

## CHEMICAL COMPOSITION OF VOLATILE CONSTITUENTS OF *Magnolia grandiflora*

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*Magnolia grandiflora* Linn, native to North America, is an immense broad-leaved evergreen of the Magnoliaceae family [1]. As one of the traditional Chinese medicines (TCMs), the leave of *Magnolia grandiflora* L. has been applied to the treatment of hypertension for many years in China. Many volatile constituents with bioactivity are present in its leave [2]. Therefore, understanding the chemical composition of volatile constituents in the leave of *Magnolia grandiflora* L. is an essential step in using it more scientifically.

In this short communication, for the first time, volatile constituents of *Magnolia grandiflora* L. were extracted by headspace solid-phase microextraction (HS-SPME) combined with microwave-assisted extraction (MAE) and then analyzed by gas chromatography-mass spectrometry (GC-MS) for the fast determination of volatile constituents [3, 4]. Compared with conventional extraction such as hydrodistillation, steam distillation, Soxhlet extraction, and so on, HS-SPME can evidently improve the extraction efficiency and it is also a time-saving, simple, and solvent-free method.

TABLE 1. Identification of the Volatile Constituents in *Magnolia grandiflora* L. from GC-MS Analysis

Compound	Rt, min	%	RSD, %	Compound	Rt, min	%	RSD, %
Furfural	6.339	1.125	7.7	Dihydrocarveol	19.682	1.552	9.8
5-Methyl-2-furancarboxaldehyde	9.356	0.895	6.4	2,6-Dimethyl-6-bicyclo[3.1.1]hept-2-ene	19.786	11.604	8.9
Benzeneacetaldehyde	11.190	0.246	8.9	3,7,11-Trimethyl-1,6,10-dodecatrien-3-ol	19.965	2.602	7.7
3,7-Dimethyl-1,6-octadien-3-ol	12.263	0.787	9.1	Spathulenol	20.322	6.515	5.8
2-Methyl-4-bromo-1-butene	12.517	0.898	10.6	1,4-Dimethyl-3-[2-methyl]-1-cycloheptene	20.374	2.298	8.8
Camphor	13.336	0.287	7.5	1H-Cycloprop[e]azulen-7-ol	20.640	1.582	8.0
2,3-Dimethylanisole	15.615	0.201	5.1	Caryophyllene oxide	20.732	2.037	9.6
1-Undecen-3-yne	15.898	0.419	8.9	Ledene alcohol	20.870	2.335	7.8
2-Hexyl-furan	15.973	0.257	8.1	$\alpha$ -Cadinol	21.084	2.288	6.8
2,4-Decadienal	16.394	0.506	7.9	Isoaromadendrene epoxide	21.153	0.821	8.4
2,5,5-Trimethyl-1,3,6-heptatriene	16.659	2.013	8.9	1,4-Methanoazulene	21.159	0.221	8.8
$\alpha$ -Farnesene	17.519	2.233	10.9	Heptadecane	21.297	0.811	7.4
Caryophyllene	17.686	9.032	10.2	<i>trans</i> -Z- $\alpha$ -Bisabolene epoxide	21.372	0.361	2.8
Isocaryophyllene	18.228	4.921	10.2	4,8a-Dimethyl-6-isopropenylene	21.436	1.644	8.3
3,7,11-Trimethyl-1,3,6,10-dodecatetraene	18.309	0.748	8.6	Dicyclohexyl-propanedinitrile	21.661	1.584	6.4
$\beta$ -Panasisene	18.494	1.978	6.1	$\alpha$ -Copaen-8-ol	21.891	0.734	5.8
$\alpha$ -Caryophyllene	18.753	1.449	6.3	Hydroxymethyl-1-methylidene	22.930	0.82	6.4
Germacrene D	18.822	0.931	8.1	Hexadecanoic acid methyl ester	23.132	0.174	6.3
1,2,3,4a,5,6,8a-Octahydronaphthalene	19.140	7.907	46	<i>n</i> -Hexadecanoic acid	23.420	0.61	5.7
1,2,3,5,6,7,8,8a-Octahydronaphthalene	19.244	2.103	7.5	Hexadecanoic acid ethyl ester	23.605	0.49	8.6
$\gamma$ -Elemene	19.342	15.671	7.1	Isopropyl palmitate	23.795	0.108	8.1
Copaene	19.509	1.139	6.0	Phytol	24.453	0.39	6.8
1,2,3,5,6,8a-Hexahydro-4,7-naphthalene	19.538	1.900	8.9	Linoleic acid ethyl ester	24.718	0.288	10.7
$\beta$ -Humulene	19.590	0.324	8.4	Tricosane	25.514	0.092	5.8

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2.0 g of fresh leaves of *Magnolia grandiflora* L. was used as the TCM sample to determine the chemical compositions of its volatile constituents. Results showed that a total of 48 constituents was separated and identified from the volatile constituents of *Magnolia grandiflora* L. The total area of 48 identified volatile constituents was more than 96% of the total chromatographic area. As shown in Table 1, the main constituents of *Magnolia grandiflora* L. included  $\gamma$ -elemene, 2,6-dimethyl-6-bicyclo[3.1.1]hept-2-ene, caryophyllene.

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