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CHEMICAL COMPOSITION OF ESSENTIAL OILS OF TWO *Mentha* SPECIES

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The genus *Mentha* (Labiatae) comprises approximately 30 species widespread throughout the world [1]. In China, 12 species have already been recorded [2], including *M. vagans* Boriss. and *M. dahurica* Fisch. *M. vagans* Boriss. and *M. dahurica* Fisch. are distributed in Xinjiang and Jiling region of China, and they have been used traditionally by local people in the treatment of fever, colds, tumefaction, and rheumatism [2].

The essential oil constituents of a few *Mentha* species have been reported [3–8], but none refer to *M. vagans* Boriss. and *M. dahurica* Fisch. Our present work reports the essential oil compounds of *M. vagans* Boriss. and *M. dahurica* Fisch. To our knowledge, it is the first report on the essential oil compositions of these two species.

The chemical compositions of the essential oils of *M. vagans* Boriss. and *M. dahurica* Fisch. are shown in Table 1 in the order of the retention indices. Twenty compounds were identified in *M. vagans* Boriss., which represented 97.1% of the oil. The oil consisted mainly of five oxygenated monoterpenes (83.4%), seven monoterpene hydrocarbons (8.7%), four sesquiterpene hydrocarbons (1.7%), and three oxygenated sesquiterpenes (3.1%). The main components were piperitenone oxide (68.5%), 1,8-cineole (13.5%), β-myrcene (2.1%), caryophyllene oxide (2.0%), and β-pinene (2.0%).

In *M. dahurica* Fisch., twenty-four compounds representing 94.2% of the total oil were identified. The most abundant components were oxygenated monoterpenes (67.9%) and monoterpene hydrocarbons (29.3%). Piperitenone oxide (52.7%), γ-terpinene (8.5%), terpine-4-ol (6.4%), 1,8-cineole (4.8%), and β-myrcene (4.5%) were the major components.

The highest content of these two *Mentha* species is piperitenone oxide, which has been previously reported as the main component of the essential oils of *M. spicata* Linn. [9], *M. rotundifolia* Huds. [10], *Calamintha nepeta* subsp. *glandulosa* [11], and *Tagetes erecta* Linn. [12].

Plant Material. The aerial parts of *M. vagans* Boriss. were collected from Xinjiang area of China in June 2008, and the aerial parts of *M. dahurica* Fisch. were collected from Jiling area of China in June 2007, during the flowering period. Plant materials were taken immediately to the laboratory to be dried at ambient temperature. Voucher specimens were deposited in the Herbarium of the Botanical Institute of Jiangsu Province and the Chinese Academy of Sciences.

Essential Oil Isolation. Air-dried plant materials were subjected to hydrodistillation using a Clevenger-type apparatus for 3 h. The obtained essential oils were dried over anhydrous sodium sulfate and, after filtration, stored in sealed vials under refrigeration until tested and analyzed.

GC Analysis. GC analysis was performed on a Shimadzu 2010 gas chromatograph equipped with a DB-1 silica column (30 m × 0.25 mm, film thickness 0.25 μm). Nitrogen was used as carrier gas (1.0 mL/min). Injector and detector(FID) temperatures were kept at 250°C and 280°C, respectively. The oven temperature program was as follows: initial temperature 60°C, held for 3 min and then increased at 3°C/min to 240°C, and kept at this temperature for 10 min. The split ratio was kept at 1:20.

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TABLE 1. Composition of the Essential Oils of *Mentha vagans* Boriss. and *M. dahurica* Fisch., %

Compound	RI[a]	*M. vagans*	*M. dahurica*	Compound	RI[a]	*M. vagans*	*M. dahurica*
α-Pinene	926	0.9	1.0	Carvone	1220	–	0.3
Sabinene	961	1.3	1.1	Piperitone oxide	1233	–	0.8
β-Pinene	964	2.0	1.2	Bornyl acetate	1275	0.2	–
β-Myrcene	981	2.1	4.5	Piperitenone	1339	–	0.4
α-Terpinene	1006	–	0.6	Piperitenone oxide	1342	68.5	52.7
p-Cymene	1009	0.5	1.7	β-Elemene	1369	0.5	0.7
Limonene	1020	0.8	0.8	β-Caryophyllene	1406	0.4	2.3
1,8-Cineole	1026	13.5	4.8	Germacrene D	1465	–	2.2
(*Z*)-β-Ocimene	1037	–	0.4	Bicyclogermacrene	1479	–	0.4
γ-Terpinene	1053	1.1	8.5	α-Muurolene	1495	0.2	–
Terpinolene	1075	–	0.5	*cis*-Calamenene	1499	0.6	–
Linalool	1084	–	1.0	Spathulenol	1553	0.5	0.4
Terpine-4-ol	1159	0.8	6.4	Caryophyllene oxide	1555	2.0	–
p-Cymen-8-ol	1164	0.4	0.7	α-Cadinol	1630	0.6	–
α-Terpineol	1173	0.2	0.8	Total		97.1	94.2

RI[a]: retention indices on the DB-1 column.

GC/MS Analysis. GC/MS analysis was performed using an Agilent-5975 with an HP-5 column (30 m × 0.25 mm, film thickness 0.25 μm). Helium was used as carrier gas (1.0 mL/min). The ionization energy was 70 eV, the source temperature was 240°C, and *m*/*z* 40–550. The other conditions were the same as for GC. The components were identified based on their retention indices (RI) and by comparison of their mass spectral fragmentation patterns with the Wiley, NIST libraries and the literature [13]. The contents of essential oil components were calculated by using GC peak areas.

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