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NEW POSSIBLE INDIGENOUS SOURCE OF FAT [1]

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Abstract. Chemical properties of seed-coat fat of *Sapium sebiferum* have been compared with those of 'dalda ghee' and corn oil. The analytical results of seed-coat fat compare reasonably well with those of two edible fats under investigation. Determination of its fatty acid composition has shown that palmitic, oleic and stearic acid are the major components.

Presently vegetable oils and tallow for edible as well as for manufacturing soap are being imported mostly from abroad by spending large sums of money. In order to find alternate local source of such fats and oils, we have compared the chemical properties of the seed-coat fat with those of 'dalda ghee' and corn oil, the two kinds of vegetable fat used widely in Pakistan. We have also examined the seed-coat fat of *Sapium sebiferum* for its fatty acid content. Although similar efforts have been made by other workers [1-4], yet this particular local source has, as yet, remained unexplored. These studies have also been prompted by the fact that these trees have adapted very well to the local climate (Islamabad), after these plants were introduced [5] here about a decade ago. (Islamabad),

Sapium-sebiferum also known as *Stillingia sebifera* [6], are trees of moderate height (10 to 15 ft) and grow in and around Islamabad. It bears small fruit (May to August), which contains two fat coated seeds storage in it. The fruits were collected and were used after about three months storage in cold room. The green pericarp turned dark brown and was removed to expose the fat-coated seeds. The fat extracted from these seeds was used for all the experiments reported here.

EXPERIMENTAL

All extracts were dried over anhydrous sodium sulphate, and evaporations of organic solvents were carried out in rotary evaporators under-reduced pressure (water pump). Vapour phase gas chromatographic analysis were performed with a Varian (model 1740-10) gas chromatograph. 'Dalda ghee' and corn oil manufactured by Lever

Brothers and Rafhan Oil Mills, respectively, were used in all experiments.

Solvent Extraction of Fat. The pericarp of the fruit was removed to expose pale-white fat coated seeds. Benzene (1 litre) was added to seeds (1 kg) and the mixture was boiled under reflux for 1 hr. The seeds were removed by filtration and the benzene extract on evaporation afforded pale yellow fat (205.8g, 20.6%). Some important chemical values of the extracted seed-coat fat as well as those of 'dalda ghee' and corn oil have been determined by the common methods for comparison, and are recorded in Tables 1 and 2.

Analysis of Component Fatty Acids of Seed-coat Fat. The seed-coat fat (10.0 g), was saponified [4,7] with 0.5N alcoholic KOH (100 ml) by boiling under reflux for 6 hr under nitrogen. The unsaponifiable matter was removed by extracting it into diethyl ether (4 times 30ml), and residual soap solution was acidified with 4N sulphuric

Table 1. Chemical characteristics of seed coat fat of *Sapium sebiferum*, 'dalda ghee' and corn oil.

Characteristics	Seed coat fat	Dalda ghee	Corn oil
Acetyl value	42.1	20.4	25.6
Acid value	3.82	0.82	0.28
Free fatty acid %	2.33	0.15	0.20
Iodine value	21.1	60.1	95.2
Saponification value	164.1	180.9	166.9
Triglycerides %	97.7	99.8	99.7
Unsaponifiable value	1.07	0.96	1.61

Table 2. Component fatty acids of seed coat fat of *Sapium sebiferum*.

Fatty acids	%
Myristic	1.4
Oleic	14.3
Palmitic	76.5
Stearic	7.6

Table 3. Chemical composition of the seeds of *Sapium sebiferum* (%).

Component	%
Crude proteins ($N \times 6.25$)	6.73
Fat	20.48
Ash	2.19
Moisture	7.76
Carbohydrate (by difference)	62.84

acid. The liberated fatty acids were extracted into diethyl ether (4 times 30 ml); evaporation of combined ethereal extracts afforded fatty acids, which were converted to their respectively methyl esters. The methyl esters were subjected to vapour phase chromatographic analysis on a diethylene glycol succinate (DEGS) column at 200°C, using argon as the carrier gas and flame ionization detector. The fatty acids were identified and their percentage composition determined by measuring their retention times and the peak areas of their methyl esters respectively (Table 3).

DISCUSSION

The analytical values of seed-coat fat are close to those of 'dalda ghee' and corn oil (Table 1). Since the seed-coat fat has ghee-like appearance at room temperature, and it also shows the lowest iodine value, this would eliminate the expensive and health hazardous catalytic (nickel) hydrogen step, usually undertaken to transform the oily appearance of edible oils to semi-solid ghee-like appearance (if found fit for human use as food).

The high acid value of seed-coat fat as compared to 'dalda ghee' and corn oil is, because, the fat has not under-

gone initial purification.

The seed-coat fat can also be used for making soap; since it contains high proportion of palmitic and oleic acid glycerides. The chemical composition of seeds shows that they contain carbohydrates, fats and proteins (Table 3), and thus could possibly find their use [8] as food additives for animals.

It is estimated [9] that on the average a tree yields about 20 kg fruit and/or 14 kg of seeds or 3 kg of seed-coat. It has been calculated that about 3000 tons of this fat can be extracted from this source. It looks a rather small slice of the national requirement, but since the fat consumption is going to increase in future with increase in population, more plantation of these trees can be undertaken and thus contribution from this source can increase many fold. To further explore the uses of this fat, experiments are in progress in our laboratories, and these results will be published later.

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