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Proximate Composition of Jamun (*Syzygium cumini*) Fruit and Seed

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Abstract: *Syzygium cumini*, generally recognized as Jamun, is a tropical tree that produces purple ovoid fleshy fruit. The ripe berries are sweetish dry to taste and are useful in preparation of health drinks, jellies, juices squashes and wine. Its seed has conventionally been used in India for the management of different diseases. The present studies were carried out to understand the chemical composition of jamun fruit and seed. Jamun fruits were assessed for their chemical composition by analyzing various parameters such as moisture, protein, fat, fibre and ash. It was revealed that jamun seed consisted of moisture(16.34±0.49), crude protein (1.97±0.59), crude fat (0.65±0.01), crude fiber(4.19±0.12), ash 2.18±0.06 and nitrogen free extracts (NFE) (74.67±2.24%). Pulp contained moisture content of 82.19±2.46%, crude protein 2.15±0.06%, crude fat 0.83±0.02%, crude fiber 1.76±0.05%, ash 2.04±0.06% and NFE 11.03±0.33. Chemical composition of jamun indicated that there are low fat contents in both fruit and seeds.

Key words: Protein · Juice · Jamun · Chemical composition · Fat · Fruit · Seeds

INTRODUCTION

Jamun is a huge evergreen tree that is well known in Ind-o-Pak. It is scientifically named as *Eugenia jambolana* or *Syzygium cumini* that belongs to family Myrtaceae. Jambul, java plum, Indian blackberry and black plum are common names of jamun [1]. India is a leading producer of jamun. Worldwide, total production of jamun is 13.5 million tonnes out of which India contributes about 15.4%. The jamun fruit have a significant amount of iron and consumed as potential drug against hyperglycemia, liver and heart diseases. A huge amount of anthocyanins also present in fruit that exhibits good antioxidant characteristics [2].

The jamun fruit has oval shape with 2-3 cm long containing a hard seed inside. The flavor of the fruit is astringent and it looks like blueberry in shape and color [3].

Jamun fruit is generally acknowledged to be very high quality for its curative function chiefly against diabetes because of its effect on pancreas. Jamun seeds also contains albumen, fat, glycosides, an alkaloid; jambosine3, resin, ellagic acid, quercetin, gallic acid as well as elements of zinc, vanadium, chromium, sodium and potassium. β-sitoterol is present in unsaponifiable material of seed fat [1]. Research studies accomplished in last twenty years has explored that jamun have an outstanding complex of naturally present antioxidant compounds [4]. However, the ellagic acid and glucoside jamboline are known as bioactive components of jamun containing antioxidant activity and hold the capacity to convert the starch into sugar [5]. The fruit of jamun is mostly used for its high vitamin C and anthocyanin contents. The major anthocyanins in jamun fruit are malvidine, glucoside, petunidin, cyaniding [6].

MATERIALS AND METHODS

Sample Preparation: The destoning of jamun fruit was conducted. Furthermore, dried seed and fruit were ground and both samples were preceded for further analysis for their quality attributes including proximate composition, polyphenols and antioxidant activity.

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Proximate Analysis: The moisture, crude protein, crude fat, crude fiber, ash content and nitrogen free extract (NFE) of jamun fruit and seed were quantified according to the protocol of AOAC [7]. All the tests were carried out in triplicates.

Moisture Content: The moisture present in jamun fruit and seed was determined by drying the sample in hot air oven (Model: DO-1-30/02, PCSIR, Pakistan) at 105±5°C till constant weight according to AOAC method No. 934-01 [7]. Following equation was followed to determine the moisture content;

$$Moisture(\%) = \frac{Initial - Weight - Final\ Weight}{Initial\ Weight}$$

Crude Protein: Protein content of sample was determined using Kjeltech Apparatus (Model: D-40599, Behr Labor Technik, Gmbh-Germany) as described in AOAC method No. 984-13 [2]. According to the procedure, jamun fruit and seeds were digested with conc. H_2SO_4 by using digestion mixture (K_2SO_4:$FeSO_4$:$CuSO_4$ as 100:5:10) until the color was transparent violet. The digested material was then diluted up to 250 mL in volumetric flask. 10 mL of 40% NaOH with 10 mL of digested sample were taken in distillation apparatus whereas liberated ammonia was collected in a separate beaker containing 4% boric acid solution, using methyl red as an indicator. Consequently, ammonium borate was formed that was used for nitrogen determination in sample. Thus percentage of nitrogen in the sample was estimated by titrating the distillate against 0.1 N H_2SO_4 solutions till light golden coloration. Crude protein content was calculated by multiplying nitrogen percent (N %) with factor (6.25).

$$N(\%) = \frac{\text{Vol. of 0.1N H2SO4 x 0.0014x Vol. of dilution (250ml)}}{\text{Vol. of distillate sample taken x Weight of sample}} \text{ x } 100$$

Crude protein (%) = Nitrogen (%) x 6.25

Crude Fat: The crude fat content was measured using hexane (solvent) through Soxtec System (Model: H-2 1045 Extraction Unit, Hoganas, Sweden) following the procedures of AOAC (2006) Method No. 920-39 [7].

Crude Fiber: The crude fiber in fat free samples was estimated by digesting firstly with 1.25% H_2SO_4 for 30 min and then with 1.25% NaOH solution through Labconco Fibertech (Labconco Corporation Kansas, USA) as described in AOAC Method No. 978-10 [7]. Afterwards, sample was filtered and washed with distilled water. The residue was weighed and placed in muffle furnace at temperature of 550-650°C till grey or white ash was obtained. The crude fiber percentage was estimated according to the following expression;

$$\text{Crude fiber (\%)} = \frac{\text{Weight of digested sample} - \text{Weight of ash}}{\text{Weight of sample (g)}} \text{ x } 100$$

Total Ash: Ash in each dry sample was determined by direct incineration in a Muffle Furnace (MF-1/02, PCSIR, Pakistan) at 550-600°C after charring, till grayish white residue (AOAC, method No. 942-05) [7].

$$Ash\ \% \quad \frac{Weight\ of\ ash}{Weight\ of\ sample} \times 100$$

Nitrogen Free Extract (NFE): NFE in jamun fruit and seed was calculated according to the following formula;

NFE % = 100 – (Moisture% + CP % + CF1 % + CF2 % + Ash %)

where,
CP = Crude protein
CF1 = Crude fat
CF2 = Crude Fiber

RESULTS AND DISCUSSION

Proximate Analysis: Jamun seeds and fruits were analyzed for proximate composition that plays a crucial role in assessing quality characteristics of raw material. Jamun fruit contains moisture, crude protein, crude fat, crude ash, crude fiber and carbohydrates that ranges from 83-86, 1.4-4.37, 0.3-1.6, 0.32-4.51, 0.30-2.09 and 16.6 %, respectively [8, 9]. Scientific explorations have revealed that seed of jamun is composed of moisture, crude proteins, crude fat, crude ash and crude fiber nearly 40.86-57.33, 2.42-5.05, 1.55-8.00, 1.47-6.21 and 1.28-6.08 %, respectively [10].

Proximate composition (Table 1) indicated that jamun seeds contains moisture, crude protein, crude fat, crude fiber, ash and nitrogen free extracts (NFE) as 16.34±0.49, 1.97±0.59, 0.65±0.01, 4.19±0.12, 2.18±0.06 and 74.67±2.24%, respectively. These results were in accordance with earlier findings Reported by Prasad *et al.,* (2010),who depicted that jamun seeds consisted of 9.34±1.99% moisture, 2.42±0.44% crude protein, 0.92±0.52% crude fat, 6.08±1.11% crude fiber and 2.93±0.82% ash [11]. Recently, it was observed that jamun seeds contain 52.91±1.48 % moisture, 5.05±0.07% crude protein, 8.00±0.10% crude fat, 3.33±0.03% crude fiber and 6.21±0.20% ash [12].

Table 1: Proximate composition of jamun seed

Proximate Composition	Quantity (%)
Moisture	16.34±0.49
Crude protein	1.97±0.59
Crude fat	0.65±0.01
Crude fiber	4.19±0.12
Ash	2.18±0.06
NFE	74.67±2.24

Table 2: Proximate composition of jamun fruit

Proximate Composition	Quantity (%)
Moisture	82.19±2.46
Crude protein	2.15±0.06
Crude fat	0.83±0.02
Crude fiber	1.76±0.05
Ash	2.04±0.06
NFE	11.03±0.33

Jamun fruits were assessed for their chemical composition by analyzing various parameters and findings are presented in Table 2. According to the results obtained, jamun fruit contained a moisture content of 82.19±2.46%, crude protein 2.15±0.06%, crude fat 0.83±0.02%, crude fiber 1.76±0.05%, ash 2.04±0.06% and NFE in jamun fruit sample was calculated to be 11.03±0.33. The current results are in accordance with the findings of Ali *et al*., (2013), who found that jamun fruit consists of 86.24±1.45% moisture, 4.37±0.04% crude protein, 1.60±0.02% crude fiber 2.09±0.03% crude fat, 4.51±0.12% ash. Likewise, Baliga *et al.* (2011) studied the composition of jamun fruit and found that jamun fruit contained 85.9±1.4% moisture, 1.4±0.7% crude protein, 0.6±0.2% crude fat, 0.6±0.06% crude fiber and 2.13±0.11% ash [3].

CONCLUSIONS

Composition analysis indicated that there are low fat contents in both fruits and seeds of jamun. It was observed that jamun seeds contains moisture, crude protein, crude fat, crude fiber, ash and nitrogen free extracts (NFE) as 16.34±0.49, 1.97±0.59, 0.65±0.01, 4.19±0.12, 2.18±0.06 and 74.67±2.24%.

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