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Fatty Acids from Anacardiaceae Seed Oils

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SEEDS from *Rhus wallichii* and *Choerospondias axillaris* belonging to the family Anacardiaceae have been analysed for the r oil contents, and their fatty acid composition was determined using tlc–glc techniques.

Experimental

The air-dried seeds were powdered and extracted thoroughly with petroleum ether (b.p. 40–60°). The solvents were removed under vacuum at 40° to obtain the oil. The analytical values of oil and seeds were determined according to the procedures recommended by the AOCS[1]. Ir and uv spectra of oils were recorded with the help of a Perkin-Elmer 621 and a Beckman DK-2A spectrophotometer, respectively. A Perkin-Elmer 154 analytical gas chromatograph equipped with a thermal detector using DEGS column (220°) with nitrogen as a carrier gas was used for fatty acid analysis.

The ir spectra of the oils had absorption peaks at 3 000s and 1 650w cm^{-1}, indicating ordinary unsaturation. There was no peak in the regions of *trans*-unsatuation and/or unusual functions. The presence of conjugated double bonds was ruled out with the help of uv-analysis. The picric acid tlc test[2] for epoxy function and Halphen test[3] for cyclopropenoid moiety in bo h the oils were found to be negative. Both the oils contained the common fatty acids in varying proportions (Table 1). In the oil from *C. axillaris*, the percentage of linoleic acid, an essential fatty acid, was as high as ~61% which is of great importance from the point of view of nutrition. However, low oil content (8%) may affect potential utility of this species. *R. wallichii* was found to contain the amount of palmitic acid (~ 70%), higher than ever reported in any other species. This species with moderate oil content (~ 13%) may be profitably used for the manufacture of detergents, surfactants, lubricants and in confectionary products.

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TABLE 1—ANALYTICAL AND PHYSICAL DATA OF SEEDS AND OILS

Source	Oil content %	I.V.	S.V.	Component acids (wt. %) by glc						
				12 : 0	14 : 0	16 : 0	18 : 0	18 : 1	18 : 2	18 : 3
C. axillaris	8 1	139.5	195.5	–	–	11.0	0 6	27.1	60.7	0 5
R. wallichii	12.7	50.9	207.6	0.5	0.8	69.8	0 8	6 8	20.6	0.8

I.V. = Iodine value, S V. = saponification value.

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Essential Oil of Indian *Cryptomeria japonica*

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CRYPTOMERIA japonica, an exotic from Japan, is an evergreen tree cultivated as plantation in the northern part of Bengal. In contrast to the

Japanese trees, Indian trees grow fast with the average annual increments of 20 to 21 m^3 per hectare per annum[1] producing lighter wood than the Japanese wood. While the Japanese wood has 10 to 12 rings per inch diameter, the Indian wood has only two rings or even less[1]. The essential oil and other heartwood constituents of the Japanese tree have been extensively studied[2-6] but there is no report on the essential oil constituents of the Indian variety. This paper reports the main constituents of the essential oil of Indian *C. japonica*.

Experimental

Acetone extract of the powdered heartwood of *C. japonica*[7] on steam-distillation gave an essential oil (1%); $n_D^{28.5}$ 1.485 5; $[\alpha]_D^{25} - 10°$ (*c* 5 in $CHCl_3$). The gas liquid chromatogram of the neutral portion of the essential oil (97%) indicated the presence of at least 14 compounds. Out of which eight compounds, A to H, constituted about 94% of the neutral portion. Compounds A, D and E could not be isolated in pure state. Other compounds were separated by column chromatography on neutral alumina, silica gel, or silica gel impregnated with silver nitrate. Separation of the compounds was monitored by glc and tlc.

Results and Discussion

Compound A (0.4%) and D (5.0%) were identified as α- and β-calacorenes by peak enhancement with the synthetic authentic samples[8]. Compound B (5.0%) was obtained as liquid, $[\alpha]_D^{25} - 48°$ (*c* 1 in $CHCl_3$); dehydrogenation with sulphur gave cadalene; picrate, m.p. 115°; a dihydrochloride, m p. 84—86°, the same as reported for muurolene hydrochloride[9]. It was thus identified as α-muurolene (nmr, ir). Compound C (32%) was a liquid, $[\alpha]_D^{25} - 62.4°$ (*c* 1 in $CHCl_3$); dehydrogenation gave cadalene. It was identified as calamenene[8] (uv, ir, nmr and ms). Compound E (2%) occured as a mixture with epicubenol; hydrolysis with alcoholic KOH gave epicubenol. It was found to be an ester of epicubenol[10]. Compound F (19 4%) was obtained as white solid, m p. 137°, $[\alpha]_D^{25} - 105°$ (*c* 1 in $CHCl_3$), by column chromatography followed by sublimation. It was found to be torreyol[11] on the basis of nmr, ms, m.m.p. and superimposable ir. Compound G, a liquid, had $[\alpha]_D^{25} - 95.7°$ (*c* 1 in $CHCl_3$). Its identity with epicubenol was confirmed by nmr, mass and identical ir spectra with that of epicubenol[11]. Compound H, a liquid, had $[\alpha]_D^{25} -$ 28.3° (*c* 1 in $CHCl_3$). It was characterised as cubenol[11] by nmr, mass and superimposable ir spectra. Compounds G and H together formed 30 3% of the oil.

Thus from the above studies and available literature on *C. japonica*, it may be said that (−)-cubenol, (−)-epicubenol and the esters of (−)-epicubenol, together constituting about 32% of the neutral fraction of the essential oil of Indian *C. japonica*, have not been reported to occur in the essential oil of the Japanese tree. More than 94% of the oil from the Indian tree consists of sesquiterpenes with cadalene skelton. On the contrary, the essential oil from the heartwood of *C. japonica* of Japanese origin contains cryptomerione, a bisabolane sesquiterpenoid ketone and β-eudesmol having eudesmane skeleton. Cryptomeridiol, which can be considered as the precursor of β-eudesmol, and cryptomerone, a possible precursor of cryptomerione, have also been isolated from the methanol extract of the heartwood of *C. japonica* of Japanese origin. The presence of these two compounds in the essential oil has not been reported, but can not be ruled out. These compounds do not appear to be present in the essential oil obtained from the heartwood of the Indian tree. The present investigation thus indicates a difference in the composition of the essential oil of the heartwood of *C. japonica* growing in Japan and in India. To establish conclusively if the difference in the growth rate would affect the biogenetic pathway, identification of all the compounds present in the non-steam-volatile portion of the acetone extract of the heartwood is also essential.

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