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## Physico-chemical characterization of different mango cultivars grown in West Bengal, India

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### Abstract

The present investigation was conducted during the year of 2016 and 2017 to determine the Physico-chemical Characterization in mango. Fruits of sixteen mango cultivars were collected from Regional Research Station, Gayeshpur, Nadia, West Bengal, India. Both physico-chemical parameters were assessed at optimum ripening condition of fruits. Among the cultivars, the fruits of Fazli, Sarikhas and Gopi Bhog were superior to others with regard to fruit length, diameter and weight. The pulp content was highest in cv. Banganpalli and was lowest in Madhu Chuski. The maximum percent of total soluble solids was in cv. Ranipasand of 20.87 °Brix and minimum of 14.79 °Brix in cv. Lakhan Bhog. The total sugars, reducing sugar as well as non-reducing sugar content was maximum in cultivars Kanchan Kosa, Khota Lagga and Kancha Mitha respectively. The acidity of fruits varied from 0.06-0.17 %. The highest content of ascorbic acid was recorded in cv. Gopi Bhog (68.36 mg/100g). The highest TSS: Acid ratio was recorded in the mango cv. Himsagar (191.12).

**Keywords:** Physico-chemical, characterization, fruit length, TSS, ascorbic acid

### Introduction

Mango (*Mangifera indica* L.) is one of the choicest and admired fruit crop of the tropical and subtropical areas of the world. Its significance can easily be recognized by the fact that it is known as 'King of Fruits'. Utilization of germplasm with distinctive characteristics in breeding programmes desires precise information to develop new cultivars (Vasugi *et al.*, 2012) [14]. India is the centre of origin for cultivated mango and is distributed in tropical and subtropical regions. Mango has been cultivated in India for more than 4000 years. India has the largest collection of mango accession and has emerged as the largest producer of mango in the world, with area 2262.8 thousand hectares, 19.68 million tons production and productivity 8.7 MT/Ha. In India highest mango producing state is Uttar Pradesh producing 4.54 million tons from 264.93 thousand hectares area, followed by Andhra Pradesh producing 3.16 million tons from 332.97 thousand hectares area (Horticulture Statistics at a Glance, 2017) [7]. Every state has its own varieties. Mango is the most important fruit crops of West Bengal occupying about 97.93 thousand hectares which is more than 60% of total area under fruits. There is a rich collection of varieties grown throughout the different districts of West Bengal and especially in Murshidabad, Malda, Nadia and Hoogly districts. Some of these have already been described by several workers (Gangully *et al.*, 1957) [6]. In spite of its unique position in the horticultural economy of India, mango improvement has not received the importance it deserves. Most of our elite cultivars of mango are biennial in their bearing habit, low in productivity, poor in keeping and processing qualities, which need urgent attention. Each agro-climatic region must find out its own cultivar that is best adapted to the local environment. Besides a number of lesser-known cultivars of mango exist in each states of India but remain confined only to the orchards of a few individuals and, as a result, these lack popularity. Some varieties are having excellent taste and unrivalled flavour with golden yellow colour. These qualities are having appealing attributes to merchants and consumers worldwide. The fruit is popular with masses due to its wide range of adaptability high nutritive value, richness in variety delicious taste and good flavour. Therefore, this work was undertaken to collect information on the physico-chemical characteristics of the mango cultivars which are less known along with popular known cultivars in the West Bengal.

## Materials and Methods

Promising sixteen cultivars such as Chatterjee, Gulab Khas, Ranipasand, Sarikhas, Himsagar, Banganpalli, Langra, Fazli, Gopal Bhog, Lakhan Bhog, Kancha Mitha, Kanchan Kosa, Kamala Bhog, Gopi Bhog, Madhu Chuski and Khota Lagga were selected for the study. The fruits were collected from Regional Research Station, Gayeshpur, Nadia, West Bengal, India. The physico-chemical characterization of fruits was carried out in the laboratory of the Department of Fruits and Orchard Management, Faculty of Horticulture, Bidhan Chandra Krishi Viswavidyalaya. Properly matured mango fruits were taken at random sampling strategy was followed for collection of samples. Layout system was randomized complete block design with three replications. Three plants in each replication were selected from each cultivar. Ten fruits collected from each plant and thirty fruits from one replication. Qualitative and quantitative characters were analyzed as per pooled analysis of variance at 1% level of significant.

Fruits were analysed on attaining optimum ripe stage specific to different cultivar. Physical character of fruits were studied in respect of fruit length, fruit diameter, fruit weight and pulp content. Chemical constituents like total soluble solid (TSS), total sugar (TS), reducing sugar (RS), non-reducing sugar (NRS), titratable acidity, TSS/ acid ratio and ascorbic acid contents were estimated by following the standard procedure. The total soluble solid (TSS) content of mango pulp was estimated by ERMA hand refractometer. Total sugar and reducing sugars were measured by Lane and Eyon method (AOAC, 1965) [2]. Ascorbic acid content and titratable acidity were determined by visual titration method (Ranganna, 1986) [11].

## Results and discussion

The variations in fruit length, fruit diameter, fruit weight and pulp content was recorded in cultivars (Table 1). The mean fruit length recorded was 9.33 cm, while the fruit length was

ranged from 6.30 cm to 12.96 cm. The maximum fruit length was recorded in Fazli (12.96 cm) followed by Sarikhas (10.63 cm) while, minimum fruit length was recorded in Kamala Bhog (6.30 cm) followed by Ranipasand (7.30 cm). Out of 16 cultivars, 8 cultivars recorded relatively higher fruit length compared to overall mean fruit length. Similar results have been reported by Begum *et al.* (2013c) [4], Begum *et al.* (2014) [3], Naz *et al.* (2014) [10] and Galal *et al.* (2017) [5]. The fruit diameter was differed significantly with a mean of 6.05 cm while, the fruit diameter was ranged from 4.03 cm to 7.92 cm among the cultivars studied. Maximum fruit diameter was recorded in Fazli (7.92 cm) followed by Sarikhas (7.51 cm) while, minimum fruit diameter was recorded in Madhu Chuski (4.03 cm) followed by Kancha Mitha (4.13). Out of 16 cultivars, 10 cultivars recorded relatively greater fruit diameter compared to overall mean fruit diameter. Similar results were reported by Begum *et al.* (2013c) [4], Begum *et al.* (2014) [3], Naz *et al.* (2014) [10] and Galal *et al.* (2017) [5]. The fruit weight was ranged from 107.24 g to 395.79 g with a mean fruit weight of 220.12 g. Maximum fruit weight was recorded in Gopi Bhog (395.79 g) followed by Fazli (342.32 g) while, minimum fruit weight was recorded in Kancha Mitha (107.24 g) followed by Ranipasand (117.52 g). Out of 16 cultivars, 8 cultivars recorded relatively greater fruit weight compared to overall mean fruit weight. These results were conformity with that reports given by Begum *et al.* (2013c) [4], Begum *et al.* (2014) [3], Naz *et al.* (2014) [10], Vieccelli *et al.* (2016) [15], Kheshin *et al.* (2016) [8] and Galal *et al.* (2017) [5]. Pulp content recorded a mean value of 1.82 ranging from 1.16 to 3.17. Minimum pulp content was recorded in Madhu Chuski (1.16) followed by Kamala Bhog (1.31) while, maximum pulp content was recorded in Banganpalli (3.17) followed by Langra (2.40). Out of sixteen cultivars, eight cultivars recorded relatively pulp content compared to overall mean pulp content. These results were conformity with that reports given by Kheshin *et al.* (2016) [8].

**Table 1:** Physical characteristic of fruits of different mango cultivars

S. No	Cultivars	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)	Pulp content
1	Chatterjee	10.55	6.83	291.08	1.84
2	Gulab Khas	7.89	6.07	146.04	1.89
3	Ranipasand	7.30	5.68	117.52	1.94
4	Sarikhas	10.63	7.51	218.60	1.36
5	Himsagar	8.70	6.41	223.46	1.81
6	Banganpalli	10.34	6.34	292.03	3.17
7	Langra	8.26	6.42	290.42	2.40
8	Fazli	12.96	7.92	342.32	2.37
9	Gopal Bhog	8.69	6.81	198.84	1.55
10	Lakhan Bhog	7.41	5.11	136.10	2.18
11	Kancha Mitha	10.53	4.13	107.24	1.33
12	Kanchan Kosa	10.61	7.30	252.58	1.35
13	Kamala Bhog	6.30	4.49	130.51	1.31
14	Gopi Bhog	10.41	6.57	395.79	2.16
15	Madhu Chuski	8.15	4.03	141.76	1.16
16	Khota Lagga	10.46	5.17	237.63	1.37
	Mean	9.33	6.05	220.12	1.82
	S.E.	0.32	0.12	10.50	0.02
	C.D. (5%)	0.91	0.33	29.57	0.06

Table No 2 revealed that highest TSS was observed in cultivar Ranipasand (20.87 °Brix) followed by Gulab Khas (20.04 °Brix) and Kancha Mitha (20.04 °Brix). Lowest TSS was observed in cultivar Lakhan Bhog (14.79 °Brix) followed by Fazli (15.68 °Brix). Similar trend in TSS content of mango cultivars was earlier reported by Begum *et al.* (2013c) [4]

similar values of TSS in Banganpalli which ranged from 15 to 22 °Brix. Out of 16 cultivars, 8 cultivars recorded relatively greater TSS compared to overall mean TSS. Similar results was reported by Begum *et al.* (2014) [3] and Galal *et al.* (2017) [5]. Highest per cent of total sugars were recorded in the cultivars, Kanchan Kosa (14.57 %) followed by Kancha

Mitha (14.41 %). Lowest per cent of total sugars were recorded in the cultivars, Lakhan Bhog (8.58 %) followed by Gopal Bhog (10.01 %). The highest reducing sugar content was found in the cultivar Khota Lagga (5.74 %) followed by Chatterjee (5.18 %). The lowest reducing sugar content was found in Gopal Bhog (2.48 %) followed by Kancha Mitha (2.88 %). Out of 16 cultivars, 7 cultivars recorded relatively

maximum reducing sugars compared to overall mean reducing sugars. Similar observations were reported by Simi (2006) in mango. Maximum non-reducing sugar content was found in Kancha Mitha (11.54 %) followed by Kanchan Kosa (10.89 %). Minimum non-reducing sugar content was found in Banganpalli (5.41 %) followed by Gopal Bhog (7.53 %).

**Table 2:** Bio-chemical characteristics of fruits of different mango cultivars

Cultivars	TSS	Total sugars (%)	Reducing sugars (%)	Non-reducing sugars (%)	Titratable acidity (%)	TSS: acid ratio	Ascorbic acid (mg/100g)
Chatterjee	18.75	11.67	5.18	6.49	0.16	119.81	42.67
Gulab Khas	20.04	12.66	4.40	8.26	0.16	131.41	24.96
Ranipasand	20.87	13.85	3.63	10.22	0.16	128.84	26.19
Sarikhas	17.02	13.25	3.59	9.67	0.13	137.14	38.10
Himsagar	18.54	12.47	3.05	9.42	0.07	191.12	41.56
Banganpalli	15.69	10.14	4.73	5.41	0.15	90.31	28.09
Langra	17.53	12.06	4.13	7.93	0.13	97.87	32.88
Fazli	15.68	12.10	3.61	8.49	0.26	55.03	29.69
Gopal Bhog	18.17	10.01	2.48	7.53	0.92	15.64	23.86
Lakhan Bhog	14.79	8.58	3.07	5.45	0.74	19.64	27.59
Kancha Mitha	20.04	14.41	2.88	11.54	0.59	43.34	26.70
Kanchan Kosa	16.88	14.57	3.68	10.89	0.40	51.48	33.92
Kamala Bhog	17.64	11.89	4.80	7.09	0.44	42.21	23.85
Gopi Bhog	18.96	12.84	3.87	8.98	0.24	86.82	68.36
Madhu Chuski	18.17	12.10	4.80	7.30	0.56	37.36	25.71
Khota Lagga	16.90	11.95	5.74	6.21	0.29	87.59	30.63
Mean	17.85	12.16	3.98	8.18	0.34	83.47	32.80
S.E.	0.26	0.37	0.10	0.37	0.06	11.46	1.06
C.D. (5%)	0.77	1.03	0.27	1.05	0.17	32.28	2.98

The cultivar Gopal Bhog recorded the highest titratable acidity (0.92 %) followed by Lakhan Bhog (0.74%) while, the cultivar Himsagar (0.07 %) recorded the lowest titratable acidity, followed by Langra (0.13 %). Six cultivars recorded relatively greater titratable acidity compared to overall mean titratable acidity among the sixteen cultivars. Similar results were reported by Mitra *et al.* (2000) [9], Rathor (2005) [12] and Galal *et al.* (2017) [5]. Maximum TSS: acid ratio was noticed in Himsagar (191.12) followed by Sarikhas (137.14) while, minimum TSS: acid ratio was noticed in Gopal Bhog (15.64) followed by Madhu Chuski (37.36). Similar result was earlier reported by Rathor (2005) [12] and Naz *et al.* (2014) [10]. The highest ascorbic acid content was found in Gopi Bhog (68.36 mg/100g) followed by Chatterjee (42.67 mg/100g) while, the lowest ascorbic acid content was found in Kamala Bhog (23.85 mg/100g) followed by Gopal Bhog (23.86 mg/100g). Out of sixteen cultivars, six cultivars recorded relatively highest ascorbic acid content compared to overall ascorbic acid content. The results were in agreement with Rathor (2005) [12] and Afifa *et al.* (2014) [1].

### Conclusion

Characterization of available mango genetic resources is helpful for identification of suitable and promising cultivars for fresh consumption and/or storage. Wide variation in almost all the physico-chemical parameters was observed in eighteen cultivars of mango. Conclusively, it could be suggested that in addition to some popular cultivars, some other lesser known cultivars have great potential for commercial exploitation.

### References

1. Afifa K, Kamruzzaman M, Mahfuza I, Afzal H, Arzina H, Roksana H. A comparison with antioxidant and functional properties among five mango (*Mangifera*

*indica* L.) varieties in Bangladesh. International Food Research Journal. 2014; 21(4):1501-1506.

2. AOAC. Association of Official Analytical Chemists. Official methods of analysis, AOAC, Washington DC, 1965.
3. Begum H, Reddy MT, Malathi S, Reddy BP, Arcahk S, Nagaraju J, *et al.* Morphological and microsatellite analysis of intravarietal variability in 'Cherukuram' cultivar of mango (*Mangifera indica* L.). Jordan Journal of Agricultural Sciences. 2014; 10(3):452-472.
4. Begum H, Reddy MT, Malathi S, Reddy BP, Arcahk S, Nagaraju J, *et al.* Morphological and microsatellite analysis of intravarietal heterogeneity in 'Beneshan' mango (*Mangifera indica*). International Journal of Biotechnology Research and Practice. 2013c; 1(1):1-18.
5. Galal OA, Galal HA, Aboulila AA. Genetic variability and molecular characterization of some local and imported mango cultivars In Egypt. Egypt Journal of Genetics and Cytology. 2017; 46:121-138.
6. Gangolly SR, Singh R, Katyal SL, Singh D. The Mango. Published by ICAR, New Delhi, 1957, 210.
7. Horticulture Statistics at a Glance. Department of Agriculture, Co-operation and Farmers Welfare, 2017.
8. Khesin MAE, Sayed HA, Allatif MAA. Morphological and molecular analysis of genetic diversity among. Journal of Horticultural Science and Ornamental Plants. 2016; 8(1):01-10.
9. Mitra S, Kundu S, Mitra SK. Studies on physical characteristics and chemical composition of some mango varieties grown in West Bengal. Journal of Inter Academicians. 2000; 4(4):498-501.
10. Naz S, Anjum MA, Chohan S, Akhtar S, Siddique B. Physico-chemical and sensory profiling of promising mango Cultivars grown in peri-urban areas of Multan,

- Pakistan. Pakistan Journal of Botany. 2014; 46(1):191-198.
11. Ranganna S. Handbook of analysis and quality control for fruits and vegetable products. Tata Mc Graw Hill Publishing Company Limited, New Delhi, 1986.
  12. Rathor CS. Genetic characterization of mango (*Mangifera indica* L.) germplasm under North Indian conditions. Part of M.Sc. thesis submitted to the Indian Agricultural Research Institute, 2005.
  13. Simi S. Characterization of traditional mango (*Mangifera indica* L.) varieties of southern Kerala Part of Ph. D Thesis submitted to the Kerala Agricultural University, 2006.
  14. Vasugi C, Dinesh MR, Sekhar K, Shivashankara KS, Padmakar B, Ravishankar KV. Genetic diversity in unique indigenous mango accessions (Appemidi) of the Western Ghats for certain fruit characteristics. Current Science. 2012; 103(2):199-207.
  15. Viçcelli JC, De Siqueira DL, Da Silva Bispo WM, Lemos LMC. Characterization of leaves and Fruits of mango (*Mangifera indica* L.) Cv. Imbu. Revista Brasileira de Fruticultura. 2016; 38(3):193.