



## **Proximate composition and selected physicochemical properties of the seed, pulp and oil of sour sop (*Annona muricata*)**

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**Abstract.** Proximate composition and physicochemical analyses were carried out on the seed, pulp and extracted oil of sour sop (*Annona muricata*). The results showed that the seed contained 8.5% moisture, 2.4% crude protein, 13.6% ash, 8.0% crude fiber, 20.5% fat and 47.0% carbohydrate. The seed also contained 0.2% water soluble ash, 0.79% titratable acidity and 17.0 mg calcium/100 g. The pulp was found to contain 81% moisture, 3.43% titratable acidity and 24.5% non-reducing sugar. Selected physicochemical characteristics included refractive indices of 1.335 for the seed and 1.356 for the pulp, specific gravities of 1.250 for the seed and 1.023 for the pulp, pH values of 8.34 for the seed and 4.56 for the pulp, and soluble solids contents of 1.5 °Brix for the seed and 15 °Brix for the pulp. The extracted oil (20.5% yield) had a 60.43% unsaponifiable value, 23.54 KOH/g acid value, 100.98 KOH/g saponification value, 1.1 KOH/g peroxide value, 1.464 refractive index, 5.77 pH, 69.5 °Brix soluble solids and 0.2900 specific gravity.

**Key words:** *Annona muricata*, Oil yield, Physicochemical properties, Proximate composition, Sour sop

### **Introduction**

*Annona muricata* is commonly known as ‘chop-chop’ in Edo state Nigeria, which is a corrupted form of the English name sour sop. It is foreign to some parts of Nigeria. It is, however, found in the rain forest and derived savannah zone in Nigeria either domesticated or growing wild. The fully mature fruit is green or light greenish yellow. The ripe, mature fruit is soft to the touch; ripeness is better detected by touch than by color. The outside of the fruit is thorny while the pulp is white and juicy with brownish seeds.

Previous research on *Annona muricata* has focused on the bark of the tree and roots for pharmaceutical purposes [1]. Little attention has been paid to using the seeds for food purposes nor has any attempt been made to extract oil from the seeds. This study was, therefore, conducted to determine selected

nutritional and physicochemical properties of the seeds, pulp and oil extracted from the seeds of sour sop.

### Materials and methods

*Collection and preparation of samples.* Fresh fruits (~1 kg) of *Annona muricata* were bought from Karmo market, Abuja. Using a kitchen knife, the outside was removed. The seeds were separated from the pulp manually. A clean white cotton cloth was used to squeeze the pulp to separate it from the fibrous components. The seed coats (testa) were removed using a laboratory pestle and mortar. The decorticated seeds were milled (Premier Mill A1) and sieved through 0.44 mm diameter sieve. The seed flour was oven-dried (Gallenkamp, UK) at 60 °C for 6 hours and separated into two equal halves of about 200 g each. The first portion was used for oil extraction while the second was used for proximate analysis. The pulp containing some liquid syrup was stored in the refrigerator at 1 °C for 4 days pending chemical analysis. The oil was extracted from the seed flour using petroleum ether in a Soxhlet apparatus (AOAC, method 14.089) [23]. The flour and extracted oil were stored at room temperature ( $28 \pm 2$  °C) in sealed cellophane bags pending chemical analyses.

*Determination of proximate composition.* Moisture was determined by oven (Gallenkamp, UK) drying at 105 °C to constant weight. Total ash, protein ( $N \times 6.25$ ), fiber and fat (solvent extraction) were determined by the AOAC [2] methods 14.085, 14.086, 14.087 and 14.089, respectively. Carbohydrate was determined by difference. Calcium was determined by the EDTA titration method [3]. Water soluble ash was determined by the method described by Pearson [3]. All analyses were carried out in triplicate and the averages recorded.

*Determination of physicochemical properties.* Titratable acidity, total soluble solids (°Brix) and non-reducing sugars (as sucrose in solution) were determined by standard methods [3]. Titratable acidity was determined by titrating dilute samples of the seed flour and pulp with 0.1 M NaOH to the phenolphthalein end point. Total soluble solids were estimated with the Abbe hand refractometer (RG 701, Officine Galileo, Italy) while the non-reducing sugar was determined by the Lane and Eynon methods described by Pearson [3]. Specific gravity was estimated using a 25 ml specific gravity bottle at 20 °C as described by Pomeranz & Meloan [4]. Refractive index was determined by an Abbe refractometer (Model RG 701, Officine Galileo, Italy). pH was determined using a pH meter (Troptronic Milano, Italy) at 20 °C.