

EFFECT OF DRYING IN SUN ON ESSENTIAL OIL CONTENT AND COMPOSITION OF *ORIGANUM MAJORANA* L

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Abstract - The research carries out the determination of essential oil components content with sun-dried methods for *Origanum Majorana* L. species. *Origanum majorana* L., were collected from Turkey at the full-flowering stage and dried with sun-drying method. The essential oils were extracted by hydro-distillation method and analyzed by using GC-MS. Sun-drying method was applied on *Origanum majorana* L. and 26 essential oil components were detected, of carvacrol (24.50 %), p-cymene (18.55 %), cis-sabinene hydrate (12.60 %), terpine-4-ol (6.60 %), β -phellandrene (5.40 %) and δ -elemene (4.15 %) as main components.

Keywords – *Origanum majorana* L., Essential Oil, Carvacrol, p-cymene

I. INTRODUCTION

Lamiaceae comprise of ca. 7200 species and 236 genera. The family is represented by 45 genera, 546 species and 730 taxa in Turkey. The members of the Lamiaceae are common mainly in the mountainous areas of Mediterranean parts of Turkey (Bagci et al., 2017).

The genus *Origanum* known as “oregano” in English, is an annual, perennial and shrubby herb that is native to the Mediterranean, Euro-Siberian and Irano-Siberian regions (Bagci et al., 2017). A total 38 *Origanum* species are recognized in the World. Most of the *Origanum* species, over 75 %, are concentrated in the East Mediterranean sub region. Of them, 16 species are considered as endemic for the flora of Turkey (Güner et al., 2000).

Origanum majorana L. belongs to the family of flowering plants Lamiaceae, considered one of the most important temperate culinary herbs with great economic and industrial importance (Sellami et al., 2009). Lamiaceae plants are collected from the wild or grown as commercial crops and used to prepare many commercial products, including herbal teas, spices, beverages, over the counter medications and pharmaceutical products (Asensio et al., 2015).

Essential oils are aromatic oily liquids extracted from different parts of plants (leaves, seed, roots, fruits, etc.) either by hydro distillation or solvent extraction (Okoh et al., 2010). The natural products have received increasing attention in the chemical, food, and pharmaceutical industries, because they can have a wide range of applications as well as could replace several synthetic compounds (Chafer et al., 2005).

Some literatures about the effects of different drying methods on the chemical composition of some aromatic plants, showed significant effects (Ahmadi et al., 2008, Khangholi et al., 2008, Asekun et al., 2006, Okoh et al., 2008, Tarkemeh and Aboutalebi,

2012). The yield of essential oil affects the quality of essential oil components. It has been determined that the duration of obtaining essential oils has an effect on the chemical components of fennel and *Laurus nobilis* L. plants (Jamshidi et al., 2004; Naderi et al., 2011).

The research carries out the determination of essential oil components content with sun-dried methods for *Origanum majorana* L. species.

II. MATERIALS AND METHODS

Plant Material and Drying Methods

Origanum majorana L. is a bushy half hardy perennial sub shrub that grows as annual. It is cold sensitive, frost tender aromatic herb that grows up-to 30-60 cm height. It has descending multi-branched reddish square stems that spill over to create a mound. The stems are straight having weak, hairy, round and green with red speckles (Pimple et al., 2016). Leaves are smooth, simple, petiolate and ovate to oblong-ovate, grey green in colour arranged opposite to each other on a square stem (Prerna and Vasudeva, 2015). *Origanum majorana* L. were collected at different stages of plant development between April and August of 2016, from Işıktepe district of Mersin province, Turkey. Sun-drying method was studied after collecting the plant material (48 hours).

Essential Oil Isolation

The dried samples of *Origanum majorana* L. (100 g) were subjected to hydro-distillation (2 hours) by using an all glass Clevenger-type apparatus, to extract essential oils, according to the method outlined by the European Pharmacopoeia.

Identification of the Oil Components

The oil composition was determined with GC-MS. GC-MS analyses were conducted in the TUBITAK (MAM). GC-MS conditions; helium was used as carrier gas at a constant flow rate of 1 mL/min. 1 μ L

of sample was injected. The GC temperature program was set as follows; 50 °C hold for 5 min, ramp to 250 °C at 5 °C/min and hold for 10 min. The temperature of the MS transfer line was set at 220 °C. Using scan mode a mass range from 50 to 650 *m/z*. Used column, DB-5 30 m x 0.25 mmID x0.25 µm. The Thermo Scientific TSQ GC-MS/MS was used in this study. Database of GC-MS device in TUBITAK Chemistry Research Laboratory used.

III. RESULTS AND DISCUSSION

Sun-drying method applied has on the essential oil content 3.00 %. Appropriately with our results, there are similar observations of other researchers about other medicinal plants (Shahhoseini et al., 2013; Dora et al., 2017; Gören et al., 2002; Çalışkan et al. 2017; Ahmadi et al., 2008; Khangholi et al., 2008; Asekun et al., 2006; Okoh et al., 2008; Rao et al., 1998; Tarakemeh et al., 2012). For example, the oil content of shade-dried leaves of *Melissa officinalis* was higher than oven dried (Shalaby et al.,1995). Also *Eucalyptus sargentii* plant materials dried in shade had higher essential oil content (Fathi and Sefidkon, 2012).

Twenty-six constituents in the essential oil of *Origanummajorana* L. were determined with the major components (Table 1). At the sun-drying, the oils consisted mainly of carvacrol (24.50 %), p-cymene (18.55 %), cis-sabinene hydrate (12.60 %), terpine-4-ol (6.60 %), β-phellandrene (5.40 %) and δ-elemene (4.15 %).

Essential oil from *Origanummajorana* L. contains terpinen-4-ol (31.15 %), cis-sabinene-hdyrate (15.76 %), p-cymene (6.83 %), sabinene (6.91 %), trans-sabinene hydrate (3.86 %) and α-terpineol (3.71 %) as the main constituent (Raina and Negi, 2012). *Origanummajorana* L.species; γ-terpinene (27.53 %), α-terpinene (21.15 %), sabinene (11.17 %), β-phellandrene (7.81 %), o-cymene (5.20 %) and thujene (4.12 %) components have been identified (Salha et al., 2017).

Thisresult is consistentwiththeresults of studies on otheraromaticplants(Gören et al., 2002, Tarakemeh, 2012, Angioni, 2006, DadalioğluandEvrendilek, 2004). Thebiologicalstructure of sebaceousglands of medicalplants is affectedbythehightemperature. Ifsomesensitiveplantsareover-dried, destruction can occur in theepithelialcells(Venskutonis, 1997; Hamrouni-Sellami et al., 2011, RahimmalekandGoli, 2013). Lowtemperatures in essentialoilcomponentshavebeenidentifiedbyhigh temperatureapplication in the drying of somemedicinalplants. Forexample, in sageandthyme (Venskutonis, 1997), in basil (Yousif et al., 1999), in mint. (Diaz-Maroto et al., 2003), in sage (Hamrouni-Sellami et al., 2012) and bay laurel (Hamrouni-Sellami et al., 2011).

Table 1.Composition of the essential oil (%) of *Origanummajorana* L.

KI*	Compound	Sun (%)
930	α-thujene	1.85
939	α-pinene	0.55
954	camphene	0.25
979	β-pinene	0.10
1003	α -phellandrene	0.95
1017	α -terpinene	1.40
1025	p-cymene	18.55
1030	β-phellandrene	5.40
1037	Ocimene-cis	0.20
1050	β-E-ocimene	3.30
1060	γ-terpinene	2.25
1070	cis-sabinene hydrate	12.60
1075	linalool	2.86
1098	trans-sabinene hydrate	3.50
1146	camphor	0.60
1150	menth-3-en-8-ol	0.45
1153	menthone	0.40
1235	terpine-4-ol	6.60
1299	carvacrol	24.50
1338	δ-elemene	4.15
1441	aromadendrene	1.55
1443	farnese	0.10
1455	α -humulene	0.15
1457	farnese-E- β	0.35
1578	spathulenol	0.10
1654	α-cadinol	0.10
	Total	92.61

*KI: Kovats Index

CONCLUSION

Sun-drying method was applied on *Origanummajorana* L. and 26 essential oil components were detected. The main components of the oil of *Origanummajorana* L. aerial parts were carvacrol(24.50 %), p-cymene (18.55 %), cis-sabinene hydrate (12.60 %), terpine-4-ol (6.60 %), β-phellandrene (5.40 %) and δ-elemene (4.15 %).

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