J. Essent. Oil Res., **10**, 654-656 (Nov/Dec 1998)

RESEARCH NOTE

Essential Oil of *Asterothamnus centrali-asiaticus* Novopokr. from Mongolia

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Abstract

The leaf essential oil of *Asterothamnus centrali-asiaticus* was analyzed by GC/MS. The leaf oil major components are β-pinene (11.6-31.4%), sabinene (9.8-22.0%), α-pinene (3.7-8.3%), (Z)-β-ocimene (5.0-8.9%), (E)-β-ocimene (4.0-5.6%), and β-phellandrene (5.3-7.6%), with lesser amounts of artemisia ketone (3.6-0.0%), terpinolene (5.1-6.2%), terpinen-4-ol (0.8-7.1%) and spathulenol (0.2-4.8%).

Key Word Index

Asterothamnus centrali-asiaticus, Asteraceae, essential leaf oil composition, β-pinene, sabinene.

Plant Name

Asterothamnus centrali-astatticus Novopokr., common name: Tuv asiin lavai (Mongolia).

Source

Foliage consisted of a bulk sample of leaves from several plants from Gurvan-Saikhaan Ula Mts. near Omno Gobi-Aimak, South Gobi province (Shatar 5/91, lab # 7527) and Caagaan cav of Dund Gobi Olzit, Middle Gobi province (Shatar 4/94, lab # 7528). Voucher specimens have been deposited at the herbarium at the Mongolian Academy of Science, Ulan Bator. This species is widespread in Mongolia and occurs into northwest inter-Mongolia, China (1).

Plant Part

Air dried leaves were steam distilled in a circulatory Clevenger-type apparatus (2) for 2 h to produce a greenish-yellow oil with a yield of 0.23-0.30%, air-dried leaf basis.

Previous Work

The leaf oil of *A. centrali-asiaticus* have been reported to contain 9-17% sabinene, 10% β-ocimene, 7.5% γ-terpinene, 7.4% p-cymene, 4-14% terpinolene with minor amounts of α- and β-pinene, camphene, α-terpinene, α- and β-phellandrene, limonene, artemisia ketone, camphor, linalool, borneol, bornyl acetate and geranyl acetate (3,4).

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Received: June 1997

1041-2905/98/0006-0654$04.00/0—

Table I. Percentage composition of the leaf oil of *Asterothamnus centrali-asiaticus* from Mongolia

RI	Compound	Omno Gobi-Aimak	Dund Gobi Olzit	RI	Compound	Omno Gobi-Aimak	Dund Gobi Olzit
931	α-thujene	0.5	0.6	1165	borneol	t	0.1
939	α-pinene	8.3	3.7	1177	terpinen-4-ol	0.8	7.1
953	camphene	1.8	0.6	1183	p-cymen-8-ol	t	0.9
976	sabinene	22.0	9.8	1189	α-terpineol	t	0.7
980	β-pinene	31.4	11.6	1193	myrtenal	-	t
991	myrcene	3.4	2.9	1195	methyl chavicol	-	0.5
998	yomogi alcohol	-	0.3	1242	carvone	-	0.3
1001	δ-2-carene	-	0.1	1254	aromatic phenolic	0.2	3.2
1005	α-phellandrene	2.7	1.0	1285	bornyl acetate	0.3	0.6
1011	δ-3-carene	0.7	1.5	1291	2-undecanone	-	0.2
1018	α-terpinene	0.7	1.2	1298	carvacrol	-	0.5
1026	p-cymene	0.2	1.7	1365	neryl acetate	t	0.1
1031	limonene	1.0	1.5	1383	geranyl acetate	t	0.2
1031	β-phellandrene	7.6	5.3	1401	methyl eugenol	0.4	0.9
1033	1,8-cineole	0.2	-	1418	β-caryophyllene	t	0.3
1040	(Z)-β-ocimene	5.0	8.9	1480	germacrene D	0.4	t
1050	(E)-β-ocimene	4.0	5.6	1480	γ-curcumene	-	0.6
1062	γ-terpinene	0.8	2.6	1483	ar-curcumene	-	0.5
1062	artemisia ketone	-	3.6	1485	β-(E)-ionone	-	t
1068	cis-sabinene hydrate	0.2	0.1	1485	β-selinene	-	t
1083	artemisia alcohol	-	0.1	1494	bicyclogermacrene	0.9	2.1
1088	terpinolene	5.1	6.2	1513	γ-cadinene	t	-
1092	hydrocarbon	t	0.6	1524	δ-cadinene	t	-
1097	trans-sabinene hydrate	t	t	1554	elemicin	t	0.3
1098	linalool	0.6	1.0	1564	(E)-nerolidol	t	0.2
1102	cis-thujone (α-thujone)	-	0.8	1576	spathulenol	t	4.8
1114	trans-thujone (β-thujone)	-	0.5	1583	globulol	-	0.4
1121	cis-p-menth-2-en-1-ol	-	0.3	1619	1-epi-γ-eudesmol	-	0.5
1129	allo-ocimene*	-	0.2	1640	epi-α-cadinol	t	-
1140	trans-p-menth-2-en-1-ol	-	0.3	1653	α-cadinol	t	-
1143	camphor	0.2	0.3	2080	abietadiene	t	t

RI = Retention Index on DB-5 (=SE54) column. Compositional values less than 0.1% are denoted as traces (t).
Unidentified components less than 0.5% are not reported; *correct isomer not identified

Present Work

GC/MS was accomplished on a Finnigan Ion Trap 800 using a DB-5 column and temperature programmed from 60°-240°C at 3°C/min (see Ref. 5 for details). The compounds were identified by combined retention times and mass spectral data (5). The composition of the oils from two locations are presented in Table I. The major constituents of the leaf oil are β-pinene (11.6-31.4%), sabinene (9.8-22.0%), α-pinene (3.7-8.3%), (Z)-β-ocimene (5.0-8.9%), (E)-β-ocimene (4.0-5.6%), and β-phellandrene (5.3-7.6%), with lesser amounts of artemisia ketone (3.6-0%), terpinolene (5.1-6.2%), terpinen-4-ol (0.8-7.1%) and spathulenol (0.2-4.8%). The presence of artemisia ketone and artemesia alcohol is noteworthy. There is considerable differences in the composition of plants from these two locations but general agreement with the previous reports (3,4). Mass spectra of unidentified constituents: [ITMS, m/z (rel. int.): RI 1092, 41(100), 55(57), 69(36), 83(20), 97(12), 111(5), 125(2), hydrocarbon; RI 1254, 41(64), 51(27), 65(23), 79(42), 91(100), 105(78), 119(43), 133(13), 147(60), 162(43), aromatic phenolic.

References

1. Ma Yo Chuan, *Flora of Mongolia. Tomus 6. Redactore Principali.* p 29, Chinese Acad. of Science, Huhhot, China (1982).
2. R. P. Adams, *Cedar Wood Oil-Analysis and Properties.* In: *Modern Methods of Plant Analysis: Oils and Waxes.* Edits., H. F. Linskins and J. F. Jackson, pp 159-173, Springer-Verlag, Berlin (1991).
3. S. Shatar, *Chemical Investigation of the Mono- and Sesqui-Terpenes of Essential Oils from Mongolian Flora, in Relation to Their Biogenesis.* Mongolian Acad. Sci. Press., Ulan Bator, Mongolia, pp 43-44 (1993).
4. S. Shatar, *Chemistry of terpene hydrocarbons of some endemic essential oil plants of Mongolia.* Proceedings, 11th International IUPAC Symp. Chem. Nat. Prod., Sofia, Bulgaria, pp 461-462 (1978).
5. R. P. Adams, *Identification of Essential Oils by Gas Chromatography/Mass Spectroscopy.* Allured Publ. Corp., Carol Stream, IL, USA (1995).