



EVALUATION OF MEDICINAL PLANT VALERIAN (*VALERIANA OFFICINALIS* L.) ESSENTIAL OIL COMPOSITIONS CULTIVATED AT GARMSAR ZONE IN IRAN

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ABSTRACT

This study was conducted on experimental field at Garmsar zone in Iran during 2010 – 2011 in order to Evaluation of medicinal plant valerian (*Valeriana officinalis* L.) essential oil compositions cultivated at Garmsar zone in Iran. Sowing date was 20 September and planting density was 80000 plant ha⁻¹. The volatile constituents of the root part of cultivated *Valeriana officinalis* were isolated by steam distillation and analysed by GC and GC-MS systems that were identified the 69 compositions. The results showed that oil percentage was 1.65%. The basic oil components among the identified 69 compounds were α -Fenchene (6.1%), Camphene (11%), Borneol (6.6%), Bornyl acetate (10.1%) and Valerenal (12.9%). and Our finding may give applicable advice to commercial and medicinal and aromatic plants researches for management for increase of quantity and quality yields in medicinal and aromatic plants farming.

KEYWORDS: essential oil content, compositions, *Valeriana officinalis* L.

INTRODUCTION

Valerian, is a medicinal plant and one of the important genera of the Valerianaceae family. The genus *Valeriana* is represented by six species growing wild in Iran. *V. officinalis* (valerian) was considered as a perfume in the sixteenth Century¹. Valerian (*Valeriana officinalis* L.) is a well-known and frequently used medicinal plant, which has a long proven history of efficacy. The plant is cultivated as a medicinal plant on a commercial scale in the northern parts of Europe and America. Valerian has been shown to encourage sleep, improve sleep quality, and reduce blood pressure². The valerian root is sedative, mild anodyne, hypnotic, antispasmodic, carminative, and hypotensive. Traditionally, it has been used for hysterical states, excitability, insomnia, hypochondriasis, migraine, cramp, intestinal colic, rheumatic pains, etc. Modern interest in valerian preparations is focused on their use as a sedative and hypnotic³. The typical constituents of valerian roots are found to be valeric and isovaleric acid, monoterpenes (α -pinene, α -fenchene, camphene), monoterpene esters (bornyl acetate, myrtenyl acetate, myrtenyl isovalerate), oxygen containing sesquiterpenes, and valerian cyclopentanoid sesquiterpenes such as valerenal, valerenone, valerenol, valerenyl acetate, valerenic acid, and valerenyl isovalerate². The oil content of *V. officinalis* has been reported to vary from 0.1% to 2%³⁻⁴. In a research evaluated essential oil content and the composition of two valerian (*Valeriana officinalis*, L.) cultivars select and Anthose, they reported that cv. Select had 0.67 and 0.87% essential oil, while similar aged cv. Anthose contained 0.97 and 1.1% essential oil. Forty-three and fifty-three components from cv. Select and cv. Anthose oils were detected, respectively. The oil composition significantly varied due to the cultivar type. The major components for cv. Select were valerenal, bornyl acetate, 15-acetoxy valeranone, valerenic acid, and camphene, while cv. Anthose had valerenal, (-)-bornyl acetate, R-humulene, camphene, 15-acetoxy valeranone, and valerenic acid. With further aging of the plants, the valerenal, valerenic acid, and R-humulene contents increased⁴. The Objective of this study was to

evaluation the composition of the essential oil of *Valerianae officinalis* cultivated at Garmsar zone in Iran.

MATERIALS AND METHODS

This study was conducted on experimental field at Garmsar zone in Iran (51° W °and 34' W; 856 m above sea level) during 2010 - 2011, in the study area is distributed with an annual mean of rain was 150 mm. sowing dates was 20 September and planting densities was 80000 plants ha⁻¹. In this study for achieve to organic agriculture, didn't use the chemical fertilizer. Initially, for need of plant nutrients were added by applying 2300 kg/ha animal manure at autumn of 2009. The washed root of plant harvested at autumn was air dried and stored at room temperature in the dark until use To determine essential oil percentage

Essential Oil Isolation Procedure

Essential oil samples were isolated from 100g root dry matter of *V. officinalis* var. Tehran for 4h, using a Clevenger⁵.

GC-MS analysis

Reaction products were identified and quantified on GC-MS system (Hewlett Packard 6890) with helium as a carrier gas. The temperature of the DB-5MS capillary column (59.5 m × 0.25 mm × 0.25 μ m, J and W Scientific) was kept at 50°C for 2 min and then increased to 300°C at a rate of 15°C/min. The scan mode at 50 -550 m/z was used for searching and for identification of products, whereas SIM mode was used for quantification⁶.

RESULTS AND DISCUSSION

The composition of essential oil extracted from *Valeriana officinalis* L. roots growing at Garmsar zone in Iran was studied by hydrodistillation and The yield of the essential oil was 1.65%. The oil yield of *V. officinalis* has been reported to vary from 0.1% to 2%^{2,4}. The final results showed that 69 compositions were identified in valerian essential oil by GC and GC- MS systems (Table1). The oil profile of our cultivar matched the literature proposed chemotype profiles. The basic oil components among the identified 69 compounds were α -Fenchene (6.1%), Camphene (11%), Borneol (6.6%), Bornyl acetate (10.1%) and Valerenal (12.9%). The oil profile of our cultivar matched the literature proposed chemotype profiles. Several chemotypes of the essential oil

of valerian roots have been distinguished earlier in the literature⁷, e.g. a valerianol type, and valeranone, cryptofauronol, and valeranal types. These compounds were found to be the main compounds in valerian root oils in researches too^{2,4,7,8}. Several authors reported the presence of valerianol as a major constituent of *V. officinalis* oil. A high content of valerianol was found in oil of *V. officinalis* roots from Serbia¹⁰, in some samples from The Netherlands⁷ and in roots of *Valeriana officinalis* from Estonia².

CONCLUSION

Essential oil of *Valeriana officinalis* is very important in pharmaceutical industry. Therefore finding of my results of this research showed that, roots of *Valeriana officinalis* cultivated at Garmsar zone in Iran, was rich in essential oil and its important components of oil were, monoterpene hydrocarbons (α -Fenchene and Camphene) and Borneol, Bornyl acetate and Valerenal.

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Table 1. Present compositions in valerian essential oil of *Valeriana officinalis* L. cultivated at Garmsar zone in Iran

Oil Yield (% v/dry weight)	1.65	
Components	RI	% composition
α -Pinene	939	0.5
α -Fenchene	951	6.1
Camphene	953	11
Methyl valeric acid-3	954	0.7
Sabinene	976	0.8
β -Pinene	980	1.0
P-cymene	1021	0.5
Limonene	1024	0.5
Camphor	1143	0.8
Borneol	1165	6.6
Pulegone	1176	1.5
Terpinene-4-ol	1177	0.4
α -Terpineol	1189	0.6
E)-Carveol(1232	0.3
Thymyl methyl ether	1235	0.6
N-hexyl isovalerate	1240	0.4
Carvacrol methyl ether	1244	0.7
Bornyl acetate	1285	10.1
Transe-pinocarvyl acetate	1297	0.6
Terpenyl acetate	1349	0.7
Cis-caryophyllene	1362	0.6
Cis-carvyl acetate	1366	0.6
cycloisosativen(+)-	1368	0.5
α -copaene	1375	0.4
β -cubebene	1390	0.6
β -elemene	1394	0.9
2,6 dimetoxy-p-pymene	1405	0.6
Italicene	1406	0.5
Dihydro isolongifolene	1408	0.3
β -cedrene	1412	1.1
E)- β -caryophyllene(1419	0.5
β -gurjunene	1429	1.1
α -cedrene	1436	0.8
Aromadenderne	1438	0.6
α -guaiane	1444	0.7
Pacifigriol isomer	1473	1.0
Zingiberene	1490	1.1
α -faranesene	1493	0.8
α -bulnesene	1495	1.1
α -selinene	1498	0.6
Isopinocarveol	1499	0.4
Bornyl isovalerate	1500	1.1
Bicyclo germancene	1502	0.8
Germacerene-D	1503	1.1
E,E)- α -farenen(1506	0.9
Valenecene	1507	1.1
α -cadinene	1521	0.9
α -calacorene	1532	1.2
Kessyl alcohol	1539	0.4
Valerance ketone	1547	0.8
β -calacorene	1554	0.9
Myrtenyl isovalerate	1555	0.7
Germacrene-B	1556	2.4
Spathulenol	1574	0.6
Guaiol	1586	0.7
Benzo-diazepene	1589	0.4
Viridiflorol	1600	0.5
Geranyl isovalerate	1605	0.4
- Eudesmol	1621	0.5
Sesquiterpene alcohol	1635	0.6
T- muurolol	1642	0.9
β -eudesmol	1645	0.5
Myrtenal acetate	1648	0.7
Valerianol	1652	1.1
Valeranone	1671	5.8
α -bisabolol	1683	1.4
Valerenic acid	1686	0.6
Z- β - santalol	1698	0.9
Valerenal	1717	12.9

RI = Retention index relative to C9-C17 n-alkanes on the DB-1 column