

Fatty Acid Composition of Tamarind Kernel Oil

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ABSTRACT AND SUMMARY

The fatty acid composition (% by wt) of Tamarind (*Tamarindus indica*) kernel oil, as determined by gas liquid chromatography was: trace lauric acid, trace myristic acid, 14.8% palmitic acid, 5.9% stearic acid, 27.0% oleic acid, 7.5% linoleic acid, 5.6% linolenic acid, 4.5% arachidic acid, 12.2% behenic acid, and 22.3% lignoceric acid.

INTRODUCTION

Tamarind (*Tamarindus indica*) is a large evergreen tree that grows abundantly in India. The tree bears flat pods which on ripening yield an edible pulp and a dark brown hard seed. Tamarind kernel, obtained after removal of brown seed coat, is powdered and is commercially known as Tamarind kernel powder (TKP). TKP is used in the textile industry as warp sizing material (1). Tamarind kernel oil has been investigated by a number of workers in the past (2-4), but the studies have been limited to general characterization of the oil. Badami and Daultabadi (5) have studied the fatty acid composition of Tamarind kernel oil by reverse phase partition chromatography. This laboratory has earlier carried out detailed studies on polysaccharide constituents of TKP (6,7). We have now undertaken studies on the lipids of TKP. The present communication deals with the fatty acid composition of Tamarind kernel oil.

EXPERIMENTAL PROCEDURES

Materials

TKP was procured locally. All the solvents and reagents used were of analytical grade. Sets of standard mixtures of fatty acid methyl esters were purchased from Analabs Inc., North Haven, CT.

Extraction and Characterization of Tamarind Kernel Oil

TKP (100 g) was extracted three times with chloroform-methanol (2:1, 600 ml) by stirring at room temperature for 6 hr each time. The mixture was filtered, and the combined filtrate was concentrated to a thick oil. The latter was dissolved in chloroform (70 ml), the chloroform solution was washed with water (3 x 14 ml), dried over anhydrous sodium sulfate, and then concentrated to afford a thick, light yellow oil in 7.4% yield, having the following characteristics: specific gravity, 0.920; refractive index, n_D^{25} , 1.4750; mp 10-12 C, iodine value, 118.4; saponification equivalent, 190.0; neutralization equivalent, 210.0; and

unsaponifiable matter, 2.5%.

Analysis of Fatty Acid Composition

The oil was saponified with 0.5N methanolic sodium hydroxide, and the fatty acids so produced were esterified using BF₃-methanol (14%) (8). The methyl esters were analyzed by gas liquid chromatography (GLC) at 180 C on a Varian Aerograph (series 1400) using a 6 ft x 1/8 in. (OD) stainless steel column packed with 15% diethylene glycol succinate (DEGS) on Chromosorb W (60-80 mesh). Peak areas were calculated by multiplying peak height with retention time (9); the identity of fatty acid ester peaks was established using known reference mixtures. The identity of unsaturated acids was further established by GLC analysis of brominated and hydrogenated samples (10).

RESULTS AND DISCUSSION

Fatty acid composition of Tamarind kernel oil obtained by us is considerably different from that reported by Badami and Daultabadi (5). These authors did not report C_{18:3} acid which we have found to be present in significant amounts. The fatty acid composition is given in Table I.

The oil is unique in having a large proportion (22.3%) of lignoceric acid. The only other oil which has been reported to contain substantial quantities of this saturated fatty acid is from the seeds of coral wood (*Adenanthera pavonia* L. family Leguminosae) (11). Another feature of note in the fatty acid composition of tamarind kernel oil is that it contains both higher saturated fatty acids and linolenic acid, a combination of unusual occurrence. Since the oil contains large proportion of saturated fatty acids and its melting point is relatively high, it can be classed under the vegetable butter group.

In sizing of cotton yarns with TKP, the fatty component acts as an internal lubricant. Consequently, tamarind kernel oil may prove to be a substitute for mutton tallow which is used as a softener in size recipes based on starches for cotton yarns.

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TABLE I

Fatty Acid Composition of Oil from Tamarind Kernel

Fatty acid	Composition (% by wt)
12:0	trace
14:0	trace
16:0	14.8
18:0	5.9
18:1	27.0
18:2	7.5
18:3	5.6
20:0	4.5
22:0	12.2
24:0	22.3

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