

## PHYSICO-CHEMICAL CHARACTERISTICS AND NUTRIENT COMPOSITION OF BANGLADESHI BANANAS

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Qualitative characteristics, biochemical and mineral status of fruits of four banana varieties were studied. Significant variation in most of the characters was found among the varieties. Minimum moisture content (68.87%) and maximum TSS (28.93%) were found in pulp of Ganasundari while it was reverse in Chinichampa. Ganasundari synthesized maximum total sugar (26.36%) and Japkathali highest vitamin C (9.99 mg/100g). Champa have shown to contain maximum amount of protein (4.9% DW basis), ash (0.87%), K (1153.0 mg), Na (50.13 mg), Ca (51.93 mg), Mg (206.65 mg) and P (109.0 mg) in even dried 100 gm pulp.

**Key words :** Fruit characteristics, Biochemical status, Banana varieties.

### Introduction

Banana is an important crop and constitutes 42% of total fruit production in Bangladesh [1]. The importance of this fruit is due to its high nutritive value (Sugars, K, P, Ca, Fe and vitamins A, B and C) [2,3] and versatile use as chips, banana Fig, flour, jam, confection, dehydrated slices etc. [4]. It has therapeutic value and has been used against stomach complaints [5]. There exists a great diversity in nutritive value among various banana cultivars [6-9]. Data on the nutrient composition of indigenous bananas would be useful both for consumers and planners. Results on physicochemical characteristics and important nutrients of four local banana cultivars grown in Bangladesh are reported in this paper.

### Materials and Methods

The experiment was conducted in the laboratories of the Department of Agriculture, Chemistry, Biochemistry and Horticulture of Bangladesh Agricultural University, Mymensingh during the period March-August 1989. Four varieties of *Musa sapientum* namely, Japkathali, Ganasundari, Champa and Chinichampa, used in this study, were collected from a field experiment under the Banana Research Project of Bangladesh Agricultural University.

Chemical analyses were done with three branches of a variety representing three replications. The working sample

was prepared by mixing the pulp from fingers of upper, mid and lower portion of a bunch and were analysed in quadruplicate to minimize the experimental error. Moisture, dry matter, TSS, TIS, sugars and ash contents were measured following standard methods of analysis [10]. Iron [11], phosphorus and starch [12] were determined colorimetrically, protein was estimated by Kjeldahl method, Na and K by flame photometric method [12]. Vitamin C was estimated by titration [13], Ca and Mg by complexometric titration using the titrant Na<sub>2</sub> EDTA [14] and pH of pulp by digital pH meter.

### Results and Discussion

The estimated results showed that significant variation exist among the varieties in most of the parameters. The results in Table 1 indicated that thickest pericarp was found in Ganasundari (2.44 mm) and the rest were in the order of Japkathali > Champa > Chinichampa but the pulp to peel ratio showed the reverse pattern of the above. Thomas *et al.* [15] obtained slightly higher pulp to peel ratio in Dwarf cavendish cultivar. Moisture content was highest in Chinichampa (75.07%) and maximum dry matter (31.15%) was accumulated in Ganasundari similar to that have been reported earlier [6]. Ganasundari accumulated maximum TSS (28.93%) closely followed by Japkathali, indicating it to be minimum content of TIS.

TABLE 1. PHYSICO-CHEMICAL CONSTITUENTS OF BANANA CULTIVARS.

Parameters varieties	Thickness of pericarp (mm)	pulp peel ratio	Moisture (%)	Dry matter (%)	Total soluble solid (%)	Total insoluble solid (%)	Sugar content (%)			Starch (% DW basis)	Protein (% DW basis)	Vitamin (mg/100g) pulp	pH of pulp
							Total	Reducing	Non-reducing				
Japkathali	2.14	2.84	70.90	29.10	26.80	2.30	24.58	15.36	9.19	4.72	3.18	9.99	4.18
Ganasundari	2.44	2.03	68.87	31.15	28.93	2.20	26.35	18.12	8.23	5.06	3.40	8.61	4.35
Champa	1.93	3.25	73.40	26.63	24.23	2.40	21.92	12.92	9.00	4.81	4.90	7.12	3.97
Chinichampa	1.77	3.26	75.07	24.93	22.58	2.35	23.22	14.65	8.57	4.67	4.81	6.53	4.25
Mean	2.07	2.85	72.06	27.97	25.63	2.31	24.02	15.26	8.75	4.82	4.07	8.06	4.19
LSD(0.01)	0.06	0.64	0.75	0.75	0.85	-	0.17	0.25	0.32	-	0.07	0.42	0.04



TABLE 2. IMPORTANT MINERAL CONTENT OF BANANA CULTIVARS (OVEN DRY BASIS).

Parameters varieties	Potassium	Sodium	Calcium mg/100g	Magnesium	Phosphorus	Iron	Ash %
Japkathali	800.0	42.53	51.16	194.46	80.0	2.01	0.75
Ganasundari	940.0	46.67	51.86	194.56	85.33	2.04	0.79
Champa	1153.0	50.13	51.93	206.65	109.0	2.59	0.87
Chinichampa	1110.0	49.87	50.93	205.7	100.0	2.65	0.84
Mean	100.75	47.30	51.47	200.34	93.58	2.32	0.81
LSD (0.01)	88.67	0.64	—	2.38	8.56	0.20	0.04

Total sugar was found to be maximum in Ganasundari (26.36%) followed by Japkathali and Chinichampa while Champa the least. The similar pattern was found in reducing sugar. Non-reducing sugar was maximum in Japkathali (9.19%) followed by Champa and Chinichampa. The present results fall in the range of total sugar content reported by different workers [17-19]. There was no significant difference of starch content among the varieties. The results were slightly higher than that already reported [18]. The estimated protein showed significant variation among the varieties, Champa (4.9%) being highest significantly followed by Chinichampa, Ganasundari and Japkathali. The results were in agreement with that of Villalonga [3].

Japkathali was found to accumulate maximum ascorbic acid (9.99 mg/100 gm pulp) followed by Ganasundari, Champa and Chinichampa. The results were in partial agreement with that of Senappa *et al.* [20]. The pH of pulp extract were significantly different among the varieties ranging from 3.97 in Champa to 4.35 in Ganasundari.

The minerals and ash content of the banana varieties varied significantly among themselves (Table 2). The variety Champa was found to be richest in K content (1153 mg/100gm) significantly followed by Chinichampa while Japkathali being the poorest. Some workers stated banana as a good source of potassium [3] and found K content similar to that of Japkathali [21]. The maximum amount of Na was found in Champa (50.13 mg/100gm) which was identical with that of Chinichampa and Japkathali was the lowest. Calcium contents among the varieties did not vary significantly. Champa (206.65 mg/100gm) and Chinichampa contained similar amount of Mg and significantly differed from Ganasundari and Japkathali. The results fell in the range previously estimated [3]. Highest content of P was found in Champa (109.0 mg/100gm) and was significantly superior to others, and the lowest was in Japkathali. However, the estimated value of P in Chinichampa was similar to that obtained in edible banana pulp [3]. The richest source of Fe was Chinichampa followed by Champa and the minimum amount in Japkathali which was identical to Ganasundari. Ahmed [16] found lower amount of iron in

banana pulp. The estimated ash content was maximum in Champa (0.87%) and minimum in Japkathali (0.75%). The ash content in Champa was found to be similar to that of Ahmed [16].

The results indicated that thickest pericarp of Ganasundari facilitates transportation of fruit. The pulp is sweet and soft but it contained few seeds. Japkathali was rich in vitamin C but lacked in other quality attributes. The variety Champa contained higher amounts of K, Na, Mg, P and ash. It was also superior in protein content having higher pulp peel ratio. Therefore, keeping in view all the physico chemical attributes, Champa may be considered as one of the superior cultivar of Bangladesh.

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