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Assessment of potentiality of mango genotypes for physico-chemical parameters of fruits under the red and lateritic zone of West Bengal

Anita Rasaily, Prerna Baraily and Goutam Mandal

Abstract
The present investigation was carried out to find out the physico-chemical parameters of different mango genotypes at mango orchard of Rathindra Krishi Vigyan Kendra, near Palli-Siksha Bhavana (Institute of Agriculture), Sriniketan, Visva-Bharati, West Bengal, during period of 2014-2015. Total nine mango cultivars namely, Amrapali, Mallika, Kohitur, Ranipasand, Golabkhas, Bombai, Kohinoor, Enayat pasand and Safdar pasand were selected. Each treatment was replicated three times and each three represents a single replication. The observations were recorded as fruit weight (gm), fruit size (cm), volume of fruit (ml), pulp: stone ratio, TSS, acidity, TSS: acidity raito, reducing and total sugar. The evaluated varieties Mallika, Kohinoor and Enayat Pasand were found to be best with respect to physico-chemical parameters of fruits. These identified varieties can be good donor in hybridization programme to evolve the superior varieties under Rathindra Krishi Vigyan Kendra, near Palli-Siksha Bhavana (Institute of Agriculture), Sriniketan, Visva-Bharati, West Bengal.

Keywords: Mango, yield, variety, mallika and lateritic

Introduction
Mango (*Mangifera indica* L.) is the most important fruit of India. Due to its high palatability, excellent taste and flavour and exemplary medicinal and nutritive value it is said to be the king of fruits. Mango being one of the ancient fruits in India, it has been associated with the heritage and culture of the nation. Due to its importance, mango has been included in art, music, sculpture and literature from the ancient time. Mango is also rich in bioactive compounds such as vitamin C, carotenoids and polyphenols, contributing to antioxidant activity (Sivakumar *et al*., 2011; Liu *et al*., 2013) [22, 13]. India is leading mango growing country which shares more than 54.2% of the global production. There are more than thousand mango varieties in India. However, only about 30 varieties, are grown on commercial scale in different states. India has the richest germplasm collection and centre for cultivating mangoes. It occupies an area of 2.263 million hectares with an annual production of 19.68 million tonnes and the productivity is 8.71 MT/hac. The export potential of India is 52761 MT of fresh and dried products of mango with the benefit cost of Rs. 44,366 Lacs. (APEDA, 2016-17). West Bengal occupying about 97.93 thousand hectares which is more than 60% of total area under fruits cultivated. The predominant mango growing districts in West Bengal are Malda, Murshidabad, Nadia and North 24-Parganas. Among them Murshidabad alone is known to have about 125 cultivars, but unfortunately very few of them viz. Himsagar, Langra, Fazli, Gopalbhog, Lakhambhog, Ranipasand, Amrapali etc are commercially exploited. The genetic diversity within mango offers various opportunities to utilize these genomic resources and technologies to manipulate desirable traits. Assessment of genetic variation within natural populations and among breeding lines is crucial for effective conservation and exploitation of genetic resources for crop improvement programs.
Fruit development is a series of complex of physiological and biochemical process. Physical parameters of fruits had significantly high correlation with biochemical parameters like fruit acidity but negative correlation with non-reducing sugar. Total and non-reducing sugar was highly and positively correlated with carotene content. Sarangi *et al*. (1999) [19] viewed that the fruit weight could be improved through increasing pulp weight and fruit volume due to their highest degree of correlation. Physical characteristics of mangoes may be described by the differences between varieties and methodologies of analysis, the ripeness of the fruit when harvested and climatic differences between the regions they were produced.

The proportion between pulp, skin and endocarp is strongly influenced by the variety. There are many discrepancies concerning the physical and chemical characteristics of mangoes. The proportion between pulp, skin and endocarp is strongly influenced by the variety and the soluble solids and titratable acidity ratio in mangoes. Study of physic-chemical characteristics of mango trees can help to identify the best varieties for consumption, industrialization and hybridization programme. In general, the mango with a higher yield of pulp, high soluble solid content and lack of fiber are required for hybridization programme.

A large number of mango varieties are being grown in India, most of them do not satisfy the requirements of an ideal commercial variety and fail in competition with other countries. The knowledge on physico-chemical parameters of different cultivars of mango fruit is prerequisites for the selection of desirable cultivar which may be acceptable for further utilization in respect of table, processing and commercial importance and breeding and adoption purpose. A huge number of traditional superior cultivars still remain confined to the orchards of few individuals only. As a result, these cultivars are not gaining popularity. No systematic works has so far been conducted in this area on the performance of different mango cultivars. It therefore, seems necessary to identify the suitable cultivars for particular agro-ecological condition. Through systematic evaluation of cultivars, which in turn may boost up production with scientific management practices and also may be incorporated in future improvement programme.

Material and Method

The present investigation was carried out at mango orchard in Rathindra Krishi Vigyan Kendra, near Palli-Siksha Bhavana (Institute of Agriculture), Sriniketan, Visva-Bharati, West Bengal, during period of 2014-2015. The experimental field is situated at 23^0 42' N latitude and 87^0 47'30" E longitudes with an average altitude of 40 meters above the mean sea level. The experiment site is semi-arid subtropical, lateritic belt in west Bengal. The average maximum and minimum mean temperature during the period of the study was 34.59 ºC to 15.17 ºC. The soil of the experiment field was sandy loam in texture, well-drained with a Ph of 6.4. Vigorously growing, healthy, disease free, grafted trees (7-years-old) of 9 mango cultivars namely, Amrapali, Mallika, Kohitur, Rani Pasand, Golabkhas, Bombai, Kohinoor, Enayat Pasand and Safdar Pasand were selected. Trees were planted at a distance of 5×5 m in square system. Design of experiment was randomized block design with three replications and each individual cultivar was considered as the treatments. The observations were recorded as fruit weight (g), fruit size (cm), volume of fruit (ml), pulp: seed ratio, TSS (ºB), acidity, (TSS: acidity ratio, reducing and total sugar.

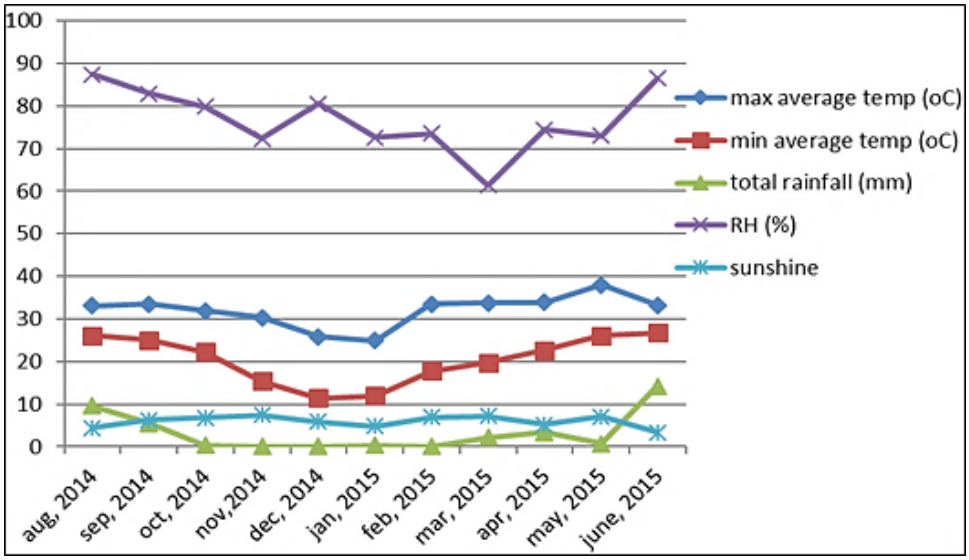

Fig 1: Graphical representation of temperature, RH, rainfall and sunshine

Result and Discussion

As depicted in the Table 1, Fruit weight was found significantly higher in Mallika (683.33) which was followed by Kohinoor (253.33), Enayat Pasand (253.33) and Kohitur (251.27). The similar trend in the variation of fruit weight from 365.33- 219.00 has been observed by Majumder *et al.* (2011) [15], while evaluating different mango cultivars. Begum *et al*. (2013) [3], Begum *et al*. (2014) [2], Naz *et al*. (2014) [17], Vieccelli *et al*. (2016), Kheshin *et al*. (2016) [11] and Galal *et al*. (2017) [6] also supported the result. Kumar (2004) [13], Shafqat *et al.* (1992), Jilani *et al.*, (2010) [9] who also found maximum fruit weight in Fajri. The higher or lower fruit weight might be due to the. The variability in fruit weight among different cultivars might be due to varietal or genetic characters or genotypic an environmental influences and managemnt practices (Mannam *et al.*, 2003). The maximum fruit size was recorded in Mallika (103.73x89.88) followed by Enayat Pasand and minimum fruit size was noted in Golabkhas (75.29x59.74). With comparison to other culttivar Mallika produced highest fruit volume (268.33) and proved its superiority over rest of the cultivars, however, it is followed by Kohinoor (176.67) and Kohitur (165.33). Similar results have been documented by Shafqat *et al.* (1997) that Alphonso and Fajri had the largest fruit. Jadhav *et al*. (2021) [8] also noted that the fruit diameter was progressively increased with advancement of time up to mature stage and slightly decreased at ripen stage. In addition to that Chatterjee (2005) [4] and Aktar (2013) reported that the diameter of mango fruit varied according to varieties at different stage of growth and development. Moreover, this result was also confirmed by the supporting report of Begum *et al*. (2013) [3], Begum *et al*. (2014) [2], Naz *et al*. (2014) [17] and Galal *et al*. (2017) [6]. The cultivars, Mallika (9.49) showed highest pulp: stone ratio than other varieties. This result is in conformity

with the finding of Gunjate *et al*. (2003) [7] and Nath *et al*. (2007) [16]. This variation in stone characteristics might be due to different in environmental interaction and genetic composition. This might be due to genetic makeup of individual genotypes. The possible cause of variation might be due to the facts that mango is the most heterozygous crop or trait controlled by polygene, its variable nature is found from place to place.

Table 1: Physical fruit parameters of different varieties of mango

Cultivars	Fruit weight(g)	Fruit size		Volume of fruit (ml)	Pulp/stone ratio
		Length (mm)	Diameter (mm)		
Amrapalli	205.70	83.23	63.53	11.33	1.16
Mallika	683.33	103.73	89.88	268.33	9.49
Kohitur	251.27	84.54	63.00	165.33	4.00
Rani Pasand	162.00	76.69	62.47	132.67	5.00
Golabkhas	145.28	75.29	59.74	123.33	2.72
Bombai	196.00	77.62	62.67	156.67	7.14
Kohinoor	253.33	96.67	69.22	176. 67	4.06
Enayat Pasand	253.33	94.18	67.83	120.00	4.00
Safdar Pasand	181.83	78.48	64.84	131.33	5.00
GM	259.12	85.60	67.01	154.19	4.73
SE(m)	24.44	14.67	3.19	8.46	0.31
CD	71.05	42.66	4.51	24.58	0.90
CV	16.3	NS	8.25	9.50	11.28

A careful scrutiny of the data in Table 2 evidently indicates that the maximum TSS content was recorded in Kohitur (20.07°B) followed by Enayat Pasand (19.28°B) and Rani Pasand (18.54°B) and Bombai (18.41°B). Range for variability is in agreement with earlier reports of Teaotia *et al* (1963) who reported varition in TSS from 13.8 to 22.0% in some importance sucking mangoes of Uttar Pradesh. Comparable result was found by Kumar (2004) [13] and Yadav *et al.* (1982) [24] in different states, who referred to the genotype variation in the same variety, may be the prevailing climatic condition. Moreover, Gurmani (1989) also observed total soluble solid range from 16.25 to 18.75% in different mango genotypes. Mallika and Kohitur observed the maximum acidity with 0.28% which was found at par with Kohinoor (0.27%). The lowest acidity was obtained in Amrapalli (0.13%). The variation in fruit acidity was found in different varieties (Kumar, 2004; Singh, 1998; Singh an Maurya, 1986; Chaudhari *et al.*,1997) [13, 21, 5] which can be owned to the genetic. This result is in conformity with the finding of Karla *et al*. (1994) [10], which exhibits variation in acidity among various mango varieties with the lowest acidity in fruits of Gulab Khas in Lucknow conditions.

The highest and lowest reducing sugar was recorded in Kohinoor (3.23%) and Bombai (1.34%) respectively. Furthermore, utmost non-reducing sugar and total sugar was obtained in Enayat Pasand (12.30%) and Kohitur (20.07%) respectively. This result was found similar with the findings of Rathore *et al.* (2009), Uddini *et al.* (2007), Singh (1968). Chaudhari *et al.* (1997) [5] also reported 2.6 to 7.1% reducing sugar in 19 south Indian mango genotypes. This variation in results is might be due to genetic difference as well as agro climate condition. The increase in total sugars might be the conversion of starch and polysaccharides into soluble sugars. The differences in the biochemical characteristics in different varieties of fruits are probably due to their genetic makeup as well as due to the influence of climatic factors (Khurshid *et al*., 2004) [12].

Table 2: Variation in fruit quality in different mango cultivars

Cultivars	T.S.S. (°Brix)	Acidity (%)	Reducing sugar (%)	Non-reducing sugar (%)	Total sugar (%)
Amrapalli	17.86	0.13	2.38	6.54	9.90
Mallika	17.05	0.28	1.45	8.47	12.90
Kohitur	20.07	0.28	2.32	4.29	4.44
Rani Pasand	18.54	0.15	1.12	9.22	12.55
Golabkhas	16.70	0.16	2.45	7.67	10.25
Bombai	18.41	0.16	1.34	5.57	2.99
Kohinoor	17.83	0.27	3.23	7.13	11.50
Enayat Pasand	19.28	0.14	1.70	12.30	13.15
Safdar Pasand	16.90	0.14	2.53	8.20	9.36
GM	17.56	0.19	2.06	7.71	9.67
SE(m)	0.07	0.01	0.17	0.65	0.69
CD	0.19	0.04	0.50	1.90	1.99
CV	0.66	11.93	14.58	14.70	12.28

Conclusion

Based on the findings related to physic-chemical properties of different mango varieties it can be concluded that cultivar Mallika, Kohinoor and Enayat Pasand was found best and can be good donor in hybridization programme to evolve the superior varieties under Rathindra Krishi Vigyan Kendra, near Palli-Siksha Bhavana (Institute of Agriculture), Sriniketan, Visva- Bharati, West Bengal.

Reference

1. Akter A. Fruit growth development and quality changes of mango varieties at different growth stages, Ph.D. thesis at Bangladesh Agricultural University APEDA Agri exchange, Ministry of commerce and Industry, Govt of India, 2016-17.
2. Begum H, Reddy MT, Malathi S, Reddy BP, Arcahk S, Nagaraju J. Morphological and microsatellite analysis of intravarietal variability in Cherukurasam cultivar of mango (*Mangifera indica* L.). Jordan Journal of Agricultural Sciences. 2014;10(3):452-472.
3. Begum H, Reddy MT, Malathi S, Reddy BP, Arcahk S, Nagaraju J. Morphological and microsatellite analysis of intravarietal heterogeneity in 'Beneshan' mango (*Mangifera indica* L). International Journal of Biotechnology Research and Practice. 2013;1(1):1-18.
4. Chatterjee D, Maurya KR, Mandal MP. Physico-chemical characteristics of mango (*Mangifera indica* L.) hybrids in Bihar. Orissa Journal of Horticulture. 2005;33(2):57-60.
5. Chaudhari SM, Patil BT, Desai GT. Performance of South-India mango varieties under semi-region of Maharashtra. Journal of Maharashtrian Agriculture University. 1997;22(1):72-74.
6. Galal OA, Galal HA, Aboulila AA. Genetic variability and molecular characterization of some local and imported mango cultivars in Egypt. Egyptian Journal of Genetics and Cytology. 2017;46:121-138.
7. Gunjate RT, Thimaiah IM, Amin SM. Growth and fruiting of some mango cultivars under high density plantation in arid conditions of Gujarat (India). Acta Horticulturea. 2003;820:403-406.
8. Jadhav PS, Jadhav SB, Garande VK. Assessment of physiological changes in mango fruit at different stage of growth and development. The pharma innovative journal. 2021;10(12):2058-2461.
9. Jilani MS, Bibi F, Waseem K, Khan MA. Evaluation of physico chemical characteristics in mango evaluation of physico-chemical characteristics of mango (*Mangifera*

indica L.) Cultivars grown in d. I. Khan. Journal of Agricultural Research. 2010;48(2):201-207.
10. Karla SK, Yadav IS, Sinha GC. Screening of some north Indian non-commercial mango varieties for processing. Indian Journal of Horticulture. 1994;51(2):136-40.
11. Kheshin 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.
12. Khurshid S, Ahmad I, Anjum MA. Genetic diversity in different morphological characteristics of litchi (*Litchi chinensis* Sonn.). International Journal of Agriculture and Biology. 2004;6(6):1062-5.
13. Kumar A. Studies on selection of superior clones in cv. Dashehari of mango (*Mangifera indica* L.) Parmar University of Horticulture and Forestry, Nauni, Solan (H.P), 2004.
14. Liu FX. Physico-chemical and antioxidant properties of four mango (*Mangifera indica* L.) cultivars in China. Food Chemistry. 2013;38:396-405.
15. Majumder DAN, Hassan L, Rahim MA, Kabir MA. Studies on physio-morphology, floral biology and fruit characteristics of mango. Journal of Bangladesh Agriculture University. 2011;9(2):187-199.
16. Nath V, Das B, Rai M. Standardization of high-density planting in mango (*Mangifera indica*) under sub humid alfisols of eastern India. Indian Journal of Agricultural Science. 2007;77:3-7.
17. 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.
18. Pandey SN, Dinesh MR. Mango, Indian Council of Agricultural Research, New Delhi, 2010, 30-97.
19. Sarangi DK, Chattopadyay TK, Debrath S. Green technology. 1999;1(2):37-42.
20. Singh A, Singh CP, Singh AK. Flowering behaviour of mango genotypes under tarai conditions of Uttarakhand. International Journal of Basic and Applied Agricultural Research. 2015;13(3):400- 406.
21. Singh R. Fruit. National book trust, new Delhi, 1988, 18-48.
22. Sivakumar D, Jiang Y, Yahia EM. Maintaining mango (*Mangifera indica* L.) fruit quality during the export chain. Food Research International. 2011;44:1254-1263.
23. Teaotia SS, Singh LP, Maurya VN, Agnihotri BN. Study of the changes in physical characters and chemical constituents of mango varieties during artificial ripening in different ripening media. Indian Journal of Horticulture. 1964;21(2):136-142.
24. Yadav SA, Prasad A, Abidi AB. Biochemical studies in mango fruits. Progressive Horticulture. 1982;14(1):51-53.