ESSENTIAL OIL COMPOSITION OF LAVANDULA OFFICINALIS L. GROWN IN JORDAN

مكونات الزيت الطيار لنبات اللافندر LAVANDULA OFFICINALIS L. المزروع في الاردن

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Abstract

Essential oils isolated by steam distillation from the fresh and dry flowers of Lavandula officinalis L., the oil yields were (1.35% , 3.8%) respectively . Oils were analyzed by GC, among 26 compounds identified , the major components were 1,8 – cineole (18.9% , 20.3%) , linalool (34.2%,33.0%) and borneol (12.1%, 11.0%), respectively .

الخلاصة

تم استخلاص الزيوت الطيارة من الازهار الطازجة والجافة لنبات اللافندر نوع (Lavandula officinalis L.) ، وكانت النسب المئوية للزيوت الطيارة الناتجة منها (١.٣٥% ، ٣.٨%) على التوالي . حللت الزيوت الطيارة باستخدام جهاز كروماتوغرافيا – الغاز (GC) وقد تم تشخيص ٢٦ مركب ومنها وجد ان المركبات الرئيسية المكونة للزيوت الطيارة هي ١، ٨ – سابنيول (١٨.٩% ، ٢٠.٣%) ، لاينالول (٣٤.٢% ، ٣٣ %) والبورنيول (١٢.١% ، ١١%) على التوالي .

Introduction :

Lavender (Lavandula officinalis L.) is a perennial shrub cultivated primarily for its aromatic inflorescences from which the oils are isolated , though its fresh and dried flowers are also marketed (14) . Lavender , a member of the Lamiaceae (Labiatae) family , native to southern Europe and the Mediterranean area , grows in full sun on dry , well-drained , stony calcareous soils (11) .Lavender oil is generally used in skin care for its anti-inflammatory , analgesic, antiseptic , bactericidal , cicatrisant and fungicidal properties .

Lavender oils contain more than 100 compounds , with the two major constituents being linalool and linalylacetate (2,7-10,16) . Other constituents include α - thujene , α - pinene , camphene , sabinene , β - pinene , myrcene , p – cymene , limonene , 1,8 – cineole , (Z)- and (E) - β - ocimene , ϒ - terpinene , camphor , terpinene – 4 – o l , lavandulol , lavandulylacetate , β - caryophyllene , (Z) - and (E) - β - farnesene etc .

Naeff and Morris (12) used a combination of analytical techniques to perform detailed analysis of spike lavender oil . The main compounds identified were 1,8 – cineole (22.9%) , camphor (16.25%) and linalool (27.06%) .

An oil which was obtained from L. latifolia plants collected on Portela do Gato , Almalagues (Portugal) in 0.3% yield , was studied by Proenca da Cunha et al. (13). In 1989 , Paseual Teresa et al. used a combination of modern analytical techniques to compare the chemical composition of a lab –distilled oil of L. latifolia with that of a commercial spike lavender oil . They

characterized 1.8 – cineole (36% , 34.9%) , linalool (30.3% , 18.9%) and camphor (8.0% , 15.0%) as major constituents in lab-distilled and commercial oils , respectively (5) . Also in 1989 , Carrasco et al. examined the composition of the oils of spike lavender (cultivated) obtained from plants of various ages (3) . A sample of spike lavender oil was studied by Formacek and Kubeczka (7) using a combination of C-NMR and capillary gas chromatography . Further studies on spike lavender oil have been done by De Pascual et al . (4) , ter Heide et al. (15) and De Rijke et al. (6) .The goal of this research was to evaluate the oil yields from the fresh and dry (L . officinalis L.) flowers , identification the chemical constituents of the oils by means of GC technique .

Experimental :

Plant materials : flowers were collected at morning from plants that were grown in Medicinal and Aromatic plants field of Ajloun University College north of Jordan at the full flowering stage on 1st July 2004 . Then a herbarium specimen has been deposited in the Herbarium of the Biology Department in AL-Yarmouk University , Irbid , Jordan .

Oil extraction : The oils were extracted by hydro distillation 50 g . of (fresh / dried) flowers were placed in a 1000 ml round bottom flask with 500 ml distilled – deionized water and the oils isolated over 3 h period using a modified Clevenger apparatus (1) .
The oil content was determined on an oil / flowers (w/w) . Oil samples were stored in sealed Varian autosampler vials at 4 °C in the dark(in refregerator).

Gas chromatography analysis and compounds identification :
The oils were diluted with (20 μ l in 1 ml) and analyzed with a Pye Unicam 207 gas chromatography (Pye Unicam instruments) with (DP 88 Pye Unicam computing integrator) coupled with (PM 8251 single – pen recorder) , the column was SE-30 (1.5 m × 4.0 mm) , the solid phase (100-120 mesh Diatomite CQ) . Temperature program was 70 ° - 250 °C at the rate of 4 °C /min . Injector Temperature : 250 °C ; detector temperature : 265 °C ; carrier gas : nitrogen , with flow rate of 25 ml / min . Detector was FID and quantitation was carried out by external standard method , constituent identification was accomplished by retention time and conjection with authentic standards which were imported from (Fluka Guarantee company) .

Results and Discussion :

The oil yields from fresh and dry flowers of L . officinalis L. were (1.35% ,3.8%) respectively , this showed an increment of (2.45%) in the oil of the dry flowers in comparison with that of fresh flowers . The analised oils showed 39 compounds , only 26 compounds were identified according to the standard oils that were available , the list of constituents identified can be seen in Table 1 .
The quantitative analysis of the oil showed that the major components were 1,8 – cineole (18.9 % and 20.3%) , linalool (34.2% and 33.0%) and borneol (12.1 % and 11.0%) in the fresh and dry flowers oil , respectively . Also we found that the quantity of the hydrocarbonic terpenes were not very different in Lavendula officinalis oil produced from fresh and dry flowers , Table 1, also from the table we can see that there was an increment in the percentage of the compound 1,8 – cineole in the dry flowers oil equal to (1.4%) in compared to its percentage in fresh flowers oil . But in case of alcoholic compounds (linalool and borneol) we found there was a decrement equal to (1.2% and 1.1%) in the oil of dry flowers against their percentages in that of fresh flowers ,

respectively . The yields and major oils components of some lavender species have been studied (5,12,16) , similar results to our study were obtained with Lavandula latifolia (2,4) , Lavandula angustifolia (16) . Also our results demonstrate that the environmental conditions of Ajloun town due to its long , cold and wet winter season was suitable enough for growing Lavender plants , therefore we recommend growing this plant widely in the north of Iraq , for its oil yield due to the same weather there .

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Table 1. Percentage composition of Lavandula officinalis L. essential oil from Jordan

No.	Compound	Percentage	
		Fresh flowers	Dry flowers
1-	∝ - thujene	0.2	0.2
2-	∝ - pinene	1.5	1.6
3-	camphene	0.5	0.6
4-	sabinene	1.0	1.0
5-	β - pinene	2.2	2.3
6-	myrcene	1.4	1.5
7-	∝ - phellandrene	0.2	0.2
8-	ρ- cymene	0.1	0.1
9-	1,8 – cineole	18.9	20.3
10-	(Z) -β -ocimene	3.4	4.1
11-	(E) -β - ocimene	1.1	1.4
12-	ϒ - terpinene	0.1	0.1
13-	terpinolene	0.4	0.6
14-	linalool	34.2	33.0
15-	camphor	4.6	4.7
16-	borneol	12.1	11.0
17-	terpinene -4-o l	2.5	2.2
18-	∝ - terpineol	2.8	2.5
19-	linalyl acetate	3.1	3.6
20-	lavandulyl acetate	1.0	1.3
21-	β - caryophyllene	0.9	0.8
22-	(Z) -β - farnesene	0.1	0.1
23-	(E) -β - farnesene	4.5	4.0
24-	caryophyllene oxide	0.2	0.2
25-	T- cadinol	0.2	0.2
26-	∝ - bisabolol	2.2	1.9

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