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Chemical Composition Analysis of Essential Oil of *Isodon wightii* (Benth) H. Hara

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Abstract: *Isodon wightii* (Benth) H. Hara is an aromatic medicinal plant commonly distributed in Western Ghats of South India. Essential oil was extracted from fresh leaves and chemical composition analysis was carried out using GC and GC-MS. Forty one compounds representing 85.15 % was identified with *cis*-meta-mentha-2,8-diene as major compound (13.08 %). The oil may be considered for food and perfume preparations due to its pleasant aromatic smell.

Key words: *Isodon wightii*; Leaves; Essential oil; GC-MS; *cis*-meta-mentha-2,8-diene.

Introduction

The genus *Isodon* is known for bioactive diterpenoids. Melissoidesin and abietic acid isolated from the leaves of *Isodon wightii* reported to have antioxidant, antiacetylcholinesterase, anticarcinogenic, cytotoxic and antibacterial activities^{2,6,7}. To maintain the species level constant in nature mass propagation protocol has been developed using nodal explants⁸. Since leaves are good source for active compounds and aromatic in smell hence the present study was designed to analyze the chemical composition of leaf essential oil.

Experimental

Collection of plant material and essential oil extraction

Fresh leaves of *Isodon wightii* (Benth) H. Hara was collected from Coonoor, Tamil Nadu. An authenticated sample was identified by Botanical Survey of India (BSI) and voucher specimen (BSI/SC/5/23/06-07-Tech.881) has been deposited in the herbarium of BSI, Southern Circle, Coimbatore, Tamil Nadu, India. 745 g of leaves

was hydrodistilled for about 3 h and the extracted oil was collected. The collected essential oil was treated with sodium sulphate, tightly sealed and stored at 4°C until further use.

Chemical composition analysis

Gas chromatography (GC) analysis

Gas chromatography (GC) analysis was carried out using Varian 3800 gas chromatography equipped with mass selective detector coupled to front injector type 1079. The gas chromatograph was fitted with DB-5 column (30 m x 0.25 mm). The injector temperature was set at 280°C and the oven temperature was initially maintained at 45°C then programmed to 300°C at the rate of 10°C/min and finally held at 200°C for 5 min. Helium was used as a carrier gas with the flow rate of 1.0 mL/min. The percentage of composition of the essential oil was calculated by the GC peak areas.

GC-MS analysis

Gas chromatography coupled with mass spectroscopy was performed using Varian 3800 gas

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chromatography equipped with Varian 1200 L single quadrupole mass spectrometer. The GC conditions were the same as reported for GC analysis and the same column was used. The mass spectrometer operated in the electron impact mode at 70 eV. Ion source and transfer line temperature was maintained at 250°C.

The compounds were identified based on the comparison of their retention indices (RI). Identification of the compounds was based on comparing their retention times and mass spectra with those obtained from authentic samples and/or the NIST and Wiley spectra as well as data from the published literature ¹.

Results and discussion

85 µL of essential oil was extracted out of 745g leaves and obtained oil was thick yellowish orange in color with pleasant aromatic smell. A total of forty one compounds constituting 85.15 % were identified and *cis*-meta-mentha-2,8-diene was identified as a major compound (13.08 %) (Table 1). The oil was mainly composed of complex mixtures of mono, sesqui and diterpenes. *cis*-meta-mentha-2,8-diene, viridiflorol and aroma-

dendrene have been reported in the essential oil of *Ligularia persica* ⁵, *Salvia albicaulis* ³ and compounds like α -thujene, β -gurjunene, γ -eudesmol and spathulenol have been reported in *Isodon japonicus* and *I. rugosus* ^{4,9}.

Conclusion

Chemical composition of essential oil from fresh leaves of *Isodon wightii* was studied first time. *cis*-meta-Mentha-2,8-diene was found to be the major compound. Out of 85.15 % identified, monoterpenes were predominant followed by sesquiterpenes and diterpenes. Since oil is rich in monoterpenes, evaluation antioxidant, antiinflammatory and anticancer properties of oil is in progress.

Disclosure statement

The authors declare that there is no conflict of interests regarding publication of this paper.

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Table1. Chemical composition of *Isodon wightii* essential oil

No.	Compounds	^a RT	^b RI	Percentage	Identification method
1	Cyclohexadiene 1-methyl-1,3-	2.90	771	0.19	RI, MS
2	α -Thujene	5.62	924	1.16	RI, MS
3	<i>cis</i> -meta-Mentha-2,8-diene	7.31	983	13.08	RI, MS
4	α -Phellandrene	7.85	1002	0.95	RI, MS
5	Methyl heptanoate	8.57	1021	0.35	RI, MS
6	Methyl heptanoate	11.51	1100	2.36	RI, MS
7	1,3,8-para-Menthatriene	11.86	1108	0.52	RI, MS
8	<i>trans</i> Thujone	12.00	1112	1.15	RI, MS
9	Fenchol	12.10	1114	1.79	RI, MS
10	Menth-2-en-1-ol < <i>cis</i> -p->	12.29	1118	3.75	RI, MS
11	Ocimene <allo->	12.70	1128	2.40	RI, MS
12	Menth-2-en-1-ol < <i>trans</i> -p->	13.04	1136	0.21	RI, MS
13	Terpinen-4-ol	14.66	1174	2.68	RI, MS
14	Naphthalene	14.84	1178	4.58	RI, MS
15	Safranal	15.64	1196	2.71	RI, MS
16	Cumenol <m>	16.85	1224	0.37	RI, MS
17	Perilla aldehyde	18.83	1269	1.74	RI, MS

table 1. (continued).

No.	Compounds	^a RT	^b RI	Percentage	Identification method
18	1-Tetradecene	24.10	1388	2.28	RI, MS
19	β-Elemene	24.15	1389	0.49	RI, MS
20	<i>cis</i> -Caryophyllene	24.95	1408	0.59	RI, MS
21	β-Gurjunene	25.95	1431	0.37	RI, MS
22	Aromadendrene	26.27	1439	5.76	RI, MS
23	<i>trans</i> -Cinnamic acid	26.80	1452	0.68	RI, MS
24	β-Chamigrene	27.82	1476	2.61	RI, MS
25	Spathulenol	31.96	1577	2.95	RI, MS
26	Caryophyllene oxide	32.16	1582	0.29	RI, MS
27	Davanone	32.37	1587	0.37	RI, MS
28	Viridiflorol	32.58	1592	6.02	RI, MS
29	Homovanillic acid	34.18	1633	1.63	RI, MS
30	α-Eudesmol	34.91	1652	1.10	RI, MS
31	Heptadecane	36.74	1700	0.42	RI, MS
32	Hexahydrofarnesyl acetone	39.37	1845	0.16	RI, MS
33	Nonadecane <n->	43.92	1900	6.51	RI, MS
34	Kaur-15-ene	47.25	1997	1.47	RI, MS
35	Sclareolide	49.40	2065	0.18	RI, MS
36	Heneicosane	50.47	2100	0.99	RI, MS
37	Abietal <dehydro>	55.74	2274	4.02	RI, MS
38	Methyl dehydroabietate	57.65	2341	0.20	RI, MS
39	Squalene	58.34	2790	2.04	RI, MS
40	Nonacosane	71.78	2900	0.22	RI, MS
41	Triacontane	74.16	3000	3.81	RI, MS
	Total identified			85.15	
	Monoterpenes			27.68	
	Sesquiterpenes			16.68	
	Diterpenes			6.89	

^a RT retention time^b RI, retention indices relative to *n*-alkanes (C8-C20) series on the DB-5 column^b MS, mass spectroscopy, MS: Computer matching of mass spectra of peaks with NIST98 GC-MS Libraries and published data

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