

prepared from their aqueous or ethanolic solutions. The results are summarised in Table.

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Composition of Essential Oil of *Thymus serpyllum* Linn.

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THYMUS serpyllum Linn., widely distributed in Kumaon region of U. P. between 1600 and 3000 m, is used indigenously against the complaints of stomach, liver, kidney and vision. The work, so far, reported on essential oil of *Thymus serpyllum* shows that the chemical composition varies depending on the extrinsic factors¹⁻³. The authors⁴ earlier reported 17 compounds viz., α -pinene, camphene, β -pinene, car-3-ene, α -terpinene, limonene, 1,8-cineole, γ -terpinene, *p*-cymene, terpinolene, *trans*- β -terpineol, terpinen-4-ol, geraniol, traces of citronellal and linalool, thymol and carvacrol besides 6 unidentified compounds in the oil extracted from young plant material of *Thymus serpyllum*. The present communication relates to the analysis of the essential oil of fully matured plant to get detailed knowledge of the volatile constituents and to find out the change in composition of the oil in different seasons.

The essential oil was extracted from fresh plant material by steam distillation. The oil was separated

from the distillate with pet. ether (60-80°), dried over anhydrous sodium sulphate and solvent was distilled off. Pet. ether solution of the oil (5 g) was treated with aq. sodium hydroxide (5%). The aqueous layer was separated, neutralized and extracted with ether. The phenols (3.1 g) were recovered by evaporating the solvent⁴. The phenolic mixture was cooled and the crystals formed were separated. The solid and liquid phenols were purified, their characteristic derivatives prepared and were identified as thymol (phenylurethane m.p. 106°; 3,5-dinitrobenzoate m.p. 102.5°) and carvacrol (phenylurethane m.p. 134°; 3,5-dinitrobenzoate m.p. 76°) respectively.

The oil free from phenols was analysed using the combined GC-MS instrument under the following conditions:

A 25 meter glass capillary column (i.d. 0.3 mm) coated with FFAP in Carlo Erba 2300 gas chromatograph was coupled with JEOL JMS-D 300 mass spectrometer through the glass interface which was further attached to JMA-2000 data system. 0.3 μ l of the sample was injected (injection split ratio 1 : 100). The column temperature was maintained at 60° for first six minutes, raised to 100° and then programmed at 4° per minute upto 180°. The injection, interface and ion source temperatures were 250°, 220° and 230° respectively. The ionization energy used was 70 ev. The spectra were scanned at 2.5 seconds interval. The reconstructed total ion chromatogram and mass spectra were plotted by the computer.

The chromatogram of the oil is presented in the Figure. The compounds corresponding to the peaks,

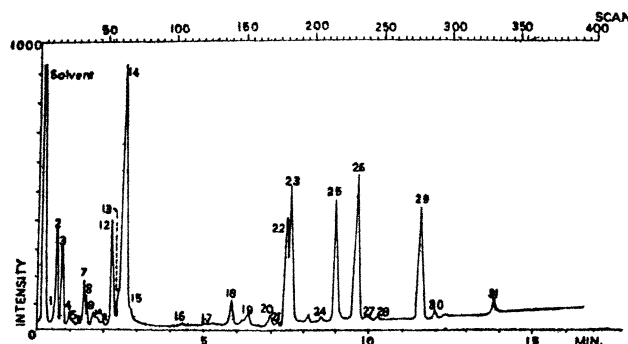


Fig. Gas chromatogram of *Thymus serpyllum* Oil

identified by their mass spectra and GC, are given in the Table.

The phenols are the principal constituents of the oil (thymol 60% and carvacrol 2%). The monoterpene hydrocarbons, sesquiterpene hydrocarbons, alcohols, esters and ketones constituted 18%, 7%, 8%, 2%, and 2% of the oil respectively. Terpinen-4-ol and *trans*- β -terpineol were found to be absent in the oil from the matured plant and the percentage

TABLE: CONSTITUENTS OF ESSENTIAL OIL OF
Thymus Serpyllum

GC Peak	Compound	GC Peak	Compound
1.	α -Thujene	17.	α -p-Dimethylstyrene
2.	α -Pinene	18.	<i>trans</i> -Sabinene hydrate
3.	Camphene	19.	Camphor
4.	β -Pinene	20.	<i>cis</i> -Sabinene hydrate
5.	Sabinene	21.	Bornyl acetate
6.	Car-3-ene	22.	Caryophyllene
7.	Myrcene	23.	Thymyl methyl ether
8.	α -Terpinene	24.	Humulene
9.	Limonene	25.	Borneol
10.	β -Phellandrene	26.	β -Bisabolene
11.	1 : 8-Cineol	27.	δ -Cadinene
12.	γ -Terpinene	28.	Sesquiterpene (C ₁₅ H ₂₄)
13.	Octan-3-one	29.	Thymyl acetate
14.	p-Cymene	30.	Carvacryl acetate
15.	Terpinolene	31.	Sesquiterpene alc. (C ₁₅ H ₂₄ O)
16.	Nonan-3-one		

of phenols was higher (62%) than that from the young plants (48%). Thus, the composition of the oil from the fully matured plant is considerably different from that of the young plant material.

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Paper entitled 'An Equation for the... ..0.1N by B. N. Ghosh

In the last para of page 40¹, please read

$$\begin{aligned} e/2L^2(2\pi ax) & \quad \text{for } e/L^2(2\pi ax) ; \\ 2L^2(2\pi a) & \quad \text{for } L^2(2\pi a) ; \\ 0.96e/2L^2(2\pi a) & \quad \text{for } 0.96e/L^2(2\pi a) \end{aligned}$$