Regional Research Laboratory, Jammu-Tawi, India

CHEMICAL INVESTIGATION OF WILD CANNABIS SATIVA L. ROOTS

V. K. SETHI, M. P. JAIN and R. S. THAKUR

Abstract

Petrol and benzene extracts of the mature plant roots have led to the isolation of five compounds which have been characterised as friedelin, epifriedelinol, β-sitosterol, carvone and dihydrocarvone. In case of latter two compounds, GLC studies were carried to establish their identity. In addition to these compounds, the chloroform extract of the ammoniacal water treated roots have led to the isolation of some basic constituents which respond to the alkaloidal tests. Due to very low concentration of these basic constituents we have not so far been able to separate them in workable quantities.

Introduction

Cannabis sativa L. grows as a weed in and around Jammu. Previous studies [1] – on the cultivated plant have mainly been carried out on different cannabinoids which are concentrated in the leaves, gum and flowering parts. The present communication deals with the systematic chemical investigation of the roots of the weed.

Experimental and Results

GLC was carried out on PE model 881 using SE-30 (silicone column) supported on chromosorb W. and nitrogen as carrier gas at a flow rate of 45 ml/min. The temperature of the column was kept at 130°.

Extraction of roots with petroleum ether:

Dried and powdered roots of mature plant (2 kg) were extracted with petroleum ether (60–80°, 2×5 l) first by cold percolation and then by hot extraction (2 l). The combined extract was concentrated to a semi-solid (20 g) which was chromatographed over neutral alumina (500 g). The elution was carried out successively with n-hexane (fr. 1–8), n-hexane-benzene (1:1, fr. 9–15), benzene (fr. 16–19) and benzene-chloroform (1:1, fr. 20–30) with each eluent of 200 ml.

Isolation of Carvone and Dihydrocarvone:

The n-hexane (fr. 1–3) yielded an oil with a characteristic odour, (2.3 g), which was subjected to GLC and two peaks were visualized for dihydrocarvone (22.3 %) and carvone (77.7 %) having the relative retention times 4.4 and 6.7 when compared with the authentic terpene specimens under same conditions of temperature etc. as given above.

Isolation of fridelin, epifriedelinol and β-sitosterol:

The other n-hexane fractions (fr. 4–6) yielded silky white crystals (15 mg) melting at 249–50°. This compound was identified as friedeline [2, 3] $C_{30}H_{50}O$ by comparison of the mmp, co-TLC (Rf. 0.77 in benzene) and superimposable IR spectra. The benzene: n-hexane mixture (1:1, Fr. 8–10) gave a crystalline solid m. p. 281–83° (20 mg). Recrystallisation of the substance from benzene-chloroform mixture raised the melting point to 282–83°. This compound was identified as epifriedelinol [2, 4] $C_{30}H_{52}O$ (β-hydroxy friedelin) by colour reactions (L. B. + Ve), mmp and co-TLC (Rf. 0.60 benzene). The fraction 12–15 gave needle shaped crystals which melted at 135–37°. This compound was identfied as β-sitosterol[5] $C_{29}H_{50}O$, by colour reactions (L. B. + Ve) and co-TLC.

Extraction with benzene:

The roots after extraction with n-hexane were extracted repeatedly with benzene. The total extract was concentrated and the solid so obtained was chromatographed over alumina as described in the preceeding experimental procedure. Further quantity of epifriedelinol (29 mg) and β-sitosterol (30 mg) was obtained.

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Adress: Dr. Sh. V. K. Sethi, Regional Research Laboratory
Canal Road, Jammu Tawi, India