was used for data collection. MS transfer line temperature was 250 °C, MS ionization temperature was 220 °C, column temperature was initially 50 °C and increased to 220 °C with 3 °C/minute increments. The structure of each compound was identified by the Xcalibur software using mass spectra (Wiley 9).

### RESULTS AND DISCUSSION

The components and component ratios of the essential oil obtained from the *Thymbra spicata* plant naturally growing in Hatay are presented in Table 1. As evidenced in Table 1, the main component, Carvacrol constitutes 72.54% of the essential oil, and is followed by  $\alpha$ -Terpinene with 17.18% and o-Cymene with % 4.90.

Table 1. The components and component ratios of the essential oil obtained from the *Thymbra spicata* plant naturally growing in Hatay

| RT    | Compound Name                           | Cas #      | Area % |
|-------|-----------------------------------------|------------|--------|
| 3,43  | -Pinene                                 | 80-56-8    | 0.10   |
| 3,48  | -Thujene                                | 99-83-2    | 0.15   |
| 5,07  | -Phellandrene                           | 555-10-2   | 0.06   |
| 6,05  | -Myrcene                                | 123-35-3   | 0.35   |
| 6,4   | -Terpinene                              | 99-86-5    | 0.60   |
| 6,88  | l-Limonene                              | 5989-54-8  | 0.09   |
| 7,08  | Eucalyptol                              | 470-82-6   | 0.34   |
| 8,22  | -Terpinene                              | 99-85-4    | 17.18  |
| 9,01  | o-Cymene                                | 527-84-4   | 4.90   |
| 15,43 | 1-Octen-3-ol                            | 3391-86-4  | 0.10   |
| 15,82 | trans Sabinene hydrate                  | 17699-16-0 | 0.08   |
| 17,46 | cis-Limonene oxide                      | 13837-75-7 | 0.12   |
| 20,39 | trans-Caryophyllene                     | 87-44-5    | 0.72   |
| 20,9  | Terpinen-4-ol                           | 562-74-3   | 0.14   |
| 24,47 | Isoborneol                              | 124-76-5   | 0.11   |
| 33,48 | (-)-Caryophyllene oxide                 | 1139-30-6  | 0.12   |
| 34,38 | -Sinensal                               | 17909-77-2 | 0.06   |
| 38,55 | (+) spathulenol                         | 77171-55-2 | 0.29   |
| 40,45 | Thymol                                  | 89-83-8    | 0.09   |
| 41,7  | Carvacrol                               | 499-75-2   | 72.54  |
| 50,56 | Cyclohexene, 2-ethenyl-1,3,3-trimethyl- | 5293-90-3  | 0.16   |
| 51,12 | 3,5-Heptadienal, 2-ethylidene-6-methyl- | 99172-18-6 | 0.09   |

The components and component ratios of the essential oil obtained from the shade-dried leaves of *Thymbra spicata* that grows naturally in Hatay are presented in table 2. As evidenced in table 2, the main component Carvacrol is present at 58.32% and is followed by  $\alpha$ -Terpinene at 28.53% and 5.20% with *o*-Cymene.

Table 2. The components and component ratios (%) of the essential oil obtained from the shade-dried leaves of the *Thymbra spicata* plant naturally growing in Hatay

| RT    | Compound Name                           | Cas #      | Area % |
|-------|-----------------------------------------|------------|--------|
| 3,42  | $\alpha$ -Pinene                        | 80-56-8    | 0.30   |
| 3,48  | $\alpha$ -Thujene                       | 2867-05-2  | 1.05   |
| 4,79  | $\beta$ -Pinene                         | 127-91-3   | 0.08   |
| 5,07  | Sabinene                                | 3387-41-5  | 0.11   |
| 6,05  | $\alpha$ -Myrcene                       | 123-35-3   | 0.96   |
| 6,4   | $\beta$ -Terpinene                      | 99-86-5    | 2.03   |
| 6,88  | Limonene                                | 5989-54-8  | 0.14   |
| 7,07  | Eucalyptol                              | 470-82-6   | 0.06   |
| 7,13  | $\beta$ -Phellandrene                   | 555-10-2   | 0.11   |
| 8,23  | $\alpha$ -Terpinene                     | 99-85-4    | 28.53  |
| 9,01  | <i>o</i> -Cymene                        | 527-84-4   | 5.20   |
| 18,91 | trans Sabinene hydrate                  | 17699-16-0 | 0.06   |
| 20,39 | trans-Caryophyllene                     | 87-44-5    | 1.26   |
| 20,9  | Terpinen-4-ol                           | 562-74-3   | 0.11   |
| 24,46 | L- $\alpha$ -Terpineol                  | 10482-56-1 | 0.08   |
| 33,75 | Caryophyllene oxide                     | 1139-30-6  | 0.23   |
| 38,54 | (+) spathulenol                         | 77171-55-2 | 0.23   |
| 40,92 | Thymol                                  | 89-83-8    | 0.12   |
| 41,7  | Carvacrol                               | 89-83-8    | 58.32  |
| 50,56 | 3,5-Heptadienal, 2-ethylidene-6-methyl- | 99172-18-6 | 0.08   |

The components and component ratios of the essential oil obtained from the sun -dried leaves of *Thymbra spicata* plant naturally growing in Hatay are presented in Table 3. As evidenced in Table 3, the main component, Carvacrol constitutes 51.14% of the essential oil, and is followed by  $\alpha$ -Terpinene with 23.38%,  $\beta$ -Terpinyl at 7.45% and *o*-Cymene at % 3.86.

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Table 3. The components and component ratios (%) of the essential oil obtained from the sun-dried leaves of the *Thymbra spicata* plant naturally growing in Hatay

| RT    | Compound Name               | Cas #      | Area % |
|-------|-----------------------------|------------|--------|
| 3,41  | -Pinene                     | 80-56-8    | 0.20   |
| 3,47  | -Thujene                    | 2867-05-2  | 0.67   |
| 4,04  | Camphene                    | 79-92-5    | 0.07   |
| 4,76  | -Pinene                     | 127-91-3   | 0.07   |
| 5,04  | Sabinene                    | 3387-41-5  | 0.08   |
| 6,01  | -Myrcene                    | 123-35-3   | 0.68   |
| 6,36  | -Terpinene                  | 99-86-5    | 1.50   |
| 6,85  | Limonene                    | 5989-54-8  | 0.11   |
| 7,04  | Eucalyptol                  | 470-82-6   | 0.11   |
| 7,1   | -Phellandrene               | 555-10-2   | 0.07   |
| 8,19  | -Terpinene                  | 99-85-4    | 23.38  |
| 8,97  | o-Cymene                    | 527-84-4   | 3.86   |
| 14,03 | Thujone                     | 546-80-5   | 0.06   |
| 14,12 | cis Sabinene hydrate        | 17699-16-0 | 0.16   |
| 15,41 | 1-Octen-3-ol                | 3391-86-4  | 0.07   |
| 17,38 | Camphor                     | 76-22-2    | 0.12   |
| 17,89 | trans Sabinene hydrate      | 17699-16-0 | 0.18   |
| 18,28 | Linalool                    | 78-70-6    | 0.34   |
| 18,51 | 1-Terpinenol                | 586-82-3   | 0.07   |
| 20,14 | Terpinen-4-ol               | 562-74-3   | 1.61   |
| 20,38 | trans-Caryophyllene         | 87-44-5    | 1.03   |
| 22,2  | trans-Pinocarveol           | 547-61-5   | 0.15   |
| 23,06 | -Terpineol                  | 98-55-5    | 0.28   |
| 23,85 | -Terpinyl acetate           | 80-26-2    | 7.45   |
| 24,07 | L- -Terpineol               | 10482-56-1 | 1.66   |
| 24,47 | Borneol, acetate            | 5655-61-8  | 0.08   |
| 25,43 | Limonene oxide              | 1195-92-2  | 0.12   |
| 27,57 | Myrtenol                    | 515-00-4   | 0.09   |
| 27,82 | p-Mentha-1(7),8-dien-2-ol   | 35907-10-9 | 0.07   |
| 33,65 | (-)-Caryophyllene oxide     | 1139-30-6  | 0.37   |
| 35,4  | Anisylacetone               | 104-20-1   | 1.09   |
| 38,53 | (-)-Spathulenol             | 77171-55-2 | 0.39   |
| 39,55 | Acetic acid, cinnamyl ester | 103-54-8   | 0.08   |
| 40,1  | Eugenol                     | 97-53-0    | 0.22   |
| 40,92 | Thymol                      | 89-83-8    | 0.13   |
| 41,41 | Junipene                    | 475-20-7   | 0.07   |
| 41,71 | Carvacrol                   | 499-75-2   | 51.14  |
| 45,12 | Alloaromadendrenoxid-(1)    | 85710-39-0 | 0.06   |

The components and component ratios of the essential oil obtained from the leaves dried in a 30 °C oven of *Thymbra spicata* plant naturally growing in Hatay are presented in Table 4. As evidenced in Table 4, the main component, Carvacrol constitutes 60.33% of the essential oil, and is followed by -Terpinene with 27.50% and o-Cymene with % 4.98.

Table 4. The components and component ratios (%) of the essential oil obtained from the leaves dried in a 30°C oven of the *Thymbra spicata* plant naturally growing in Hatay

| RT    | Compound Name                           | Cas #      | Area % |
|-------|-----------------------------------------|------------|--------|
| 3,42  | -Pinene                                 | 80-56-8    | 0.27   |
| 3,48  | -Thujene                                | 2867-05-2  | 0.89   |
| 4,78  | -Pinene                                 | 127-91-3   | 0.07   |
| 5,06  | Sabinene                                | 3387-41-5  | 0.10   |
| 6,04  | -Myrcene                                | 123-35-3   | 0.86   |
| 6,39  | -Terpinene                              | 99-86-5    | 1.77   |
| 6,88  | Limonene                                | 5989-54-8  | 0.13   |
| 7,12  | -Phellandrene                           | 555-10-2   | 0.15   |
| 8,22  | -Terpinene                              | 99-85-4    | 27.50  |
| 9     | o-Cymene                                | 527-84-4   | 4.98   |
| 15,42 | 1-Octen-3-ol                            | 3391-86-4  | 0.08   |
| 18,9  | trans Sabinene hydrate                  | 17699-16-0 | 0.07   |
| 20,39 | trans-Caryophyllene                     | 87-44-5    | 1.09   |
| 20,89 | Terpinen-4-ol                           | 562-74-3   | 0.11   |
| 24,47 | Isoborneol                              | 124-76-5   | 0.08   |
| 33,75 | Caryophyllene oxide                     | 1139-30-6  | 0.20   |
| 38,54 | (-)-Spathulenol                         | 77171-55-2 | 0.21   |
| 40,91 | Thymol                                  | 89-83-8    | 0.12   |
| 41,7  | Carvacrol                               | 499-75-2   | 60.33  |
| 50,55 | Cyclohexene, 2-ethenyl-1,3,3-trimethyl- | 5293-90-3  | 0.08   |

## CONCLUSION

The results of the study suggest that the highest ratio of carvacrol, the main component of *Thymbra spicata* essential oil is obtained from the fresh sample that was not dried (72.54%). The highest carvacrol ratio was obtained in essential obtained from the leaves dried in a 30°C oven (60.33%), this was followed by the essential obtained from shade-dried leaves (58.32%) and sun-dried leaves (51.14%). *Thymbra spicata* var. *spicata* both grows naturally and is cultivated in Hatay's flora and a study conducted to determine its essential oil components (Mert *et al.*, 2007), it was found that the carvacrol ratio in the shade-dried leaves was 79.5% in samples harvested from the natural flora, and 80.6% in cultivated samples, and these values were higher than the carvacrol values that we obtained in shade-dried (58.32%), fresh (72.54%), sun-dried (51.14%) and leaves dried in a 30°C oven.

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