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STUDIES ON THE ESSENTIAL OIL OF *PEROVSKIA ABROTANODES*

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Abstract

The oil of *P. abrotanoides* was studied with GC-MS for its chemical constituents which shows the presence of 24 compounds. Some of the chemical constituents were identified through comparison with the mass-spectrum of individual compound given in the literature while a few others were characterised on the basis of their fragmentation pattern in the mass-spectrum. It was observed that the ecological conditions have a pronounced effects on the chemical constituents. A marked difference in the local variety was observed when it was found that it did not contain α or β-pinene whereas these compounds were reported in species available elsewhere.

Introduction

Perovskia abrotanoides Karel. Syn. *P. artemisioides* Boiss. Labiatae occurs in Pakistan in the northern part of Baluchistan[1] as well as in Afghanistan, Iran and Soviet Union. The chemical constituent of this plant growing in Central Asia have been investigated by Serkebaeva *et al.*[2] Nigam et al. reported[3] the constituents of the essential oils of *P. abrotanoides*. The constituents of the essential oils of *P. abrotanoides* of Afghanistan origin have been reported by Ch. Younus et al.[4]

The essential oil of *P. abrotanoides* has been reported to possess antiviral property[5]. Moreover the oil has a marked but transitory choleretic action in rats when administered intraduodenally as the pure oil or intravenously as a saturated solution[6].

In view of the biological activity the essential oil of *P. abrotanoides* mentioned above and also considering the literature report that the chemical

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constituent of the essential oil of this plant differ considerably from region to region[7], a GC/MS study of the essential oil of Pakistani *Perovskia abrotanoides* was undertaken.

Experiment

Gas chromatography GC-9A Shimadzu was used under the following conditions: For GLC and GLC/MS, column type packet glass spiral column length 2.1 meter, column internal diameter 3 mm, column outer diameter 5 mm, filled with PT 10% OV-101 on W-HP chromosorb, 80-100 mesh carrier gas flow 50 ml/min carries gas pressure 4 kg/cm^2. Hydrogen gas pressure 0.7 kg/cm^2, Oxygen gas pressure 0.6 kg/cm^2, injector and detector temperature 300°C detector type FID. Initial temperature 150° final temperature 250°C. Rate of heating 5°/min with initial and final hold times of 5 minutes each sample vol. 1.0 μ 1. The carrier gas was N_2 for analytical HPLC and He for GC/MS analysis. Magnesium sulphate used was of Merck grade. Diethyl ether (Merck) was used and was pre-dried with sodium wire.

The plant under investigation was collected from Ziarat (Balochistan) in the month of June. The freshly cut aerial parts of the plants, (1 kg.), after air drying were steam distilled. The distillate was extracted with ether, which was dried ($MgSO_4$) and filtered off. Removal of ether gave a pale yellow coloured liquid (2.0 g) with pleasing smell, which were the combined essential oils of *P. abrotanoides*. The oil thus obtained was screened by GC-MS technique (Fig.1) which showed the presencce of twenty-four compounds. Twelve compounds from these could be characterised.

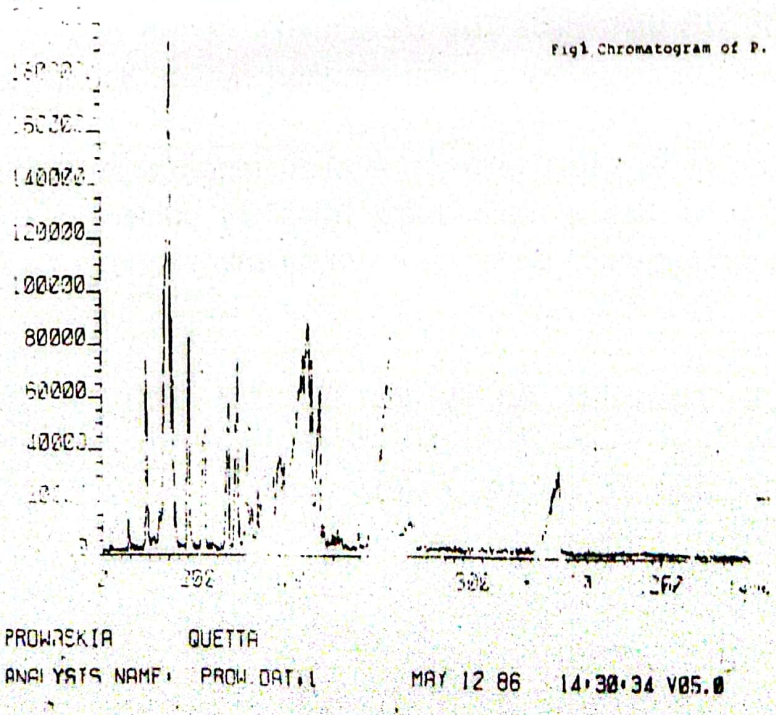

Fig1 Chromatogram of P. Abrutanoides Oil.

Table 1

Compound	Formula	Mass to charge ratio	Intensities observed	Intensities (Literature)
1,8 Cineol	$C_{10}H_{18}O$	108, 93, 154, 111, 139, 95, 121, 126 (#)	100, 84, 70, 68, 52, 58, 16, 10	100, 86, 66, 78, 60, 54, 14, 20 (source *)
Caryophyllene	$C_{15}H_{24}$	93, 91, 55, 79, 133, 189, 67, 69, 77, 81, 105, 173, 161 (##)	100, 66, 60, 54, 50, 50, 40, 30, 36, 30, 34, 34, 32	100, 70, 50, 75, 77, 20, 40, 90 42 45, 46, 10, 30 (source *)
Iso–Borneol	$C_{10}H_{18}O$	95, 110, 136, 121, 139, 96, 93, 111 (#)	100, 20, 10, 8, 8, 12, 16, 7	100, 28, 10, 8, 7, 12, 11, 7 (source *)
Borneol	$C_{10}H_{18}O$	95, 110, 139, 136, 121, 96, 111 (#)	100, 20, 12, 9, 7, 6, 9, 7	100, 22, 10, 10, 7, 6, 10, 8 (source***)
Borneol Acetate	$C_{10}H_{20}O_2$	95, 93, 136, 121, 135, 108, 109, 154 196 (#)	100, 48, 42, 36, 30, 20, 14, 10, 2	100, 50, 30, 20, 16, 10, 2 (source *)
Eugenol	$C_{10}H_{12}O_2$	164, 121, 149, 91, 93, 103, 131, 137 (#)	100, 54, 42, 46, 42, 36, 28, 22	100, 30, 44, 41, 20, 52, 36, 30 (source*)
γ–Terpenene	$C_{10}H_{16}$	93, 121, 136, 92, 91 (#)	100, 70, 48, 25, 21	100, 30, 41, 25, 22 (source**)

\# Mass to charge ratio scanned the upto 90 z/e.

\## Mass to charge ratio scanned upto 50 z/e.

* Analysis of essential oils by gas chromatography and mass spectroscopy Yashiro Masada John Willey & Sons Inc. New York – London – Sydney – Toronto.

** Eight peak index of mass spectra 2nd Ed. Vol.1 (1974) mass spectrometry centre AWRE Aldermactan U.K.

*** NSRDS–NBS 63 U.S. Department of Commerce, National Bureau of standards EPA/NIH mass spectra data base Vol.2.

The presence of the compound in Table 2 was indicated the fragmentation pattern of mass spectra.

Table 2

Compound	Formula	Prominent peak in mass spectra
Elemol	$C_{15}H_{26}O$	59, 93, 81, 121, 67, 107, 136 (##)
Allo–Aromadendrene	$C_{15}H_{24}$	93, 92, 133, 107, 120, 105, 121 (#), 119, 147, 148, 161, 189, 204
Nerolidol	$C_{15}H_{26}O$	69, 91, 79, 93, 67, 81, 55, 132, 105 (##)
Citronellal	$C_{10}H_{18}O$	69, 55, 95, 111, 121, 136, 139, 154 (##)
Humulene	$C_{15}H_{24}$	93, 80, 121, 67, 147, 107, 55, 107 (#)

Mass to charge ratio scanned upto 90 z/e.

Mass to charge ratio scanned upto 50 z/e.

Further work is under progress.

Results and Discussion

The GC-MS analysis of the essential oil of *P. abrotanoides* revealed the presence of 24 peaks (chart-1) out of these 12 could be identified on the basis of the fragmentation pattern in their mass spectra (Table-1). It is interesting to note that we did not detect the presence of α and β pinene in the Pakistani variety in contrast to the central Asian and Afghan varieties.

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