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STUDIES ON THE ESSENTIAL OIL OF THE *COLEUS AROMATICUS* PLANT

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The essential oil of the ornamental plant, *Coleus aromaticus* grown in Pakistan, has been examined for the first time with respect to its quality and chemical composition. It has been shown that the essential oil with an yield of 0.1% consists of α-pinene (0.465%), β-pinene (0.115%), myrcene (0.172%), limonene (10.585%), γ-terpinene (3.589%), P-cymene (1.150%), β-caryophyllene (0.437%) and β-selinene (17.389%), ethyl salicylate (5.505%), thymol (8.125%), carvacrol (40.402%), eugenol (7.358%), and an unidentified phenolic fraction (4.25%). A marked qualitative and quantitative difference in the chemical composition of the essential oil and that obtained from similar species produced elsewhere in the world has been noticed.

INTRODUCTION

Coleus aromaticus or *Coleus amboinicus* (N.O. Labiatae) is a small aromatic herb that smells much like thyme and is locally known as *ajwani patharchut.* This evergreen perennial herb has fleshly leaves [4], sweet fragrance and thrives in gardens. Raising of the plant for ornamental purposes is mainly carried out by vegetative reproduction. Pieces of the plant stem are cut and transplanted throughout the year.

This ornamental plant is grown in India and Sri Lanka in addition to Pakistan. Various parts of this plant are used in the preparations of local medicines used for a number of ailments. It is claimed that the juice of the plant, when mixed with sugar, is an effective cure for different types of convulsive affections[3].

The PCSIR has long pursued a programme of evaluating the local flora for general scientific information and technical applications. In continuation of this activity *Coleus aromaticus* essential oil has been examined for its chemical composition. It has been observed that carvacrol is the major constitutent (40.4%) of the essential oil of *Coleus aromaticus.* Additionally unidentified phenolic constituents (4.25%) have also been detected and it is assumed that the medicinal attributes may well be because of these constituents.

MATERIALS AND METHODS

The plant material comprising fresh stalks and leaves of *Coleus aromaticus* was collected from local nurseries. The essential oil from this material was recovered by dry steam distillation[1]. Standard methods, usually employed for such studies, were followed for the evaluation of the recovered essential oil[2]. The percentage yield and various physico-chemical properties of the essential oil are given in Table: 1.

Table 1. Percentage yield and physico chemical properties of the essential oil of *Coleus aromaticus*

Sr. No.	Constants	Results
1.	Yield	0.1%
2.	Distillation time	8 hr.
3.	Colour	Light yellow
4.	Odour	Aromatic
5.	Specific gravity	0.9545
6.	Refractive index (30°)	1.4779
7.	Acid value	3.24

Chromatographic Analysis of the Oil. The essential oil recovered by steam distillation was further resolved into different fractions by column chromatography using hexane as the solvent and silica gel as an adsorbent. Elution of the column with hexane alone removed the hydrocarbon fraction. The oxygenated components were eluted with increasing proportions of di-ethyl ether in n-hexane. The column was finely washed with diethyl ether eluting more polar constituents.

The hydrocarbon fraction was further resolved into individual components by GLC using a glass column

(6.35mm x 1.5m) packed with polyethylene glycol succinate (20%) on dolomite (60-80 mesh), nitrogen as the carrier gas and flame ionization detector. The column was operated at 110°. The identity of the components was verified by coinjecting with authentic samples and observing identical retention times. The oxygenated components, recovered from the column followed by preparative TLC[6], were further resolved and identified using IR and GLC comparison techniques with the authentic samples.

The chemical composition of the essential oil of *Coleus aromaticus* thus determined is recorded in Table 2.

Table 2. Percentage composition of the essential oil of *Coleus aromaticus*

Component	Percentage
α-Pinene	0.465
β-Pinene	0.115
Myrcene	0.172
Limonene	10.585
γ-Terpinene	3.589
p-Cymene	1.150
p-Caryophyllene	0.437
β-Selinene	17.389
Ethyl salicylate	5.505
Thymol	8.125
Carvacrol	40.402
Eugenol	7.358
Unidentified phenolic compound	4.250

DISCUSSION

The sweet smelling and light coloured essential oil of *Coleus aromaticus* was resolved into hydrocarbons and oxygenated fractions by column chromatography on silica gel using hexane as the solvent. The combined hexane eluted fractions were hydrocarbons in nature comprising 34.4% of the essential oil and were composed of many substances as indicated by GLC. These terpenes were latter resolved into eight specific substances by GLC. The identity of these hydrocarbons was confirmed by the identical retention times when compared with standard substances. Thus β-salinene (17.4%) and limonene (10.6%) as the major and β-caryophyllene (0.44%), β-pinene) (0.11%) α-pinene (0.46%), myrcene (0.17%), γ-terpinene (3.6%) and *p*-cymene (1.15%) as the minor constituents of the hydrocarbon fraction of *Coleus aromaticus* essential oil were identified. Identification of these hydrocarbon components of the *Coleus aromaticus* is being reported for the first time, as in the previous work on the essential oil there is no mention of these substances.

The oxygenated fractions of the oil consisted of three types of compounds, viz, the esters, the phenoles and the phenolic ethers. The ester's fraction was eluted from the column by 2% diethyl ether in hexane and was identified as pure ethyl salicylate. Confirmation of this identification was based on the comparison of the identical TLC and IR behaviour of the authentic sample.

Increased quantity of diethyl ether (5%) in hexane further eluted the oxygenated substances which were identified as phenols and phenolic others. These compounds, however, have already been reported to exist in the essential oil of *Coleus aromaticus* found in India[5]. The phenols and phenolic ethers were shown to be composed of thymol (8.125%), carvacrol (40.402%), eugenol (7.358%), and unidentified phenolic fraction (4.25%). Presence of chavicol in this essential oil has already been reported. Because of the non-availability of a standard, its presence was not confirmed. However, it is assumed that the unidentified phenolic compound (4.25%) is chavicol. Since the Rf values of these compounds are very close to each other they are not cleanly separated by column or thin layer chromatography. Their resolution and percentage composition was therefore determined by GLC and the identification was validated by co-injecting the column with the standard samples.

It is of interest to mention here that the percentage existence of these substances in the essential oil is markedly different from those reported previously. This difference could either be attributed to climatic and soil changes or the procedure of evaluation or both factors combined together.

Although the essential oil percentage in *Coleus aromaticus* is small (0.1%), yet it is an important oil because of its very high contents of phenolic substances (60.0%). The medicinal values of all the oxygenated substances present in the essential oil are well known and therefore, this oil has a potential of being a commercial crop. Efforts are therefore, being made for the trial production of *Coleus aromaticus* as a crop. These trials are expected to establish various parameters essential for raising a crop. Only then

will an opinion be formed concerning the economic viability or otherwise of this plant.

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