

Studies on some physical characteristics of BAU-GPC released mango germplasms under Mymensingh condition

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Abstract: The present study was conducted at the Germplasm Centre (GPC), Department of Horticulture, Bangladesh Agricultural University to study on some physiological characters of BAU-GPC released mango germplasm. Several mango germplasm of BAU-GPC released viz. BAU Aam-3, BAU Aam-5, BAU Aam-6, BAU Aam-8, BAU Aam-9, BAU Aam-11 and BAU Aam-12 were selected for this study. From the observation of mango characteristics after harvest, the maximum fruit showed ellipsoid shape and good external appearance where peeling quality was easy and skin was thin. From the study, the highest weight of fruit (309.3 g) and peel (51.18 g) were taken from BAU Aam-5 where the same germplasm also produced the highest on thickness of fruit (6.617 cm), breadth of stone (4.623 cm) and thickness of stone (2.437 cm). The highest weight of pulp (216.2 g), peel to pulp ratio (8.033) and edible portion (71.94%) were found from BAU Aam-3. BAU Aam-6 showed the highest on pulp to stone (5.047) and peel to stone (1.60) ratio whereas the highest breadth of fruit (6.650 cm) was found in BAU Aam-8. Non edible portion of peel (20.20%) and total (39.51%) were observed from BAU Aam-9. On the other hand BAU Aam-11 created the highest on length of fruit (12.44 cm), length of stone (10.17 cm) and non edible portion of stone (21.91%). The highest weight of stone (52.04 g) was also found from BAU Aam-12.

Key words: BAU-GPC germplasm, fruit characteristics, physiological characters

Introduction

Mango (*Mangifera indica* L.) is a tropical and sub-tropical fruit belonging to the faBAU Aamly Anacardiaceae, originated in the southeast Asia, especially in India and begun to cultivation at least 4000 years ago (Litz, 1998). Bangladesh ranks top in area and third in production among the fruits grown in the country (BBS, 2010). Bangladesh produces 1047000 tons of mangoes every year in 79000 acres area under garden, which gives an average yield of 81 kg acres⁻¹ (BBS, 2010). The yield is very low compared to that in other countries, such as 8.95 tha⁻¹ India (Ghosh, 1998) and 9.41 tha⁻¹ in the Philippines (Espino and Javier, 1989). Haque *et al.* (1993) studied the varietal characteristics of 20 varieties of mango at Jessore. Among others, Islam *et al.* (1990 and 1992) at Nawabganj and Sardar *et al.* (1991) at Rajshahi recorded physical characteristics of some mango varieties. But the varieties of which qualities has not yet been explored need immediate study. Therefore, this study was undertaken to assess detail information on the qualitative, fruits and stone characteristics of some mango germplasms grown at Mymensingh, which were not earlier evaluated. Mango is recognized as one of the choicest and is well accepted fruit all over the world and also acknowledged as the king of fruit (Shahjahan *et al.*, 1994). Mango cultivars also differ in flavour (Berardini *et al.* 2005) and nutritional characteristics (Ahmad *et al.*, 2007). In Bangladesh mango is considered to be the best of all indigenous fruits because of its excellent flavour, attractive fragrance, beautiful shades of colour, delicious taste and nutritional value. Like many other fruits, mango is highly perishable in nature. The fruits undergo many physiological and biochemical changes that lead to ripening and senescence. In the circumstances, the present study has been designed to obtain information on some physiological characteristics of mango germplasm.

Materials and Methods

An experiment was conducted at the laboratory of BAU Germplasm Centre (GPC), Department of Horticulture, Bangladesh Agricultural University, Mymensingh during May to August 2011. Seven mango germplasm were selected for the study namely BAU Aam-3, BAU Aam-5, BAU Aam-6, BAU Aam-8, BAU Aam-9, BAU Aam-11 and BAU Aam-12 were used as in this study. These seven

mango germplasms were considered as the experimental treatments and the total number of plants was 21. The experiment was laid out in MSTATC program under ANOVA-4 function with 3 replications. Single plants of each germplasm about four years old were considered as a replication. Ten well-matured fruits from each germplasm were collected randomly, brought to the laboratory in a polyethylene bag and were analyzed for various physical characteristics such as shape of fruit, external appearance, skin color, peeling quality, flesh color, weight of fruit (g), weight of pulp (g), weight of peel (g), weight of stone (g), length of fruit (cm), breadth of fruit (cm) thickness of fruit (cm), length of stone (cm), breadth of stone (cm) thickness of stone (cm), peel to pulp ratio, pulp to stone ratio, peel to stone ratio, edible portion (%) and non edible portion (%). The measurement in respect of fruit weight, fruit size and fruit shape were recorded with the help of Laboratory balance, slide calipers and by using a Catalogue of Mango Germplasms, IIHR (2002), respectively. Data were analyzed and the means were separated by LSD test.

Results and Discussion

The fruit of selected BAU-GPC mango germplasm were collected after harvest and observed the fruit characteristics of those fruit which results was present in Table 1 where the maximum germplasm showed ellipsoid shape and good external appearance. Among the seven germplasm, two were poor appearance and one are medium (Table 1). The results are in conformity with the findings of Ghose and Hossain (1988). Skin colour were the maximum yellowish green, where BAU Aam-3 and 5 was yellow and BAU Aam-11 and 12 showed green colour. The variability was found in the present study confirms the findings of Mukherjee (1977) who reported that fruit colour at maturity is dependent on genotype. Different mango germplasm showed different flesh colour whereas BAU Aam-5, 8 and 12 was yellow, BAU Aam-3 and 6 showed orange and BAU Aam-9 and 11 was light yellow to look their flesh colour. Peeling quality was also easy to whole selected germplasm except BAU Aam-6 and it was difficult to identify the peeling quality. Skin thickness was also thin excluding BAU Aam-6 which was thick (Table 1).

Weight of fruit showed significant variation due to the examination of different BAU Aam germplasm whereas another weight of pulp, peel and stone were also produced significant variation (Table 2). The highest weight of fruit (309.30 g) and peel (51.18 g) were recorded from BAU Aam-5 whereas the highest weight of pulp (216.2 g) and stone (52.04 g) were found from the germplasm BAU Aam-3 and 12, respectively (Table 2). From the Table 2, it was also observed that the lowest weight of fruit, pulp, peel and stone (112.1, 79.88, 23.41 and 23.41 g, respectively) were

recorded from BAU Aam-9. From the above observation, it was found that the variation in fruit, pulp, peel or stone weight may be due to genetic or physiological factors. Similar study were also observed by Haque *et al.* (1993) and Iqbal *et al.* (1995) where they reported that the variation in fruit weight among the different mango varieties. The results of the present study are in partial agreement with the research findings of Haque *et al.* (1993) who recorded 14.00 to 70.00g stone weight.

Table 1. Fruit characteristics of BAU-GPC released some mango germplasm

Germplasm	Shape of fruit	External appearance	Skin colour at ripe stage	Flesh colour	Peeling quality	Skin thickness
BAU Aam-3	Oblong	Good	Yellow	Orange	Easy	Thin
BAU Aam-5	Oblong oval	Good	Yellow	Yellow	Easy	Thin
BAU Aam-6	Ellipsoid	Good	Yellowish green	Orange	Difficult	Thick
BAU Aam-8	Ellipsoid	Medium	Yellowish green	Yellow	Easy	Thin
BAU Aam-9	Oblong	Good	Yellowish green	Light yellow	Easy	Thin
BAU Aam-11	Ellipsoid	Poor	Green	Light yellow	Easy	Thin
BAU Aam-12	Ellipsoid	Poor	Green	Yellow	Easy	Thin

Table 2. Qualitative characteristics viz. weight, fruit and stone sizes of mango germplasm

Germplasm	Weight (g)				Fruit size (cm)			Stone size (cm)		
	Fruit	Pulp	Peel	Stone	Length	Breadth	Thickness	Length	Breadth	Thickness
MI-1	291.60 c	216.20 a	26.24 f	48.79 c	11.23 d	7.33 a	6.45 b	8.34 e	4.59 a	2.02 b
MI-2	309.30 a	207.20 b	51.18 a	50.20 b	9.903 f	7.53 a	6.62 a	8.12 f	4.62 a	2.44 a
MI-3	267.70 d	185.10 d	44.79 b	38.26 e	11.71 c	6.45 a	5.98 c	9.92 b	3.77 c	1.54 d
MI-4	236.40 f	163.90 f	39.27 c	35.37 f	10.95 e	6.65 a	6.04 c	9.86 c	4.29 b	1.72 cd
MI-5	112.10 g	79.88 g	23.41 g	20.86 g	9.867 f	4.94 b	4.33 e	8.06 f	3.17 d	1.91 bc
MI-6	238.60 e	166.90 e	27.87 e	48.36 d	12.44 a	7.02 a	5.37 d	10.17 a	4.36 b	1.95 bc
MI-7	292.90 b	201.40 c	36.66 d	52.04 a	11.85 b	6.64 a	6.37 b	8.98 d	3.69 c	2.35 a
Sig. level	**	**	**	**	**	**	**	**	**	**
CV (%)	3.17	3.0	3.27	3.02	3.15	9.86	3.08	3.21	3.44	3.27

** = Significant at 1% level of probability

A highly significant variation was found on length of fruit where the longest fruit (12.44 cm) was found from BAU Aam-11. The maximum breadth (6.65 cm) was significantly taken from BAU Aam-8 where BAU Aam-5 produced the maximum thickness (6.62 cm). The minimum results were also observed on different fruit size viz. length, breadth and thickness (9.87, 4.94 and 4.33 cm, respectively) were observed from the mango germplasm of BAU Aam-9 (Table 2). Bhuyan and Kobra (2007) reported that the length, breadth, and thickness of fruits varied from 6.00 to 12.50, 4.59 to 7.90 and 4.20 to 7.12 cm, respectively which results were similar with my study. From an experiment, Sardar *et al.* (1995) reported that length, breadth and thickness of mango fruits varied from 7.6 to 15.5, 5.5 to 8.9 and 5.0 to 8.2 cm, respectively. Mollah and Siddique (1973) also found different fruit size in different mango varieties.

Different BAU-GPC mango germplasm also showed significant different on different stone size viz. length, breadth and thickness (Table 2). Among the BAU-GPC

mango germplasm, BAU Aam-5 produced the maximum breadth (4.62 cm) and thickness (2.44 cm) whereas the longest length of stone (10.17 cm) was observed from the mango germplasm BAU Aam-11. On the other hand, the lowest length of stone (8.06 cm) and breadth (3.17 cm) were recorded from BAU Aam-9 whereas the lowest thickness (1.54 cm) was observed from the germplasm of BAU Aam-6 (Table 2).

A significant variation on different stone size viz. length, breadth and thickness found to be the effect of different BAU-GPC mango germplasm (Table 3). Among the seven BAU-GPC mango germplasm, peel to pulp ration range was 3.61 to 8.03, where the highest ratio was found from BAU Aam-3 and lowest was observed from BAU Aam-9. Similarly, the highest pulp to stone ratio (5.05) and peel to stone ratio (1.60) were recorded from BAU Aam-6. On the other hand, the lowest pulp to stone (3.14) and peel to stone (0.81) ratio were taken from BAU Aam-11 and 12, respectively (Table 3). This finding differs with that of Hossain and Talukdar (1974) who recorded ratio 0.05 to 0.44.

This might have been occurring due to the varietal differences and/or the variation of environmental factors. BAU-GPC Aam germplasm was significantly influenced on percent edible portion which was important character for the identifying a better quality fruits (Table 3). The BAU-GPC

mango germplasm on edible percentage range was 63.41 to 71.94%. Edible portion was significantly the highest (71.94%) and the lowest (63.41%) were taken from the germplasm BAU Aam-3 and 9, respectively (Table 3).

Table 3. Qualitative characteristics viz. ratio, edible and non edible portion of mango germplasm

Germplasm	Peel to pulp ratio	Pulp to stone ratio	Peel to stone ratio	Edible portion (%)	Non edible portion (%)		
					Peel	Stone	Total
MI-1	8.03 a	4.42 c	0.85 e	71.94 a	11.15 g	17.77 d	28.92 g
MI-2	3.98 f	4.23 d	0.97 d	65.87 f	19.04 b	17.41 e	36.44 b
MI-3	4.94 d	5.05 a	1.60 a	71.18 b	17.23 d	15.10 g	32.33 f
MI-4	4.22 e	4.91 b	1.03 c	68.03 c	18.03 c	15.65 f	33.67 e
MI-5	3.61 g	3.64 f	1.15 b	63.41 g	20.20 a	19.31 c	39.51 a
MI-6	5.90 b	3.14 g	0.92 d	66.17 e	13.19 f	21.91 a	35.10 c
MI-7	5.64 c	3.82 e	0.81 e	66.98 d	14.13 e	19.93 b	34.07 d
Sig. level	**	**	**	**	**	**	**
CV (%)	3.08	3.16	3.52	3.02	3.04	3.03	3.02

** = Significant at 1% level of probability

Similar studies were also observed by Uddin *et al.*, 2006. They reported that the percent edible portion of the different germplasms ranged from 54.16 to 81.62. This result also agreed with the findings obtained by Sardar *et al.* (1995). Percent non edible portion varied significantly among the germplasm, where the total non edible portion was the highest (39.51%) and the lowest (28.92%) which were taken from the BAU-GPC mango germplasm BAU Aam-9 and 3, respectively (Table 3). The present result is in partial agreement with the research findings of Bhuyan and Islam (1986) who recorded 18.51 to 30.06% non-edible portion. Among the seven BAU Aam germplasm, BAU Aam-11 produced the maximum percentage of stone (21.91%) and lowest percentage of peel (13.19%) where BAU Aam-9 formed the highest percentage of peel (20.20%) and BAU Aam-6 was the lowest (15.10%) on stone percentage (Table 3). Similar study were also reported by Uddin *et al.*, 2006 who reported that the percent peel of different germplasms ranged from 9.28 to 27.59. Bhuyan and Islam (1986) also observed 8.07% to 19.25% stone portion in 13 mango varieties. The result has also some similarities with the findings of Ahmad *et al.* (1989) where they observed 11.70 to 20.50% peels in 10 mango germplasms.

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