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CONTRIBUTION STUDY TO THE CHEMICAL COMPOSITION OF THE VOLATILE OIL IN PELARGONIUM GRAVEOLENS, AN AROMATIC PLANT WIDELY SPREAD IN DAMASCUS-SYRIA

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ABSTRACT

Many medicinal plants are present in Damascus, which are widely used in traditional medicine, and in the food industry as flavor and preservative. The aim of this Study focused on the volatile oil in this Plant, *Pelargonium graveolens* L Plant materials were collected from several origin of the city Damascus and, classified and the volatile oil is extracted. The structure of the chemical components of the extracted volatile oil was studied using GC (two-dimensional gas chromatography and Simple gas chromatography). The main chemical components of the volatile oil identified using a quantitative analysis of two-dimensional gas chromatography coupled with mass spectrometer quadric pole, and the ratio of each chemical components is determined using GC-FID. The main ingredients of the Volatile oil were Citronellol, Geraniol, and Linalool.

KEYWORDS: *Pelargonium graveolens* aromatic plant, volatile oil, chemical composition, gas chromatography.

INTRODUCTION

Geranium is a very common and widely spread plant in Syria[1], It is a small herbal plant with curved long petiolet leaves (Figure-1). The plant is aromatic has very likely odour.

Figure 1: Pelargonium graveolens (geranium).

The aerial parts of the plant and its volatile oil is added to some jams and sweets as a flavoring agent. The aerial parts of the plant and its volatile oil are used in the treatment of urinary tract infections, fungal infections and oral ulcers.[2-3]

This study aims to determine the chemical composition of the volatile oil in the aerial parts of *Pelargonium graveolens*, which is commonly used as preservative in the food industry. The volatile oil of the plant geranium playing an important role in the plant. In many cases it plays a role as defender against the attacking organisms,

as well as against insects. Some constituents of the plant, such as turbines, have a distinctive smell, making them appealing to polarizing public interest and researchers. Others, such as quinones and tannins, can be responsible for plant pigmentation and other components responsible for plant taste (eg, Capsaicin in chili peppers).[4-7]

The objective of this research was the study of the chemical constituents of the volatile oil extracted from the aerial parts of *Pelargonium graveolens* L., Widely spread in the city of Damascus.

Plant Materials and methods

Plant materials were gathered from several sites of Damascus.

Extraction of the volatile oil

The volatile oils were extracted from the aerial parts of the plant using water steam distillation (Clevenger).[8-13]

Study the chemical composition of the volatile oil

The chemical composition of the volatile oil was studied using gas chromatography: Comprehensive quantitative analysis of the two-dimensional gas chromatography of the volatile oil using four-polar quick scan mass spectrometer (GC × GC-q MS).

The analysis was completed using GC-MS 6890 (Agilent Technologies) Burwood, Australia, coupled with the 5973 mass spectrometer. Column HP5 (film thickness 0.25 micrometer, 30 mm x 250 µm and BP20 (film thickness 0.25 micrometer), silica gel (Agilent) dimensions of 0.5 m × 320 µm. The analysis it was completed using GC 17 AFW FID (chimadzu).

Quantitative analysis using two-dimensional gas chromatography of the volatile oil was done using the quadratic quadrilateral quick-scan (GC × GC-q MS), temp. program: 40 C^o to 240 C^o at a rate of 3 m / min, injection temp.: 240 C^o.

The chromatogram of GC-FID, showed 64 compounds in the volatile oil (figure-2 and figure -3), (Table -1).

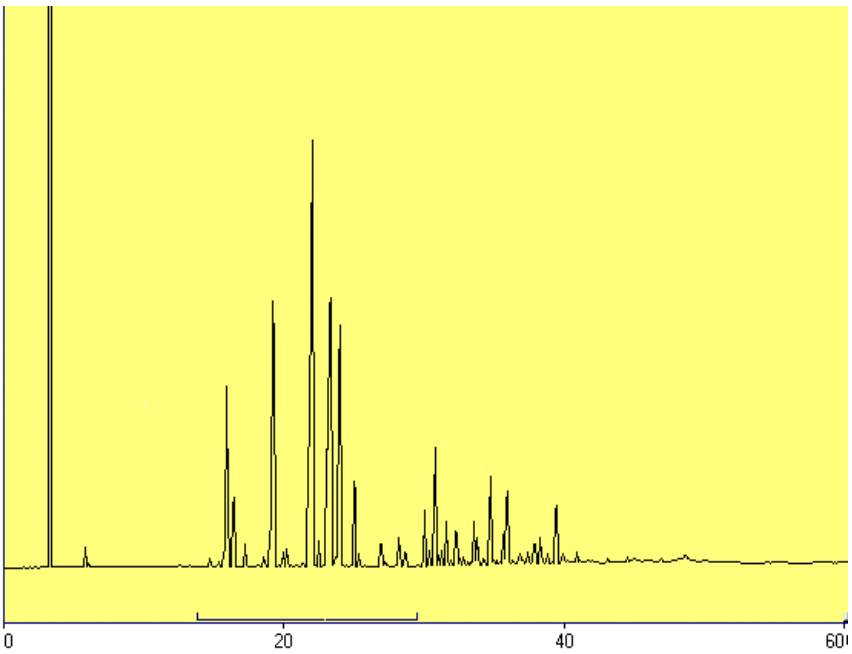

Figure (2): GC-FID of the volatile oil in the aerial parts of geranium.

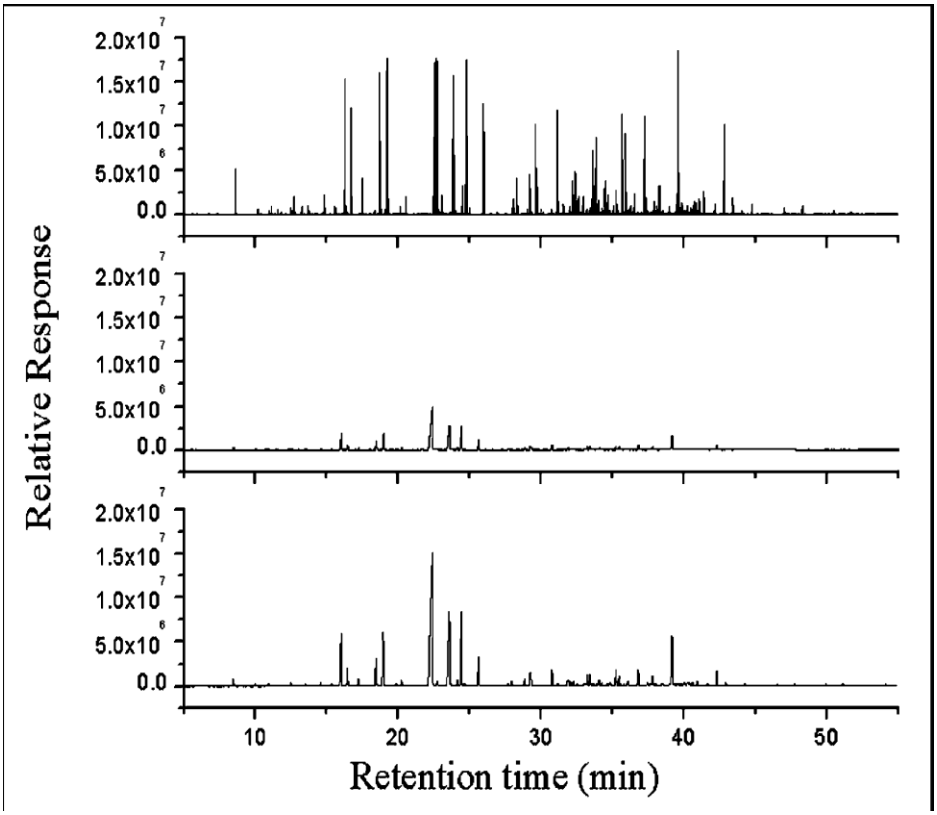

Figure (3): Gas chromatography diagram with mass spectrometer. (GC-MS).

Table 1: Main compounds of the volatile oil.

$^{2}t_R$/min	$^{1}t_R$/min	Compound	No.
0.66	8.61	a-Pinene	1
1.44	10.94	6-Methyl-5-hepten-2-one	2
0.9	11.19	Myrcene	3
0.84	11.61	a-Phellandrene	4
1.08	12.54	p-Cymene	5
0.9	12.82	Limonene	6
0.96	13.26	cis-b-Ocimene	7
1.04	13.76	trans-b-Ocimene	8
1.62	14.8	cis-Linalool oxide	9
0.96	15.6	Terpinolene	10
1.68	15.6	trans-Linalool oxide	11
2.21	16.35	Linalool	12
1.1	16.78	cis-Rose oxide	13
1.1	17.5	trans-Rose oxide	14
1.34	18.77	Menthone	15
1.8	18.88	Citronellal	16
2.64	18.8	Iso-isopulegol	17
1.41	19.35	Isomenthone	18
1.86	19.3	Terpinen-4-ol	19
2.02	20.23	Neoisomenthol	20
2.55	20.56	a-Terpineol	21
0.21	22.47	Nerol #	22
2.73	22.77	Citronellol #	23
1.91	2314	Neral	24
2.07	23.61	Piperitone	25
0.33	24	Geraniol	26
1.98	24.45	Geranial	27
1.44	24.84	Citronellyl formate	28
1.69	26.01	Geranyl formate	29

0.92	28.13	a-Cubebene	30
2.34	28.2	Phenylethyl propanoate	31
1.26	28.3	Citronellyl acetate	32
0.93	29.27	a-Copaene	33
0.96	29.66	a-Ylangene	34
0.98	29.8	b-Bourbonene	35
1.46	29.9	Geranyl acetate	36
1.02	31.4	b-Caryophyllene	37
0.96	31.77	trans-a-Bergamotene	38
1.02	31.94	Aromadendrene	39
1.02	32.29	a-Guaiene	40
1.08	32.72	a-Humulene	41
1.02	33.02	Alloaromadendrene	42
1.2	32.29	Citronellyl propanoate	43
1.1	33.84	Germacrene D	44
1.08	33.75	g-Muurolene	45
1.32	33.75	Geranyl propanoate	46
1.16	35.69	d-Cadinene	47
1.26	35.7	cis-Calamenene	48
1.14	35.95	Citronellyl-n-butyrate	49
1.38	36.57	a-Agarofuran	50
1.2	37.01	Germacrene B	51
1.34	37.33	Geranyl-n-butyrate	52
2.43	38.25	Phenylethyl tiglate	53
1.68	39.69	10-Epi-g-eudesmol	54
1.97	40.2	Hinesol	55
1.98	40.05	g-Eudesmol	56
1.32	41.79	Geranyl valerate	57
1.46	42.88	Geranyl tiglate	58
1.2	43.46	Citronellyl hexanoate	59
1.3	44.75	Geranyl hexanoate	60
1.2	47.05	Citronellyl heptanoate	61
1.32	48.38	Geranyl heptanoate	62
1.29	50.59	Citronellyl octanoate	63
1.38	51.75	Geranyl octanoate	64

RESULTS AND DISCUSSION

The main ingredient of the volatile oil it was citronellol (sweet rose-like odor), geraniol (flowery-rose like odor) and their aldehyde and ketone derivatives. The plants from South Africa and Bourbon contain unusual amounts of Citronellol, Isomenthone and mono-terpenes, which can be distinguished by the presence of certain components such as Guaia-6, 9diene in Bourbon oil and the presence of -udesmol [gamma] 10-Epi in South African. Chinese oil is similar to the Bourbon oil, which contains about 40% more Citronellol and fewer geraniol and linolenol.[13-14] Accordingly, the aromatic oil derived from the common fragrant plant in the city of Damascus has a chemical structure closer to the Chinese geranium.

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