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STUDIES ON THE ESSENTIAL OILS OF THE PAKISTANI SPECIES OF THE FAMILY UMBELLIFERAE

Part LII. *Bupleurum stewartianum* Seed Oil

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Bupleurum stewartianum belongs to the genus *Bupleurum* of N.O. Umbelliferae. The physico-chemical properties and the chemical composition of the essential oil of the seed of *Bupleurum stewartianum* have been studied. The yield of the *B. stewartianum* seed oil is 0.3 % and has the following composition: α-pinene (1.98 %), α-thujene (1.65 %), santene (9.30 %), camphene (3.45 %), myrcene (3.64 %), β-phellandrene (2.46 %), limonene (2.34 %), γ-terpinene(1.21 %), *p*-cymene (1.02 %), geranyl acetate (9.14 %), citronellyl acetate (8.40 %), borneol (2.86 %), α-terpineol (20.4 %), coumarins (21.34 %) and a mixture of hydroxy compounds (3.45 %). Certain species of the genus *Bupleurum* have been used medicinally for stomach and liver ailments.However, the physiological effects of the oil will have to be evaluated for determining the medicinal importance of the oil.

Key words: Umbelliferae, essential oil, *Bupleurum stewartianum.*

INTRODUCTION

Bupleurum stewartianum is available in Kalapani and Thandiani (Abbotabad District), where it has been found growing wild on the grassy slopes of hills. *B. stewartianum* belongs to the genus *Bupleurum* of the N.O. Umbelliferae [1]. World-wide this genus has over 150 species, out of which only 20 species and three varieties including *Bupleurum stewartianum* have been reported to grow in the subcontinent. In Europe and Asia in general they are found mostly in the temperate regions. The plants are either annual or perennial herbs [2].

Three species of the genus *Bupleurum* viz, *B. exaltatum, B. falcatum* and *B. jecundum* have been used against some diseases of the stomach and liver, but no literature is cited on the medicinal uses of *B. stewartianum* [3,4,5].

The present investigations have been carried out in order to gain knowledge of the physico-chemical characteristics and chemical composition of the essential oil of *B. stewartianum,* particularly of the Pakistani species.

The plant material was collected at the flowering, immature and mature fruiting stages from Kalapani for the present studies.

MATERIALS AND METHODS

The essential oil of the seed of *B. stewartianum* with an yield of 0.3 % was obtained by the dry steam distillation of the crushed material [6]. The physico-chemical evaluation of the oil was carried out according to the methods already reported [7].

Column chromatography was used for the fractionation of the essential oil into its various constituents. The individual components were identified by the gas liquid chromatographic analysis described in our previous paper [8].

RESULTS

The percentage yield, physico-chemical values and column chromatographic fractions of the essential oil of the seed of *B. stewartianum* as also the chemical composition of each fraction are presented in Tables 1-2.

Table 1. Percentage yield and physico-chemical values of the essential oil of the seed of *B. stewartianum.*

Yield	0.3%
Specific gravity	0.8134^{18}
Refractive index	1.5079^{18}
Acid value	15.01
Easter value	17.54

The subscripts indicate the temperature at which these parameters were determined.

Table 2. Percentage composition of the essential oil of the seed of *B. stewartianum*.

Eluents	Component	Column/GC Percentage
n-Hexane	α- Pinene	1.98
	α- Thujene	1.65
	Santene	9.30
	Camphene	3.45
	Myrcene	3.64
	β- Phellandrene	2.46
	Limonene	2.34
	γ- Terpinene	1.21
	p- Cymene	1.02
2 % Diethyl ether in hexane	Granyl acetate	9.14
	Citronellyl acetate	8.40
10-15 % Diethyl ether in *n*-hexane	Borneol	2.86
	α- Terpineol	20.40
	Mixture of hydroxy compounds	3.45
5 % Ethanol in diethyl ether	Coumarins	21.34
	Tarry matter	7.36

DISCUSSION

The essential oil of the seeds of *B. stewartianum* is light brownish in colour and possesses a pleasant smell [9]. The fraction of the oil by elution of the column with *n*-hexane gave 27.05 % hydrocarbons whose composition as revealed by GLC, was α-pinene (1.98 %), α-thujene (1.65 %), santene (9.30 %), camphene (3.45 %), myrcene (3.64 %), β-phellandrene (2.46 %), limonene (2.34 %), γ-terpinene (1.21 %) and *p*-cymene (1.02 %).

The oxygenated fractions were further separated into their components by TLC and the resultant constituents were identified by GLC and IR and by preparing their known derivatives. The oxygenated compounds identified were geranyl acetate (9.14 %), citronellyl acetate (8.40 %), borneol (2.86 %), α-terpineol (20.4 %) and a mixture of hydroxy compounds (3.45 %) which could not be resolved by TLC because of their close Rf values. The last fraction of the oil consisted of a mixture of coumarins (21.34 %). Their separation and identification are in hand.

Because of its being a member of the genus *Bupleurum* which has medicinal importance, physiological investigations on the essential oil of the species would be of interest. However, chemical investigations have revealed the importance of the oil with respect to its use in industrial perfumery. The essential oil appears to be a promising component in blending perfumery of higher fantasy.

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