

NOTE

GC/MS Analysis of the Essential Oil of *Thymus persicus* Leaves

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The essential oil obtained from the fresh leaves of *Thymus persicus* growing wild at 2200 m in Lorestan State, was analyzed by using GC and GC/MS. Twenty-six compounds representing 98.05% of *T. persicus* essential oil were identified. The major constituents were thymol (10.38%), carvacrol (25.71%), γ -terpinene (5.63%), limonene (11.62%), 1,8-cineol (5.24%) and *trans*-sabinene hydrate (7.78%).

Key Words: *Thymus persicus*, Essential oil, Thymol.

The genus *Thymus* L. (Labiatae) (Iranian name: Avishan¹) consists of about 11 species (*Thymus fallax*, *Thymus daenensis* subsp. *daenensis*, *Thymus transcasicus*, *Thymus persicus*, *Thymus kotschyamus*, *Thymus fedtschenjoi*, *Thymus migricus*, *Thymus caucasicus*, *Thymus eriocalyx*, *Thymus tranutvetteri* and *Thymus kotshyanus*) grown in Lorestan state are endemic¹. *Thymus* species are commonly used as flavoring agents, spice and medicinal plants¹. *Thymus* species are also used as tonic, carminative, digestive, antispasmodic, antiinflammatory, antitussive, expectorant and for the treatment of colds in Iranian traditional medicine^{3,4}.

There is a considerable research interest towards the compositional analysis of *Thymus* essential oils³ obtained from the aerial parts of the plant, e.g., thymol, carvacrol, *p*-cymene, β -pinene, γ -terpinene, β -caryophyllene, 1-borneol, 1,8-cineole, etc.⁵⁻⁸ The literature survey showed that the analysis of the leaf oil of *Thymus persicus* growing in the Lorestan region had not been done. Thus, it is thought worth while to identify the chemical constituents of the essential oil from this region.

The fresh leaves of *T. persicus* were collected from the 2200 m highland of Zagros Mountain in the Lorestan State, during April 2005. The plants were identified and authenticated by Dr. H. Amiri at the Department of Biology,

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University of Lorestan. Voucher specimens was deposited in the herbarium of Research Institute of Forest and Rangeland, Tehran.

Isolation of essential oil: The fresh leaves of the plant (43 g) were hydrodistilled in a Clevenger-type apparatus for 2 h. The oil was dried over anhydrous sodium sulfate and immediately injected to GC-MS.

Analysis of oil: GC analyses were carried out on a Shimadzu 17A gas chromatograph equipped with a FID and a BP-5 (non-polar) capillary column (30 m \times 0.32 mm, 0.25 μ m film thickness). The oven temperature was held at 60°C for 3 min, then programmed at 5°C/min to 260°C. Other operating conditions were as follows: carrier gas He, at a flow rate of 5 mL/min; injector temperature 230°C; detector temperature 245°C; split 40, column flow ratio 1 : 8 mL/min. GC-MS analysis was performed on a Shimadzu 17A GC coupled with Shimadzu QP5050A mass system. The operating conditions were the same as described above but the carrier gas was He. Mass spectra were taken at 70 eV. Mass range was from m/z 50–500 amu. Quantitative data were obtained from the electronic integration of the FID peak areas. The components of the oil were identified by comparison of their mass spectra and retention indices with those published in literature⁹.

The hydrodistillation of the leaves of *T. persicus* gave pale green oil with a yield of $3.1 \pm 0.1\%$ (v/w) on dry weight basis. The general chemical profiles of the tested oil, the percentage content of the individual components and retention indices are given in Table-1. In the oil of *T. persicus*, twenty-six components were identified, which represented about 98.05% of the total detected constituents. The major constituents of the oil were thymol (10.38%), β -caryophyllene (2.5%), 1,8-cineol (5.24%), *trans*-sabinene hydrate (7.78%) and carvacrol (25.71%). Other components were present in amounts less than 4% (Table-1). In particular, monoterpene phenols were the most abundant compound group of the oil (69.25%).

TABLE-1
CHEMICAL COMPOSITION OF *T. PERSICUS* ESSENTIAL OIL

Compound	RI	Content (rel. %)
1-Limonene	1021	0.10
α -Phellandrene	995	0.86
α -Pinene	937	1.14
Camphene	950	1.33
Sabinene	1115	0.56
β -Pinene	971	1.02
α -Terpinene	1011	2.54
Limonene	1008	11.62
1,8-Cineol	1084	5.24
(+)-3-Carene	1005	1.04
γ -Terpinene	1048	5.63

Compound	RI	Content (rel. %)
<i>trans</i> -Sabinene hydrate	1050	7.78
α -Terpinolene	1185	1.05
<i>cis</i> -Sabinene hydrate	1204	1.05
L-Linlool	1084	1.22
L-Camphor	1112	3.61
1-Borneol	1138	4.07
<i>cis</i> -Ocimenol	1025	0.87
Carvacrol methyl ether	1228	1.11
Thymol	1162	10.38
Carvacrol	1238	25.71
β -Caryophyllene	1572	2.50
<i>cis</i> -Bisabolene	1509	1.65
Sapthulenol	1577	1.59
Caryophyllene oxide	1548	2.56
Juniper camphor	1596	0.97
Total		98.05

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