

PHYSICO-CHEMICAL PROPERTIES OF GUAVA SEED OIL

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Seed of guava fruit yielded 9.26% oil on fresh seed basis. The seed oil, extracted with solvent hexane, on analysis by gas chromatography showed a Fatty acid composition of C 6:0 (0.26%) C 8:0 (0.83%) C 12:0 (0.02%), C 14:0 (0.06%) C 16:0 (8.14%) C 18:0 (3.04%), C 18:1 (3.04%) C 18:2 (75.52%).

Key words: Guava seed oil, Physico-chemical analysis.

Introduction

Despite the fact that Pakistan is basically an agricultural country, it has not been able to meet its edible oil requirements from its local sources. The gap between domestic production and consumption of edible oil has increased from 82,000 tonnes in 1970-71 to 7,10,000 tonnes in 1986-87 representing a growth rate of 13.5%/anum.

This situation demands concerted efforts to mobilize all available resources, both conventional and un-conventional aimed at reducing the import and achieving self sufficiency in the shortest possible time.

Guava is grown throughout Pakistan with an annual production of 335,000 tonnes [2]. The fruit comes to the market during specific and short period of time.

It has been estimated that 931 tonnes of oil worth rupees 14.90 million could be produced from the seeds of the surplus of guava fruit. No work on the composition of guava seed oil has been reported in Pakistan. It was, therefore, worthwhile to evaluate guava seeds as a source of edible oil.

Material and Methods

Extraction of guava seed oil. For the production of clarified guava drink and guava nectar, guava fruits were pulped in a pulper with 1.3mm mesh sieve. The seeds which are 3% of the whole fruit, were collected from the waste material and were analysed for moisture, ash, protein, crude fibre and percent oil by the methods described in AOAC [3]. The seeds were washed, dried and crushed in a pestle mortar and extracted in a solvent extractor using hexane. The hexane extract was dried over anhydrous sodium sulphate. The solvent was evaporated under vacuum and the extract weighed as crude oil.

Physico-chemical properties of guava seed oil. Physico-chemical properties such as colour specific gravity, refractive index, acid, peroxide, ester, saponification and iodine values were estimated by standard procedures [4].

Preparation and gas chromatography of methyl esters. Methylation. Fresh transmethylating reagent 20% methanolic

sulphuric acid was prepared as described by Khan *et al.* [5], 2 mls of transmethylating reagent was added to each replicate tube containing 200mg oil samples. The tubes were then tightly sealed and heated in an oven at 80° for two hrs. After cooling, distilled water 2 ml was added to each tube and the methylesters were extracted thrice with hexane (4ml). The combined extract was concentrated to 1 ml under a stream of nitrogen.

Gas chromatography. Fatty acid methylester composition of the oil (FAME); as obtained on a Perkin elmer Model 3920 gas chromatography equipped with flame ionization detector (FID). Peak area and concentration were calculated by "Intersmat ICR-IB". The operating conditions were as follows:-

Carrier gas (N ₂)	25 ml/min.
Dectector	FID
Detector temperature	250°
Injector temperature	200°
Column temperature	200°
Air	50 psi
Hydrogen	20 psi
Chart speed	5mm/min.
Volume of sample injected	2 µl
Column	Glass 6 ft x 2 mm coated with 20% DEGS on Chromosorb W80-100 mesh

The physico-chemical characteristics of guava seed and seed oil are given in Table 1. The seeds are 3% by weight

TABLE 1. PHYSICO-CHEMICAL PROPERTIES OF GUAVA SEED AND SEED OIL.

	Seed		Seed oil
Protein	6.825%	Oil	9.26%
Moisture	31.29%	Colour	Straw yellow
Ash	0.8%	Refractive index at 30°	1.4745
Oil	9.26%	Specific gravity	0.939
Fibre	0.25%	Iodine value	68.3
Starch	Traces	Free fatty acids	2.5%
		Ester value	206.331%
		Acid value	4.975%
		Peroxide value	8.45%

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TABLE 2. THE FATTY ACID COMPOSITION OF GUAVA SEED OIL BY GLC.

Fatty acids as methylesters		Concentration (%)
<i>(i) Saturated</i>		
Caproic acid	6:0	0.26
Capric acid	8:0	0.83
Lauric acid	12:0	0.16
Myristic acid	14:0	0.08
Palmitic acid	16:0	7.71
Stearic acid	18:0	4.22
<i>(ii) Unsaturated</i>		
Oleic acid	18:1	12.69
Linoleic acid	18:2	75.52

TABLE 3. THE FATTY ACID COMPOSITION OF THE OILS OF GUAVA SEED, SUNFLOWER, GROUNDNUT, OLIVE, SOYBEAN AND COTTON SEED.

Fatty acids	Guava seed	Sun flower (8)	Groundnut oil (6)	Olive oil (7)	Soybean oil(9) Bragg variety	Cotton seed oil(10) B.S.I. variety
C12:0	0.02	—	—	0.1	—	—
C14:0	0.06	1.5	0.1	0.8	0.3	1.4
C16:0	8.14	11.5	12.9	19.0	13.8	28.8
C18:0	3.04	Traces	1.9	1.7	5.4	3.5
C18:1	13.10	55.0	47.1	65.7	13.8	22.5
C18:2	75.52	32.0	31.2	10.9	41.2	41.2

of the whole fruit and the seed oil is 9.26% of the seed on a fresh weight basis. The ester, acid and peroxide values of guava seed oil are 206.331%, 4.975% and 8.45% respectively. The fatty acid composition of the saponifiable matter is given in Table 2. The results show that the oil contains fatty acids of chain length C 6 to C 18. Furthermore the oil contains 88.62% unsaturated fatty acids and only 11.44 saturated fatty

acids. Moreover guava seed oil seems to be important nutritionally since it contains a high proportion of the essential fatty acid linoleic acid (75.52%), which is much higher than that found in sunflower, groundnut, olive, soybean and cotton seed oils (Table 3). Accordingly the importance of guava seed oil in meeting the oil needs of Pakistan is enhanced by its nutritional significance as a source of essential fatty acids.

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