COMPARISON OF THE VOLATILE CONSTITUENTS OF *THYMUS SURPYLUM* FROM THE ALTITUDE OF FAR WESTERN NEPAL & NORTH INDIA

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Abstract: The composition of aerial parts of the *Thymus Serpylum* family Labiatae, collected from two localities in Uttarakhand of India *viz*., Martoli village (3600 m), Jageshwar (1500 m) and one locality from Dadeldhura district of far western Nepal (1900 m) are reported. The steam-distilled essential oils have been investigated for its flavor constituents by GC and GC-MS. Seventeen compounds representing (88.16%), twenty compounds representing (97.03%) & seventeen compounds (96.13%) respectively from Martoli village, Jageshwar and Dadeldhura have been identified. The collection from Martoli village contained thymol (68.32%) along with carvacrol (7.19%) as major constituents and the sample collected from Dadeldhura is also rich in thymol (74.92%) and carvacrol (5.09%). However, the sample from Jageshwar had reduced amount of thymol (46.24%) along with significant quantities of γ-terpinene (12.21%), thymoquinone (9.43%), p-cymene (7.30%) and considerably reduced amount of carvacrol (4.62%). The Nepali (Dadeldhura) sample is good source of thymol.

Key words: *Thymus serpylum*; Labiatae; Composition of volatile constituents; Dadeldhura; Thymol; Carvacrol; Thymoquinone; P-cymene.

INTRODUCTION

Thymus Serpylum family Labiatae is a small spreading, very aromatic, often tufted shrublet with many tiny elliptic-oblong leaves and with small whorls of purple flowers crowded into short dense terminal clusters.20-80 cm in height and is used medicinally[1]. Essential oil obtained from *Thymus serpylium* was shown to have insecticidal property[2]. Earlier report on essential oil composition of *Thymus serpylium* revealed thymol (60%) and carvacrol (2%) as the major constituent along with some mono and sesquiterpene hydrocarbons.[3] One another study on chemical composition of the essential oil of *Thymus serpylium*, thymol is the major constituent (42.63%) along with borneol (l3.13%), p-cymene (9.54%), carvacrol (8.16%) camphor (3.54%), and terpene-4-ol (2.90%) caryophyllene(2.19%) are the other constituents[4].

MATERIALS AND METHOD

The fresh plant material was collected from three different localities i.e. Martoli, Jageshwar and Dadeldhura district of far western Nepal. The materials were steam distilled using copper still fitted with spiral glass condensers for two hours obtaining 5 Lit. water distillate. The distillate saturated with NaCl was extracted with n-hexane. The organic phase was dried over anhydrous Na_2SO_4 and the solvent was distilled off in rotary evaporator to yield essential oils.

Gas chromatography (GC)

GC was done using NUCON 5765 Gas chromatograph fitted with RTX-5MS non-polar fused silica capillary column (30m x 0.32 mm i.d.). The column temperature 60^0-210^0C was programmed at 3^0 C/ min using N_2 as carrier gas at 4Kg/cm^2. The injector temperature was 210^0C, detector temp. 220^0 C and injection size 0.2µl using 10% solution of the oil.

Gas chromatography-mass spectrometry (GC-MS)

The GC-MS was done by using Thermoquest Trace GC 2000 interfaced with Finnigan MAT Polaris Q Ion trap Mass spectrometer fitted with RTX-5MS non-polar fused silica capillary column (30m x 0.25 mm i.d.). The column temperature 60^0-210^0C was programmed at 3^0 C/ min using helium as carrier gas at 1.0 ml/ min. The injector temperature was 210^0C, injection size 0.1 µl, split ratio 1:40. MS were taken at 70 eV with mass range of m/z 40-450. Characterization was done on the basis of Retention Index, Library Mass Search (NIST & Wiley), by comparing with the mass spectral literature data[5].

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Table 1: Essential oil composition of *Thymus Surpylum*

SN	Compound	Area Percentage			Mode of identification
		Martoli	Jageshwor	Dadeldhura	
1	thujene	t	0.51	0.52	a,b
2	α-pinene	t	0.45	t	a,b
3	camphene	0.12	0.28	0.21	a,b
4	β-pinene	0.18	t	t	a,b
5	β-myrcene	t	0.89	t	a,b
6	α-terpinene	0.15	2.50	0.20	a,b
7	borneol	0.16	1.34	1.09	a,b
8	terpin-4-ol	0.20	0.50	0.35	a,b
9	α-terpineol	t	0.06	0.04	a,b
10	p-cymene	0.39	7.30	2.25	a,b
11	γ-terpinene	0.18	12.21	1.50	a,b
12	*cis*-sabinene hydrate	0.29	0.20	0.70	a,b
13	thymoquinone	0.20	9.43	0.51	a,b
14	bornyl acetate	0.22	0.31	t	a,b
15	thymol	68.32	46.24	74.92	a,b
16	carvacrol	7.19	4.62	5.09	a,b
17	eugenol	6.50	1.50	3.16	a,b
18	β-caryophyllene	0.40	5.00	1.98	a,b
19	bicyclogermacrene	0.15	0.92	0.63	a,b
20	(*E,E*)- α-farnesene	2.01	1.43	2.23	a,b
21	caryophyllene oxide	1.50	1.34	0.75	a,b
	Total oil %	**88.16%**	**97.03%**	**96.13%**	

* a = Retention Index on DB-5 Column, b = MS (GC/MS), t = trace (<0.1%)

RESULT AND DISCUSSION

The essential oil from the aerial parts of *Thymus Surpylum* was investigated for its flavor constituents by GC and GC-MS. Seventeen compounds representing (88.16%), 20 compounds representing (97.03%),and 17 compounds representing (96.13%) respectively from Martoli village, Jageshwar and Dadeldhura(Nepal) have been identified. The collection from Martoli village contained thymol (68.32%) as a major component along with carvacrol (7.19%). While the sample collected from Dadeldhura was rich in thymol (74.92%) and carvacrol (5.09%). While the sample collected from Jageshwar have reduced amount of thymol (46.24%) and carvacrol (4.62%). But the oil from Jageshwar have significant amount of γ-terpinene (12.21%), thymoquinone (9.43%), p-cymene (7.30%). The essential oil of *Thymus Surpylum* collected from three different regions have considerable variation in percent composition with respect to the major and minor constituents. Table 1. The rich percentage of the thymol making good source of thymol in the Nepali sample.

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