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Study Of Physicochemical Properties Of Jamun Seed (Syzygium Cumin) The Nutritional Boon

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Abstract

The objective of this study was to evaluate the physicochemical, proximate, vitamins, and minerals composition of jamun (SyzygiumCumini) seeds. The jamun fruit had a dark purple color, whereas the jamun seed was seen to be white to pink in color. The jamun fruit and seed exhibited an oblong form. The dimensions and weight of the jamun fruit were measured to be 32 mm in length, 28.8 mm in breadth, and 18.33 g in weight. The seed, on the other hand, had dimensions of 18.25 mm in length, 11.10 mm in width, and weighed 1.65 g. The chemical composition of jamun seeds was analyzed, including moisture content, crude fat, crude protein, carbohydrate, crude fiber, and ash, which were found to be 54, 1.05, 2.85, 31.63, 7.02, and 1.51 g/100g, respectively. The jamun seed was discovered to contain the following values for vitamin content: vitamin A (3 IU/100g), vitamin B3 (0.092 mg/100g), and vitamin C (0.22 mg/100g). The jamun seed powder included the following amounts of minerals: iron (0.140 mg/100g), calcium (0.651 mg/100g), magnesium (0.010 mg/100g), phosphorous (0.072 mg/100g), potassium (16.07 mg/100g), and zinc (0.009 mg/100g). Therefore, it was determined that these jamun (Syzygium Cumini) seed traditional medicinal plants are a valuable source of nutrients, including protein, fiber, vitamins, and minerals.

Keywords: Jamun fruits, seeds physicochemical properties, Medicinal value.

Introduction

India is the birthplace of numerous fruit crops, and the majority of these crops are restricted to their own producing regions.

Despite their significant nutritional and therapeutic qualities, there is a lack of commercial cultivation for these crops. The majority of underused fruits are incorporated into the fundamental formulas of numerous ayurvedic medicines.

One of the most prevalent yet neglected fruits that is currently gaining popularity is Jamun (Syzygiumcumini). This plant is native to South East Asia and India, although it has also been cultivated in Hawaii, Australia, the Philippines, Kenya, Florida, and other locations. Jamun fruits are grown annually and can be found in the months of June and July (Shrivastava and Kumar, 2009).

Fig -1, Showing Jamun Fruit, Fress Jamun Seeds and Dried Jamu

[1]. The jamun fruits are classified as berries with a taste that is both sweet and sour (Warrier et al., 1996 "[2]." The prevalent varieties of jamun include Kaatha, Narendra Jamun-6, and Konkan bhardoli. The jamun fruit is a large, oblong-shaped berry that has a deep purple or bluish-black tint. The pulp of the fruit is a shade of purple pink and has a high level of juiciness and sweetness, as stated by Achrekar et al. in 1991 "[3]."

The global annual production of Jamun is around 13.5 million tons, with India accounting for 15.4% of this total. India ranks second globally in Jamun output. Ayurvedic medicine traditionally utilizes all parts of the jambul plant, including its fruits, leaves, seeds, and bark. For decades, jamun seed powder has been utilized as a natural remedy for regulating blood sugar levels. This herb is highly delectable and possesses detoxifying characteristics that aid in the maintenance of natural urine and perspiration. It possesses hypolipidemic, cardioprotective, immunomodulatory, and neuro-psychopharmacological properties. In addition, there are papers documenting the antioxidant, anti-inflammatory, antipyretic, anti-allergic, anti-bacterial, gastro-protective, and radioprotective activities of Jamun seed extract. Additionally, it functions as a liver stimulant, aids with digestion, has a cooling effect, and acts as a blood purifier. Jamun seeds contain a glycoside called Jamboline, which aids in regulating glucose levels within the normal range (Kalse et al., 2016). "[4]." The Ayurvedic book recommends an average dosage of 1-3 g of jamun seed powder per day for the treatment of diabetes, according to Shorti et al. (1962). "[5]." There has been no comprehensive investigation conducted on the physicochemical and nutritional characteristics of Jamun seed. Therefore, this study aims to examine the physicochemical, proximate, vitamins, and minerals composition of jamun seed.

Methods

The method (Shahnawaz and Sheikh) [6] was used to measure the physical qualities, including color, form, weight, length, width, and texture. Chemical characteristics such as moisture, crude fat, crude protein, carbohydrate, crude fiber, and ash were assessed using the AOAC 2005 method [7]. The spectrophotometric approach described in the modified standard method of (AOAC 2000) [8] was used to determine the concentration of vitamins, such as vitamin A. The quantification of vitamin B3 was conducted following the established methodology outlined by Anuradha et al. in 2013 [9]. The study conducted by Hussian et al. in 2006 [10] was employed to determine the concentration of vitamin C. The mineral content, including iron, calcium, magnesium, phosphorous, potassium, and zinc, was determined using the method described by Ranganna (2011) [11].

Preparation of jamun seed powder: One must choose jamun fruits that are evenly ripened, disease-free, and sound. The pulper was used to separate the pulp and seed of the jamun fruit. Next, the seed was soaked in water and subsequently dehydrated in a tray drier set at a temperature of 60°C for a duration of 48 hours until it was completely dried. The dried seed was then pulverized in a pulveriser to obtain a fine powder with an average particle size of 0.58 mm.

Fig -2, Showing Jamun seeds puverizer machine

Findings and Analysis

Physical attributes of the jamun fruit and seed:

The physical characteristics aid in the visual recognition of fruits. As a result, certain physical characteristics are noted and recorded in Table 1.

The data reported in Table 1 provides a comprehensive overview of the specific physical parameters that were determined. The jamun fruit was observed to have a dark purple color, while the jamun seeds were found to be white to pink. Additionally, the color of the jamun seed kernel was black. The jamun fruit, seed, and seed kernel all had an oblong shape. The measurements of the jamun fruit, seed, and seed kernel were determined to be 31 mm, 18.20 mm, and 16.48 mm, respectively. The measurements for the width of the jamun fruit, seed, and seed kernel were reported as 28.7 mm, 11.05 mm, and 10.29 mm, respectively. The findings revealed that the mean weight of jamun fruit was determined to be 18.32 grams, while the weight of the seed was 1.62 grams and the weight of the seed kernel was 0.92 grams.

Sr.No.	Physicalcharacteristic			
	Parameters	**Fruit**	**Seed**	**Seedkernel**
1	Colour	Darkpurple	Whitetopink	black
2	Shape	Oblong	Oblong	Oblong
3	Length(mm)	31.5	18.22	16.50
4	Width(mm)	28.6	11.06	10.28
5	Weight (g)	18.35	1.63	0.93
6	Texture	Smooth	Coarse	Coarse

Table 1. Physical attributes of the jamun fruit and seed

The data pertaining to the physical properties of jamun fruit indicated that ocular observation revealed a smooth texture, but the seed and seed kernel exhibited a coarse texture. Similar findings on the physicochemical attributes of jamun were also discovered by Ghosh et al. (2017) [12]. The current study's findings on the physical qualities of jamun fruit closely align with the results reported by Muhammad et al. (2009) [13].

Analysis of the nutritional composition of jamun seeds:

Table 2 provides information on the proximate composition of jamun seed. The results reveal that the jamun seed contains moisture, crude fat, crude protein, carbohydrate, crude fiber, and ash. These characteristics were used to examine the proximate composition of jamun seed powder.

The proximate composition analysis (Table 2) revealed that jamun seeds have a moisture content of 53 g/100g, crude fat content of 1.02 g/100g, crude protein content of 3.84 g/100g, carbohydrate content of 31.62 g/100g, crude fiber content of 7.01 g/100g, and ash content of 1.51 g/100g. These results were consistent with previous research. According to a study conducted by Prasad et al. in 2010, jamun seeds were found to have 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, as reported by Shahnawaz et al. in 2010 [14].

The moisture content of java plum seeds has been observed to range from 40.86% to 57.33%, protein content from 2.42% to 5.05%, ash content from 1.47% to 6.21%, fat content from 1.55% to 8.00%, and crude fiber content from 1.28% to 10.95% in previous research conducted by Kochar et al. (2006) [15] and Swami et al. (2012) [16]. The current findings on seed composition closely align with previously documented values, with the exception of elevated levels of protein and fiber content.

Table 2. Analysis of the nutritional composition of jamun seeds

Sr.No.	Proximatecomposition	
	Parameters	**Values(g/100g)**
1	Moisture content	53.25
2	CrudeFat	1.03
3	Crudeprotein	3.85
4	Carbohydrate	31.63
5	Crudefiber	7.02
6	Ash	1.50

These disparities may stem from variances in cultivars, farming techniques, and climate factors. The composition of jamun seed includes 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 NFE (74.67±2.24%) (Ahmad et al., 2015) [17].

Nutritional composition of jamun seeds:

The table labeled as Table 3 provides a quantitative evaluation of the vitamins found in the jamun seed.

Table 3. Nutritional composition of jamun seeds

Sr.No.	Vitamincontent	
	Vitamins	**Values(mg/100g)**
1	VitaminA(Retinol)	3 IU/100g
2	VitaminB3(Niacin)	0.095
3	VitaminC(Ascorbicacid)	0.213

Table 3 data revealed that jamun seeds contain 3 IU/100g of fat-soluble vitamin A (Retinol), and 0.09 (mg/100g) of water-soluble vitamin B3 (Niacin) and 0.21 (mg/100g) of vitamin C (Ascorbic acid). It was discovered that jamun seeds possess a greater concentration of water-soluble vitamins. The findings align closely with the results reported by Ghosh et al., (2017) [12] and Shahnawaz et al., (2010) [14].

Analysis of the mineral makeup of jamun seeds:

The table 4 presents the estimated mineral makeup of jamun seed powder. The nutritional value of jamun seed powder was assessed using factors such as iron, calcium, magnesium, phosphorous, potassium, and zinc.

Table 4. Analysis of the mineral makeup of jamun seeds

Sr.No.	Mineralcomposition	
	Minerals	Values(mg/100g)
1	Iron	0.141
2	Calcium	0.652
3	Magnesium	0.011
4	Phosphorous	0.073
5	Potassium	16.09
6	Zinc	0.010

The jamun seed powder included the following trace element values (mg/100g): iron - 0.140, calcium - 0.652, magnesium - 0.011, phosphorous - 0.073, potassium - 16.05, and zinc - 0.010. The current findings regarding seed composition closely align with the previously documented mineral content values published by Ayya et al. (2015) [18] and Veeram et al. (2017) [19]. These results were consistent with previous findings documented by Desai et al. (2018) [20].

Conclusion

The objective of this study was to analyze the physicochemical, proximate, vitamins, and minerals composition of Jamun seed. The physical parameters are crucial for the design of processing machinery and equipment. Jamun is rich in protein and lipids. Additionally, Jamun seeds contain a significant quantity of vitamin C (ascorbic acid) and minerals such as iron, calcium, and potassium. The seeds of Jamun are rich in antioxidants, Havonoids and proteins. Therefore, Jamun seeds can be used in the creation of functional food products. More research is still needed to determine and identify the Jamun compounds and to elucidate for these astounding bioreactive properties and health benefits.

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