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Studies on the essential oils of *Curcuma haritha* Mangaly & Sabu and *C. raktakanta* Mangaly & Sabu

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Abstract

The essential oils obtained by hydrodistillation from the fresh rhizomes of two endemic species of *Curcuma* viz. *C. haritha* and *C. raktakanta* were studied by GLC analysis. Eleven components were identified from *C. haritha* of which camphor (21.24%) was the major component and ten components were identified from *C. raktakanta* of which ethyl p-methoxycinnamate (16.57%) was the major component. α-pinene, β-pinene, camphor, terpinyl acetate, turmerone and ethyl p-methoxycinnamate were common to both the species.

Key words: *Curcuma haritha, Curcuma raktakanta,* essential oil.

The genus *Curcuma* (Zingiberaceae) consists about 50 species, chiefly distributed in South East Asia. About 17 species are reported from South India, of which seven species are endemic. Some of the commercially important species of *Curcuma* are well exploited and studied. The rhizomes of such species are good sources of essential oils and chemical constituents of *C. zedoaria* (Ma *et al.* 1995), *C. longa* (Sharma *et al.* 1997), *C. aromatica* (Bordoloi *et al.* 1999) and *C. amada* (Behura 2000) were reported. However, most of the wild relatives of these species are still underexploited and not subjected to chemical investigation.

In this communication, the essential oil composition of two hitherto uninvestigated endemic species of *Curcuma* viz. *C. haritha* Mangaly & Sabu and *C. raktakanta* Mangaly & Sabu are reported.

C. haritha grows upto a height of 80 cm, has a large rhizome, pale yellowish gray inside, and finger shaped sessile tubers. This species is endemic to Kerala, distributed in almost all districts in semishaded forest lands, grass lands and also in plantations. *C. raktakanta* is moderately tall, grows upto 60 cm. Its rhizome is medium sized, yellowish white inside and has branched sessile tubers. This is also endemic to Kerala and is known only from central part of the state. Fresh rhizomes of both these species were collected from established populations and were cut into small pieces and hydrodistilled in a Clevenger apparatus for 4 - 5 h. The volume of oil collected was noted and the oil was dried over anhydrous sodium sulphate and stored at 4 - 5° C for analysis. The quantitative estimation of the components of the essential oil was carried out by Gas Liquid Chromatography (GLC). The GLC analysis of each sample was performed using Nucon Gas Chromatograph (Model 5765) equipped with a flame ionisation detector (FID). Nitrogen was used as carrier gas with a flow rate of 40 ml per minute. The samples were injected on SE30 (10%) chromosorb-w packed stainless steel column (2 m x 2 mm). The injector temperature

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was 220° C and the detector temperature 240° C. The oven temperature was programmed at the rate of 8° C per minute from 80° C to 150° C and thereafter at the rate of 6° C per minute upto 290° C. The components were identified by matching their retention time with those of authentic standards and also by co-chromatography. The percentage composition of the major components were obtained by computer integrated peak area calculations.

On hydrodistillation, the rhizome of *C. haritha* yielded 0.58% oil. The oil was bluish violet in colour, which turned reddish when exposed to sunlight. It had a characteristic, penetrating camphoraceous odour. The chromatogram revealed the presence of 19 components in the essential oil. Of these, 11 components comprising of 71.33% were identified (Table 1). The major components identified were camphor (21.24%), camphene (14.59%), ar-turmerone (9.63%), β-pinene (6.67%) and turmerone (5.39%). The percentage of monoterpenoids and hydrocarbons were estimated as 52.78% and that of sesquiterpenoids and oxygenated compounds as 47.22%. The camphoraceous penetrating smell of *C. haritha* oil is due to the presence of camphor as its major constituent and also due to the related compounds such as camphene and borneol.

The rhizomes of *C. raktakanta* yielded 0.15% oil on hydrodistillation. The oil was violet in colour and had a penetrating odour with fruity aroma. The chromatogram showed the presence of 18 components in the essential oil among which 10 components comprising of 78.93% were identified (Table 1). Ethyl p-methoxycinnamate (16.57%), β-pinene (13.42%), camphor (12.78%) and β-caryophyllene (11.25%) were the major components. The percentage of monoterpenoids and hydrocarbons were estimated as 35.32% and that of sesquiterpenoids and oxygenated compounds as 64.68%.

Six components namely α-pinene, β-pinene, camphor, terpinyl acetate, turmerone and ethyl p-methoxycinnamate were common in both the species. The chemical constituents and initial olfactory evaluation of the oils show that they may have greater application in pharmaceuticals/ medicine and in aromatherapy.

Table 1. Essential oil components (%) of *C. haritha* and *C. raktakanta*

Component	*C. haritha*	*C. raktakanta*
α-pinene	1.75	5.25
β-pinene	6.67	13.42
p-cymol	2.89	-
camphor	21.24	12.78
camphene	14.59	-
borneol	1.37	-
terpinyl acetate	2.43	3.43
bornyl acetate	-	2.82
ethyl cinnamate	-	4.23
β-caryophyllene	-	11.25
tridecane	-	3.87
pentadecane	1.84	-
turmerone	5.39	5.31
ar-turmerone	9.63	-
ethyl p- methoxycinnamate	3.53	16.57

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