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Estimation of Micronutrient Content and Dietary Fibre in *Musa balbasiana* Seeds and Blossom

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A B S T R A C T

The aim of this study was to assess the vitamin mineral and dietary fiber composition of *Musa balbasiana* seeds and flowers. *Musa balbasiana* is a highly nutritious and affordable fruit grown in India, particularly in Assam, although it is largely ignored and underutilized due to the seeds. As a result, the current research aimed to determine the nutritional composition of and flowers. Standard techniques were used for the analysis of the micronutrient content and fibre content. Both samples indicated presence of different vitamins and minerals. Iron content of *Musa balbasiana* seeds is 3.09mg/100g and calcium content of 218.33 mg/100gm which indicates it has a very good amount of iron and calcium. Both the samples also had zinc in it. B-Vitamins were also found in both the samples and it also had an excellent content of dietary fibre.

***Key words*:** *Musa balbisiana*, Dietary fibre, Micronutrient, Seeds, Blossom

Musa balbisiana is an important plant native to north east part of India. *Musa balbisiana* Colla is a robust herb belonging to the family Musaceae and occurs both in wild habitat and cultivated in Assam, India. In Assam, it is commonly known as *Bhimkol* or *Athiakol*. Banana is known to be, not only in carbohydrates, dietary fiber, certain vitamin and mineral but is also rich in many health promoting bioactive phytochemicals [1]. Parts of this plant such as seeds, fruit pulp, Inflorescence and corm have been known to possess several medicinal properties [2]. According to Basumatary *et al.* [3], *Musa balbisiana* inflorescence may be a potential source of high value phytochemicals for nutraceuticals, pharmacological and food additive application. *Musa Balbisiana* is native to India and other parts of Asia and is said to be utilized in folk medicine since a long time by the tribal people of Northeast India [4]. It is reported that other than banana fruits, banana blossom also has tremendous nutritional value. They are excellent source of vitamins, certain minerals, good source of fibre and protein. Banana blossoms are also excellent source of certain phytochemicals which acts as antioxidants. Singh [5] founded that consumption of banana blossoms reduces the blood sugar level and raise the hemoglobin level in the body as it is rich in fibre and iron which assists in the production of red blood cells. Banana blossom is said to be a good source of both soluble and insoluble dietary fibre, is very helpful for people suffering from irritable bowel syndrome (IBS) and diarrhea. Including banana blossom to their diet plan can help reduce such problems. Since the blossoms are rich in vitamin C, it can be helpful in ulcer management because vitamin C plays important role in promoting tissue repair and wound healing. The blossoms can be used for the treatment of bronchitis, constipation and peptic ulcer, since the banana blossoms are rich in phytochemicals like vitamins, flavonoids and protein [6]. Hence the micronutrient content of banana blossom and banana seed is estimated to enumerate the presence of the important phytonutrients in *Musa balbasiana*

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MATERIALS AND METHODS

The samples of *Musa balbasiana* were procured from the local markets of Guwahati, Assam. The fruits and flowers were then taken to the Food Nutrition and Dietetics Department's lab, where they were thoroughly washed and peeled. The fruit was sliced open, and the seeds were removed and washed. The flower was chopped into small pieces, and both the seeds and the bloom were dried in a hot air oven at 40°C for 48 hours before being ground to a fine powder with a mixer grinder. The powder was also made into aqueous and ethanolic extracts, which were then analyzed for different nutritional content.

Nutritional parameters

The micronutrients were analyzed using the methods outlined by AOAC [7].

RESULTS AND DISCUSSION

Mineral composition

The mineral yield of *Musa balbisiana* flower and seeds is presented in (Table 3). The trace elements detected in *Musa balbisiana* were iron, zinc, calcium, magnesium, phosphorous. Minerals contents determined for the seeds and flower was found to constitute good amount of calcium, magnesium, phosphorous significantly highest content of calcium in both flower and seed extract. Essential trace elements are required for cell growth and metabolism of proteins, carbohydrates, lipids and energy [8]. The study showed the iron content of *Musa balbisiana* was 2.26mg/100g in flower and while in seeds the amount was 3.09mg/100g. The zinc content exhibited 0.22mg/100g in flower and 0.58mg/100g in seeds of *Musa balbsisiana*. Earlier reported by [9] the zinc detected in the *Musa balbsiana* inflorescence (MBI) was 0.969±0.066 mg/100g. The study showed a good amount of calcium 42.17mg/100mg in flower and a higher amount of calcium content in seeds 218.33mg/100g. The calcium amount is comparatively higher than bhimkol dehydrated powder (30mg/100g) [10]. The magnesium content of *Musa balbisiana* was found to be 23.47 mg/100g in flower and 39.21mg/100g in seeds. Also, the phosphorous amount detected was 42.3mg/100g in flower and 58.48 mg/100g in seeds respectively. The attained phosphorous value is similar to the biochemical composition of banana (bhimkol) powder (38.01mg/100g) [11]. Banana flower contains a good amount of protein, fiber, iron therefore *Musa balbisiana* flower can be incorporated with vitamin C rich food to enhance the bioavailability of iron proportionally which can be beneficial for patients suffering with anaemia also iron rich banana flower can be incorporated with other iron rich foods in product development [12-13]. Zinc has role in cellular metabolism, wound healing, protein synthesis and also serves as antioxidant [14]. Magnesium is an essential abundant mineral found in the body, magnesium deficiency can lead to multiple cardiovascular disease, diabetes mellitus [15-16].

Table 1 Mineral composition of flower and seeds of *Musa balbisiana* colla

Parameter	Banana flower	Banana seeds
Iron (mg/100g)	2.26	3.09
Zinc (mg/100g)	0.22	0.58
Calcium (mg/100g)	42.17	218.33
Magnesium (mg/100g)	23.47	39.21
Phosphorus (mg/100g)	42.3	58.48

Table 2 Vitamins and dietary fiber composition of MB flower and seeds

Parameter	Unit	Banana flower	Banana seed
	Dietary fibre		
(i) Soluble	g/100g	2.41	3.42
(ii) Insoluble	g/100g	11.54	15.31
(iii) Total	g/100g	13.95	18.73
Vitamin B_3	mg/100g	0.4	0.26
Vitamin B_6	mg/100g	0.38	0.12
Vitamin B_9	µg/100g	13.37	7.44
Vitamin C	mg/100g	4.48	1.11
Cellulose	%	24.31	19.51
Hemicellulose	%	9.54	5.48
Lignin	%	1.34	0.86

The (Table 2) presents the vitamins and dietary fiber content of Mb flowers and seeds. The study revealed that *Musa balbisiana* colla flower and seeds is a rich source of dietary fiber 13.95g/100g and 18.73g/100g respectively which were mainly composed of cellulose, hemicelluloses, lignin the insoluble dietary fiber cellulose content detected was higher than hemicelluloses and lignin. The good amount of cellulose in *Musa balbisiana* flower can be a good source of bio-based packaging material [17]. The cellulose content was 24.31% in flower and 19.51% in seeds whereas hemicelluloses content ranged 9.54% in flower and 5.48% in seeds. The lignin content exhibited was 1.34% in flower and 0.86% in seeds. *Musa balbisiana* colla contains vitamins such as vitamin B_3, Vitamin B_6, Vitamin B_9. Vitamin B_3 or Niacin content in flower and seeds exhibited in smaller amounts 0.4mg/100g in flower and 0.26mg/100g in seeds. Vitamin B_6 findings exhibited a minimal amount of 0.38mg/100g and 0.12mg/100g in flowers and seeds respectively. The study showed Vitamin C content of 4.48mg/100g in flowers and 1.11mg/100g in seeds. Vitamin B_9 or folic acid content exhibited 13.37µg/100g in flowers and 7.44µg/100g in seeds respectively. The good amount of seeds can be used in preparation of fiber based foods and also can be valuable dietary supplements. Soluble and insoluble dietary fiber on human health benefits in lowering cholesterol levels and preventing constipation [18]. Dietary fiber daily intake recommended by Indian Council of Medical Research is 40gm [19] therefore one can achieve half of daily dietary requirement consuming *Musa balbisiana* seed. Vitamin B_6 helps in regulation of cellular metabolism and one of important molecules in cells of human body [20]. Vitamin C or ascorbic acid possess antioxidant property and scavenging potential against free radicals [21]. The folic acid in both flowers and seeds can be considered a preferable amount. Folic acid or folate is required during fetal development with cellular division. During pregnancy folic acid deficiency can cause high risk of preterm delivery and infant low birth weight [22].

CONCLUSION

The results of our study indicates that *Musa balbisiana* seed and flower can be a promising source of micronutrients along with the other medicinal properties. Both are excellent

source of dietary fibre with is very important in our diet specifically to deal with metabolic disorders. Further investigations are required to establish its other therapeutic potential of different parts of the plant. However, as a source of micronutrient *Musa balbisiana* seed and blossom can be widely used for value addition and development of different food products to deal with micronutrient deficiencies among the populations.

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LITERATURE CITED

1. Sidhu JS, Zafar TA. 2018. Bioactive compounds in banana fruits and their health benefits. *Food Quality and Safety* 2(4): 183-188.
2. Taylor JLS, Rabe T, McGaw LJ, Jager AK, Staden J. 2001. Towards the scientific validation of traditional medicinal plants. *Plant Growth Regul*. 34(1): 23-37.
3. Basumatary S, Nath N. 2018. Assessment of chemical compositions and in vitro antioxidant properties of *Musa babisiana Colla* inflorescence. *International Journal of Pharmaceutical Research* 10(1): 80-85.
4. Kalita H, Boruah DC, Deori M. 2016. Antidiabetic and antilipidemic effect of *Musa balbisiana* root extract: a potent agent for glucose homeostasis in streptozotocin-induced diabetic rat. *Frontiers in Pharmacology* 7: 102.
5. Singh S, 2017. Banana blossom-an understated food with high functional benefit. *International Journal of Current Research* 9(1): 44516-44519.
6. Timsina B, Nadumane VK. 2014. Anti-cancer potential of banana flower extract: An *in vitro* study. *Bangladesh Jr. Pharmacology* 9(4): 628-635.
7. AOAC. 1990. Official methods of food analysis (15th Edition). Williams S. (Eds). Association of Official Analytical Chemists, Washington D.C. pp 152 164.
8. Al-Fartusie FS, Mohssan SN. 2017. Essential trace elements and their vital roles in human body. *Indian Jr. Adv. Chemr. Sciences* 5(3): 127-136.
9. Daimari M, Swargiary A. 2020. Study of phytochemical content and antioxidant properties of *Musa balbisiana* corm extract. *Indian Journal of Pharmaceutical Sciences* 82(4): 707-712.
10. Singh B, Singh JP, Kaur A, Singh N. 2016. Bioactive compounds in banana and their associated health benefits - A review. *Food Chemistry* 206: 1-11. doi: 10.1016/j.foodchem.2016.03.033.
11. Das P, Devi R, Dutta AS, Boro RC, Sarmah TC. 2016. Studies on nutritional components, antioxidant activities and microbial load in simple processed product developed from banana (cv. Bhimkol). *Asian Journal of Chemistry* 28(1): 47.
12. Anand S, Sharma M. 2019. Product development from banana blossom powder and indian gooseberry powder for anaemic adolescent girls. *International Journal of Health Sciences & Research* 9(5): 273-278.
13. Mishra P, Tewari M, Tiwari DK. 2017. Development and evaluation of cookies prepared by banana flower, lotus stem and finger millet for anaemic adolescent girls. *Annals of Horticulture* 10(2): 235-239.
14. Osredkar J, Sustar N. 2011. Copper and zinc, biological role and significance of copper/zinc imbalance. *Jr. Clinic. Toxicology S* 3(2161): 0495.
15. DiNicolantonio JJ, Liu J, O'Keefe JH. 2018. Magnesium for the prevention and treatment of cardiovascular disease. *Open Heart* 5: e000775. doi:10.1136/openhrt-2018-000775
16. Kisters K, Gröber U. 2013. Magnesium in health and disease. *Plant and Soil* 368(1): 155-165.
17. Begum YA, Deka SC. 2019. Chemical profiling and functional properties of dietary fibre rich inner and outer bracts of culinary banana flower. *Journal of Food Science and Technology* 56(12): 5298-5308.
18. Bazzano LA. 2008. Effects of soluble dietary fiber on low-density lipoprotein cholesterol and coronary heart disease risk. *Current Atherosclerosis Reports* 10(6): 473-477.
19. Gopalan C, Rama Sastri BV, Balasubramanian SC. 2014. *Nutritive Value of Indian Foods*. Published by Indian Council of Medical Research (ICMR), Hyderabad.
20. Parra M, Stahl S, Hellmann H. 2018. Vitamin B_6 and its role in cell metabolism and physiology. *Cells* 7(7): 84.
21. Pehlivan FE. 2018. Vitamin C: An epigenetic regulator. *In*: Vitamin C-an Update on Current Uses and Functions. IntechOpen.
22. Scholl TO, Johnson WG. 2000. Folic acid: influence on the outcome of pregnancy. *The American Journal of Clinical Nutrition* 71(5): 1295S-1303S.