International Journal of Botany Studies
www.botanyjournals.com
ISSN: 2455-541X
Received: 20-08-2021, Accepted: 05-09-2021, Published: 20-09-2021
Volume 6, Issue 5, 2021, Page No. 702-705

# Nutrient content of *Musa balbasiana* seeds and flowers: Qualitative estimation and proximate analysis

**Daisy Sharma[1], Chandana C Baruah[2], Pameena Narzary[3], Ritismita Devi[4], Manash Pratim Sarma[5]**

[1] Assistant Professor, Department of Food Nutrition and Dietetics, Assam Down Town University, Panikhaiti, Ghy, Assam, India

[2] Professor, Department of Pharmacology and Toxicology, College of Veterinary Science, AAU, Khanapara, Ghy Assam, India

[3] JRF, DBT Project, Department of Food Nutrition and Dietetics, Assam Down Town University, Panikhaiti, Ghy, Assam, India

[4] Assistant Professor, Department of Biochemistry, Assam Down Town University, Panikhaiti, Assam, India

[5] Associate Dean and Associate Professor, Department, of Biotechnology, Assam Down Town University, Panikhaiti, Ghy Assam, India

**Abstract**
The present study was undertaken to evaluate the qualitative test and to estimate the proximate composition of *Musa balbasiana* seeds and flower. *Musa balbasiana* is a very nutritious and inexpensive fruit available and cultivated in India specifically in Assam but, it is highly overlooked and underutilised. Therefore, the current study was planned to find out the nutritive composition of *Musa balbasiana* seeds and flower. The qualitative tests and the proximate analysis was done using standard protocols. In qualitative test both the samples showed presence of carbohydrates and amino acids, whereas in proximate analysis it was found that both the samples showed good amount of carbohydrate. The *Musa balbasiana* seeds were rich in fibre and total minerals i.e 4.31g/100g and 5.04g/100g respectively. Whereas *Musa balbasiana* had a good amout of protein i.e 17.2 g/100g. Both *Musa balbasiana* seed and flower can therefore be a good source of macro as well as micro nutrient and can be potentially used for value addition in food products.

**Keywords:** nutrient, *Musa balbasiana* seeds, proximate

## Introduction

Banana is one of the oldest cultivated plants also being the fourth most important dietary staple food in the world (Kumar *et al.*, 2018) [4]. Banana belong to Musaceae family (Mathew and Negi 2017) [26]. Banana is a rich source of carbohydrate, vitamins, minerals, antioxidants and is a super food and serve as a low cost food source (Mohapatra *et al.*, 2010) [24]. It has been reported that banana posses various health benefits such as antitumor and antioxidant potential (Borges *et al.*, 2014) [11]. *Musa balbisiana* classified as monocotyledons herb locally known as Bhimkol or Athiyakol is characterized as compact fruit bunch and having seeds with number differing (50-65) widely cultivated in Assam considering the state as among one of the important producer (Borborah *et al.*, 2016 ; Ghosh and Dash 2018) [10, 17]. *Musa balbisiana* colla is a store house for primary and secondary bioactive metabolites such as carbohydrate, protein, calcium, phosphorous, potassium, secondary metabolites such as flavonoid, phenolic compounds, polyphenol, alkaloids (Dan and Thaha 2014; Bora and Das 2017) [14, 8]. *Musa Balbisiana* has been reported to have antidiabetic factors in the seed, peels, flower studied by (Gopalan *et al.*, 2019) [19] and having effective control in the post prandial hyperglycemia on STZ induced diabetic rats. Antiurolithic activity of fruit extract of *Musa balbsiana* was studied extensively by (Ly *et al.*, 2021) and detected change in the $Cao_x$ morphology. In 2018, Zubair demonstrated Antiulcer potential of fruit extract of *Musa Balbisana* fruit extract. The antioxidative potential of peel and inflorescence was reported by (Nofianti *et al.*, 2021; Basumatary and Nath 2018) [30] thus indicating result comprising property in treating pharmacological problems and having chemotherapeutic potential. Appropriate consumption of combination of fruits and vegetables may effectively lower the potential risk of developing cardiovascular diseases (Adebawo *et al.*, 2006) [1]. Phytochemicals such as flavonoids, polyphenols, tannins, saponins, monoterpenoid, sesquiterpenoids, quinones, alkaloids, diterpenes, triterpenes, phenols were reported to be constituted in fruit, roots, corm, inflorescence, flower, seeds of *Musa balbisiana* (Kusuma *et al.*, 2017, Kalita *et al.*, 2016, Daimari *et al.*, 2020, Borah *et al.*, 2017) [23, 21, 13, 7]. Flavonoid rich fruit can help in correcting diabetes and reduces inflammation (Mahoney *et al.*, 2014) [25]. Findings carried out by (Nofianti *et al.*, 2021) [30] revealed the presence of tannins, saponins in flower, peel, pulp, seeds. Three new triterpenes 31-norcyclolaudenone (1), cycloartenol (2) and (24R)-4a, 24-trimethyl-5a-cholesta-8, 25(27)-dien3b-ol (3) were detected in the inflorescence of *Musa balbisiana cv Saba* (Tin *et al.*, 2016) [35]. Various reports revealed multiple medicinal values of *Musa balbisiana* extracts such as rhizomatous stem, fruit decoction is used during dysentery and pin worm infection by tribal people of Assam as reported by (Kalita and Deb

2004) [20]. Also famous kolakhar (in Assamese) a filtrate prepared from the ashes of peels, leaves etc of banana plant is used as antiseptic, healing cough and also as a substitute for salt (Kalita and Kandar 2014; Neog and Deka 2013) [22, 29]. It has been reported that decoction of corm extract of *Musa balbisiana* is practiced as antidiabetic medicine by the people of Kokrajhar, Assam (Daimari *et al.*, 2020) [13]. Also to be noted juice of rhizomes of *Musa balbisiana* colla is believed and consumed to cure hepatitis in Northeast India (Borthakur *et al.*, 2004) [12].

**Methodology**

In the present study we have prepared *Musa balbisiana* flower and seeds extract and characterized its qualitative and quantitative content.

**Plant materials**

The ripe fruits and edible flower of *Musa balbisiana* were collected from the local market of Guwahati, Assam. The fruits and flower were then brought in the lab of Food Nutrition and Dietetics Department and was washed properly and peeled. The fruit was cut and the seeds were taken out and cleaned. The flower was cut into small pieces then both seeds and flower were then dried for 48hrs in hot air oven at a temperature of 40°C and grounded to fine powder using mixer grinder. Further the powder was prepared into aqueous and ethanolic extract and subjected to qualitative and quantitative analysis.

**Preparation of aqueous extract**

The powdered seeds and flower about 5g were dissolved in 20ml of distilled water. This was allowed to stand for overnight and were then filtered using Whatsman No 1 filter paper.

**Qualitative test and proximate analysis**

The qualitative test and proximate analysis of the samples were done using standard protocols.

**Fig 1:** *Musa balbasiana* fruit and flower

**Results and Discussion**

**Table 1:** Qualitative test for seeds and flower

| Qualitative test | Name of test | Seeds | Flower |
|---|---|---|---|
| Test for reducing sugar | Fehling's test | (-) | (-) |
| | Benedict test | (+) | (+) |
| | Molisch test | (+) | (+) |
| Test for protein | Biuret test | (-) | (-) |
| | Xanthopoetic test | (-) | (-) |
| | Ninhydrin test | (+) | (+) |
| | Strong acid precipitate by coagulation test | (-) | (-) |
| | Precipitation reaction | (-) | (-) |
| Test for lipids | Solubility test | (-) | (-) |

(+ Present, - Absent of the particular compound)

The result of qualitative analysis of both seeds and flower is given in Table 1. The carbohydrate were mainly seen in both the sample except for Fehling's test. Benedict test and Molisch test showed positive result indicating presence of aldehyde and ketone in both seeds and flower. Basumatary and Nath 2017 also reported the positive attributes of *Musa balibsiana* colla inflorescence for Benedict's test. The flowers and seeds of *Musa balbisiana* showed good indication of presence of amino acids, amines, ammonia when subjected to ninhydrin test by showing deep blue and deep purple colour. Preliminary solubility test for lipids detected the absence of lipid in *Musa balbisiana* flower and seeds which were insoluble in organic solvent such as chloroform and ether.

**Table 2:** Proximate analysis of *Musa balbisiana* flower and seeds per 100g

| S. no. | Parameter | Banana flower | Banana seed |
|---|---|---|---|
| 1 | Protein (g/100g) | 17.26 | 8.81 |
| 2 | Fat (g/100g) | 0.76 | 1.39 |
| 3 | Fiber (g/100g) | 2.06 | 4.31 |
| 4 | Total minerals (g/100g) | 3.66 | 5.04 |
| 5 | Total carbohydrates (g/100g) | 64.42 | 69.3 |
| 6 | Total sugars (g/100g) | 8.14 | 6.39 |
| 7 | Energy (Kcal) | 333 | 324 |

**Proximate composition**

Proximate analysis of seeds and flower was determined by AOAC methods. The proximate analysis result is presented in Table 2. The study showed *Musa balbisiana* flower and seeds contain highest amount of protein, carbohydrate, energy, fiber. The lowest content was found to be fat in both flower (0.76 g/100g) and seeds (1.39g/100g). The protein content of flower and seed of *Musa balbisiana* was found to be17.26g/100g and 8.81g/100 respectively. This value when compared to *Musa balbisiana* pulp (7.51±0.38%) was found to be high (Borah *et al.*, 2021). Good amount of protein in banana flower possess significant antibacterial potential and also valorization of banana flowers with other plant protein can have valuable role in functional foods and can be served as ingredient for enhancing the protein availability (Sitthiya *et al.*, 2018; Komal *et al.*, 2019) [34]. Subsequently the protein content in *Musa balbisiana* is higher compared to the protein content of *Musa acuminate* dehydrated inflorescence 14.5±0.40 g/100g (Fingolo *et al.*, 2012) [16]. Fiber content exhibited 4.31g/100g in seeds and 2.06g/100g in flower respectively. This value is comparatively higher than those in seven green leafy vegetables found in Sonitpur district (Saha *et al.*, 2015) [33]. As reported by (Das *et al.*, 2009) [15] the nutritional composition of some Assamese recipes indicates the kaldil bhaji (banana flower stir fried) contain a crude fibre amount of 3.1±0.02. The carbohydrate content in *Musa balbisiana* flower was 64.42g/100g and 69.3g/100g in seeds. Bolanos *et al.*, 2021 reported the carbohydrate content of banana flower (*Musa accuminata*) as 59.68±1.26 % dry weight. The carbohydrate proportion is similar to tray dried kolphul (banana inflorescence) 50.94%. The sugar content of *Musa balbisiana* was 8.14g/100g in flower and 6.39g/100g in seeds. The energy value of *Musa balbisiana* colla flower and seeds were 333kcal and 324 Kcal respectively. Borah and Mahanta 2015 estimated the energy value of bhimkol incorporated low amylase extrudates as 398.50±4.2. Bhimkol riped fruit can supply 16.8% of the energy RDA for infants (Barthakur *et al.*,

1990) [5]. Hence *Musa balbisiana* seeds and flower can be a said as a good source of energy, protein and fibre and can be included in one's daily diet as a healthy food source.

## Conclusion

From the present study it can be concluded that both *Musa balbisiana* seeds and flower were rich in macronutrients like carbohydrate and protein as well as in terms of total mineral content and fiber content. Therefore, value addition of products from *Musa balbisiana* will not only bring to people's awareness to the existence of this nutrient dense fruit, but it will also encourage its consumption by the masses as a healthier alternative to the conventional food products.

## Acknowledgement

The authors wish to acknowledge the help provided by the Clinical instructors of Dept. of Biochemistry and FND, Assam down town University while carrying out the research work. The paper is a part of authors PhD Project under Assam down town University.

## References

1. Adebawo O, Salau B, Ezima E, Oyefuga O, Ajani E, Idowu G *et al*. Fruits and vegetables moderate lipid cardiovascular risk factor in hypertensive patients. Lipids in health and disease,2006:5(1):1-4.
2. Aehla PF, Vijayalakshmi D, Suvarna VC, Yatnatti S. Processing of banana blossom and its application in food product. Int. J. Curr. Microbiol. App. Sci,2018:7(8):1243-1250.
3. Al-Fartusie FS, Mohssan SN. Essential trace elements and their vital roles in human body. Indian J Adv Chem Sci,2017:5(3):127-136.
4. Ashok kumar K, Elayabalan S, Shobana VG, Kumar P, Pandiyan M. Nutritional value of banana (Musa spp.) cultivars and its future prospects: A review. Current Advances in Agricultural Sciences (An International Journal),2018:10(2):73-77.
5. Barthakur NN, Arnold NP. Chemical evaluation of Musa 'Bhimkol'as a baby food. Journal of the Science of Food and Agriculture,1990:53(4):497-504.
6. Borah A, Mahanta CL, Kalita D. Quality attributes of extruded breakfast cereal from low amylose rice and seeded banana (Musa balbisiana, ABB). Journal of Food Research and Technology,2015:3(1):23-33.
7. Borah M, Das S. Antidiabetic, antihyperlipidemic, and antioxidant activities of Musa balbisiana Colla. in Type 1 diabetic rats. Indian journal of pharmacology,2017:49(1):71.
8. Borah M, Das S. Anti diabetic, anti hyper lipidemic, and antioxidant activities of Musa balbisiana Colla. in Type 1 diabetic rats. Indian journal of pharmacology,2017:49(1):71.
9. Borah T, Washmin N, Bora NJ, Saikia J, Bomzon PS, Ahmed TH *et al*. Effect of drying techniques on yield, nutritional, minerals of wild banana pulp (Musa balbisiana Colla): physicochemical and morphological characterization thereof. British Food Journal, 2021.
10. Borborah K, Borthakur SK, Tanti B. A new variety of Musa balbisiana Colla from Assam, India. Bangladesh Journal of Plant Taxonomy,2016:23(1):75-78.
11. Borges CV, de Oliveira Amorim VB, Ramlov F, da Silva Ledo CA, Donato M, Maraschin M *et al*. Characterisation of metabolic profile of banana genotypes, aiming at biofortified Musa spp. cultivars. Food chemistry,2014:145:496-504.
12. Borthakur SK, Choudhury BT, Gogoi R. Folklore hepato-protective herbal recipes from Assam in Northeast India. Ethnobotany,2004:16:76-82.
13. Daimari M, Swargiary A. Study of phytochemical content and antioxidant properties of Musa balbisiana corm extract. Indian Journal of Pharmaceutical Sciences,2020:82(4):707-712.
14. Dan M, Thaha MA. Nutritional studies on lesser known wild edible bananas from Western Ghats, India. Global Journal of Research on Medicinal Plants & Indigenous Medicine,2014:3(4):127.
15. Das P, Devi LP, Gogoi M. Nutrient composition of some regional recipes of Assam, India. Studies on Ethno-Medicine,2009:3(2):111-117.
16. Fingolo CE, Braga J, Vieira A, Moura MR, Kaplan MAC. The natural impact of banana inflorescences (Musa acuminata) on human nutrition. Anais da Academia Brasileira de Ciências,2012:84:891-898.
17. Ghosh T, Dash KK. Respiration rate model and modified atmosphere packaging of bhimkol banana. Engineering in Agriculture, Environment and Food,2018:11(4):186-195.
18. Gopalan C, Rama Sastri BV, Balasubramanian SC. Nutritive value of Indian foods, 1971.
19. Gopalan G, Prabha B, Joe A, Reshmitha TR, Sherin DR, Abraham B *et al*. Screening of Musa balbisiana Colla. seeds for antidiabetic properties and isolation of apiforol, a potential lead, with antidiabetic activity. Journal of the Science of Food and Agriculture,2019:99(5):2521-2529.
20. Kalita D, Deb B. Some folk medicines used by the Sonowal Kacharis tribe of the Brahmaputra valley, Assam, 2004.
21. Kalita H, Boruah DC, Deori M, Hazarika A, Sarma R, Kumari S *et al*. Antidiabetic and antilipidemic effect of Musa balbisiana root extract: A potent agent for glucose homeostasis in streptozotocin-induced diabetic rat. Frontiers in pharmacology,2016:7:102.
22. Kalita P, Kander CC. Kolakhar-a traditional herbal soda of Assam. J Adv Pharm Res Biosci,2014:2(5):122-123.
23. Kusuma SAF, Mita SR, Firdayani INDAH, Mustarichie RESMI. Study on the antibacterial activity of fruit extracts of Klutuk Banana (Musa balbisiana colla) against Shigella dysenteriae ATCC 13313. Asian J Pharm Clin Res,2017:10(7):220-3.
24. Ly HT, Nguyen MT, Pham TH, Nguyen HD, Nguyen MK. Anti-urolithic, anti-inflammatory and anti-bacterial properties of various extracts from Musa balbisiana Colla fruits, 2017.
25. Mahoney SE, Loprinzi PD. Influence of flavonoid-rich fruit and vegetable intake on diabetic retinopathy and diabetes-related biomarkers. Journal of diabetes and its complications,2014:28(6):767-771.
26. Mathew NS, Negi PS. Traditional uses, phytochemistry and pharmacology of wild banana (Musa acuminata Colla): A review. Journal of ethnopharmacology,2017:196:124-140.
27. Mohapatra D, MishraS, Sutar N. Banana and its by-product utilisation: an overview, 2010.
28. Mondal IH, Rangan L, Uppaluri RV. Parametric optimality of tray dried Musa balbisiana Colla

blossom. Journal of Food Science and Technology,2020:57(12):4599-4612.
29. Neog SR, Deka CD. Salt substitute from banana plant (Musa Balbiciana Colla). J. Chem. Pharm. Res,2013:5(6):155-159.
30. Nofianti T, Muhtadi A, Fidrianny I, Fuadah AS, Nurviana V. Klutuk Banana (Musa Balbisiana Colla) Peel Fractions: Antioxidant And Antihyperglycemic Potential. International Journal of Applied Pharmaceutics, 2021, 1-6.
31. Rafa Zubair NV, Suresh A, Babu G, Asma MA, Prahlad A, Hanisha KP. Assessment of anti-ulcer potential of unripe fruit extract of Musa balbisiana in stress induced ulcer model. World Journal of Pharmacy and Pharmaceutical Sciences,2018:7(8):1328-1336.
32. Ramírez-Bolaños S, Pérez-Jiménez J, Díaz S, Robaina L. A potential of banana flower and pseudo-stem as novel ingredients rich in phenolic compounds. International Journal of Food Science & Technology, 2021.
33. Saha J, Biswal AK, Deka SC. Chemical composition of some underutilized green leafy vegetables of Sonitpur district of Assam, India. International food research journal,2015:22(4):1466.
34. Sitthiya K, Devkota L, Sadiq MB, Anal AK. Extraction and characterization of proteins from banana (Musa Sapientum L) flower and evaluation of antimicrobial activities. Journal of food science and technology,2018:55(2):658-666.
35. Tin HS, Padam BS, Kamada T, Vairappan CS, Abdullah MI, Chye FY. Isolation and structure elucidation of triterpenes from inflorescence of banana (Musa balbisiana cv. Saba). International Food Research Journal,2016:23(2):866.