



Plant Archives

Journal homepage: <http://www.plantarchives.org>DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2026.v26.no.2.074>

PHYSICO-CHEMICAL CHARACTERIZATION OF MANGO (*Mangifera Indica* L.) GENOTYPES UNDER BASTAR AGRO-CLIMATIC CONDITIONS

Usha Kanouje^{1*}, Sh. Ram Kumar Dewangan¹, Ganesh Prasad Nag², Danendra Kumar Jain¹ and Roshni Tiwari²

¹Department of Fruit Science, Mahatma Gandhi University of Horticulture and Forestry (MGUVV) Durg, Chhattisgarh, India, 491111.

²Department of Vegetable Science, Mahatma Gandhi University of Horticulture and Forestry (MGUVV) Durg, Chhattisgarh, India, 491111.

*Corresponding author E-mail: ushakanouje@gmail.com

(Date of Receiving-08-06-2026; Date of Revision-27-07-2026; Date of Acceptance-18-08-2026)

ABSTRACT

An experiment was conducted at the Research cum instruction farm Krantikari Debridhur College of Horticulture and Research Station, Jagdalpur, MGUVV, Durg, Chhattisgarh, India, during the year 2025-26 to study the physico-chemical parameters of different mango (*Mangifera indica* L.) genotypes. The selected genotypes are collected from 5 different district viz Bastar, Kanker, Dantewada, Kondagaon, Sukma. The results showed the variations among physico-chemical properties. The maximum total sugar (18.12%) and reducing sugar (4.09%) were found in CGBM-57. In comparison, the maximum non-reducing sugar (14.03%) also found CGBM-57 and maximum ascorbic acid (42.31 mg/100g) were found in CGBM-72 and the maximum TSS (Total soluble solid) was observed in CGBM-75 (20.35 °Brix) followed by CGBM-5 (18.95 °Brix) and the highest acidity was found in CGBM-49 genotype (0.51%).

Key words: genotypes, mango, physico-chemical parameters, variations

Introduction

Mango (*Mangifera indica* L.) Family Anacardiaceae, is one of the most profitable crops in tropical and subtropical regions in the world. Originating in the Himalayan foothills of the Indian-Myanmar region, it has been cultivated for more than 4,000 years and is renowned for its excellent flavour, attractive fragrance, and high nutritional value. Mango can play an important role in balancing human diet by providing about 64-86 calories of energy per 100 g (Rathore *et al.*, 2007)

In India, Mango was grown over an area of 2394 thousand hectares in 2024-25 with an annual production of 22663 thousand MT (Anonymous, 2024-25). Chhattisgarh state occupies an area of approximately 77.753 thousand hectares with an annual production of 473.333 thousand MT and having the productivity 6.08 thousand MT of mango (Department of Agriculture, Govt. of C.G). The Bastar covers an area of 1.31 thousand

hectares with a production of 9.77 thousand MT (Department of Agriculture, Govt. of C.G).

The fruit is also rich in fiber which aids digestion and prevents constipation. Mango is consumed both as a fresh fruit and in processed forms such as juice, pulp and concentrate. The pulp is used as a base for making ice cream, yogurt, jam, jelly and chutney. The juice is a popular beverage and is also used for making alcoholic beverages such as wine and brandy (Khurshid *et al.*, 2015).

The information regarding to physico-chemical attributes of fruit of mango are very important to identify superior genotypes with desirable fruit quality, assess their suitability for fresh consumption and processing for varietal improvement and commercial cultivation.

Material and Method

Experimental site

The experiment was carried out at quality laboratory,

Table 1: Physical characteristics of different mango genotypes.

S. No.	Notation	Treatments	Fruit weight (gm)	Peel weight (gm)	Pulp weight (gm)
1.	T ₁	CGBM-4	123.41	41.89	71.58
2.	T ₂	CGBM-5	166.06	69.95	94.02
3.	T ₃	CGBM-19	220.61	95.45	133.11
4.	T ₄	CGBM-20	202.32	63.85	106.79
5.	T ₅	CGBM-41	140.47	28.95	102.77
6.	T ₆	CGBM-42	176.10	58.41	104.83
7.	T ₇	CGBM-49	143.88	49.54	87.85
8.	T ₈	CGBM-51	122.80	39.25	57.47
9.	T ₉	CGBM-55	150.54	33.41	52.52
10.	T ₁₀	CGBM-57	240.05	70.45	109.50
11.	T ₁₁	CGBM-61	277.94	70.60	125.78
12.	T ₁₂	CGBM-65	413.47	145.38	184.47
13.	T ₁₃	CGBM-72	210.51	55.34	110.91
14.	T ₁₄	CGBM-73	249.68	60.50	137.75
15.	T ₁₅	CGBM-74	148.82	52.60	99.93
16.	T ₁₆	CGBM-75	210.74	60.31	127.45
17.	T ₁₇ (Check variety)	Neelum	204.47	33.00	113.10
S.E. m ±			6.746	1.430	2.146
C.D. at 5 %			19.241	4.079	6.120

Krantikari Debridhur College of Horticulture and Research Station, Jagdalpur, Bastar, Chhattisgarh, India. The design of experiment was RBD (Randomized block design) with 17 genotypes and 4 replications.

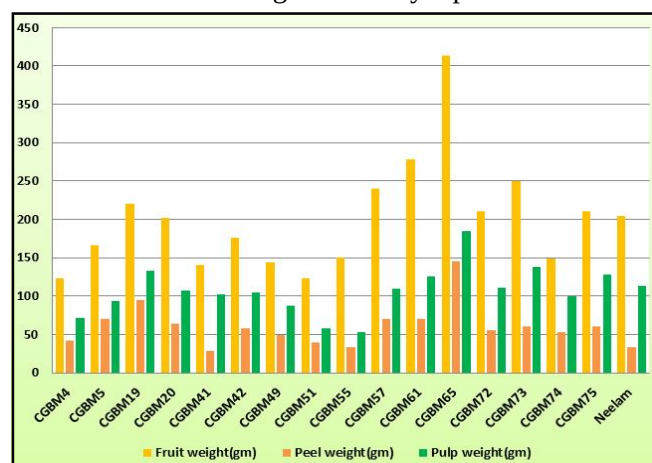
Methodology

Fruit weight (g fruit⁻¹):

The fruit weight of twenty fruits was recorded on electronic balance and results were given as weight in grams per fruit.

Pulp weight of fruit (g fruit⁻¹):

The individual weight of twenty representative fruits

**Fig. 1:** Weight of fruit, peel and pulp of different mango genotypes.**Table 2:** Studies on total soluble solid (T.S.S.), titratable acidity and total soluble solid: acid (T.S.S.: Acid) ratio of mango genotypes.

S. No.	Notation	Treatments	TSS (°Brix)	Acidity (%)	TSS: Acidity
1.	T ₁	CGBM-4	16.79	0.42	39.89
2.	T ₂	CGBM-5	18.95	0.42	38.82
3.	T ₃	CGBM-19	15.96	0.33	47.51
4.	T ₄	CGBM-20	15.43	0.41	38.75
5.	T ₅	CGBM-41	16.98	0.51	34.03
6.	T ₆	CGBM-42	15.12	0.34	44.02
7.	T ₇	CGBM-49	18.65	0.51	36.62
8.	T ₈	CGBM-51	16.07	0.44	27.26
9.	T ₉	CGBM-55	17.55	0.34	51.78
10.	T ₁₀	CGBM-57	15.45	0.37	42.04
11.	T ₁₁	CGBM-61	16.44	0.40	43.13
12.	T ₁₂	CGBM-65	19.30	0.41	46.68
13.	T ₁₃	CGBM-72	17.14	0.43	39.54
14.	T ₁₄	CGBM-73	18.38	0.33	53.85
15.	T ₁₅	CGBM-74	13.55	0.40	32.79
16.	T ₁₆	CGBM-75	20.35	0.41	39.60
17.	T ₁₇ (Check variety)	Neelum	17.03	0.25	64.72
S.E. m ±			0.257	0.012	1.432
C.D. at 5 %			0.733	0.034	4.083

pulp were taken from each sample with electronic balance and average pulp weight was recorded in grams.

Peel weight of fruit (g fruit⁻¹):

The individual weight of twenty representative fruits peel were taken from each sample with electronic balance and average peel weight was recorded in grams.

Total Soluble Solids (°Brix):

For measurement of TSS (Total Soluble Solids), which is measured in °Brix and based on the total refraction principle, used a hand Refractometer at 20 °C.

Titrate acidity (%):

Titrate acidity of fruits was calculated by titrating

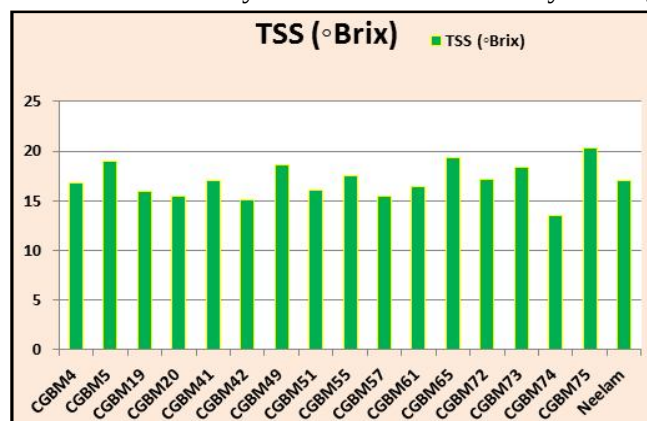
**Fig. 2:** Total soluble solids (°Brix) of mango genotypes.

Table 3: Studies on total sugar, reducing sugar, non-reducing sugar and ascorbic acid content of mango genotypes.

S. No.	Notation	Treatments	Total Sugar (%)	Reducing Sugar (%)	NRS (%)
1.	T ₁	CGBM-4	13.83	3.35	10.48
2.	T ₂	CGBM-5	15.10	3.49	11.61
3.	T ₃	CGBM-19	13.54	3.55	9.99
4.	T ₄	CGBM-20	13.24	3.80	9.44
5.	T ₅	CGBM-41	14.36	3.65	10.71
6.	T ₆	CGBM-42	17.63	4.08	13.55
7.	T ₇	CGBM-49	16.25	3.66	12.59
8.	T ₈	CGBM-51	15.26	3.43	11.83
9.	T ₉	CGBM-55	13.78	3.74	10.04
10.	T ₁₀	CGBM-57	18.12	4.09	14.03
11.	T ₁₁	CGBM-61	15.51	3.43	12.08
12.	T ₁₂	CGBM-65	16.94	3.59	13.35
13.	T ₁₃	CGBM-72	14.65	3.59	11.06
14.	T ₁₄	CGBM-73	15.87	4.08	11.79
15.	T ₁₅	CGBM-74	15.82	3.59	12.23
16.	T ₁₆	CGBM-75	17.24	3.66	13.58
17.	T ₁₇ (Check variety)	Neelum	14.22	2.90	11.32
S.E. m ±			0.307	0.101	0.257
C.D. at 5 %			0.876	0.289	0.734
NRS: Non-reducing sugar (%)					

the fruit juice extract with 0.1N NaOH as per method described by Ranganna (1986) using phenolphthalein as indicator using the following formula stated below and was expressed in percentage:

$$\text{Titrate Acid} = \frac{\text{Titre} \times \text{Normality of NaOH} \times \text{Volume made up} \times \text{Equiv. Wt. of acid} \times 100}{\text{Volume of aliquot taken for estimation} \times \text{Wt./ Volume of sample taken} \times 1000}$$

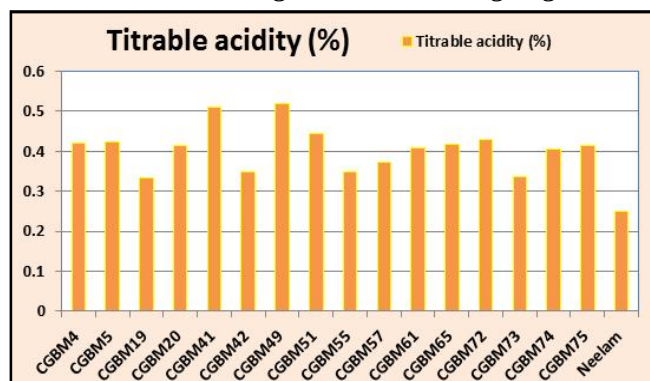
Total Soluble Solids/Acid ratio

It is calculated by following formula:

$$\text{TSS / Acid ratio} = \frac{\text{TSS}}{\text{Titrate acid} (\%)}$$

Sugar content (total, reducing and non-reducing):

The total, reducing and non-reducing sugars were

**Fig. 3:** Titrate acid (%) of mango genotypes.**Table 4:** Studies on ascorbic acid content of mango genotypes.

S. No.	Notation	Treatments	Ascorbic acid (mg/100g)
1.	T ₁	CGBM-4	37.99
2.	T ₂	CGBM-5	39.77
3.	T ₃	CGBM-19	29.88
4.	T ₄	CGBM-20	31.36
5.	T ₅	CGBM-41	34.95
6.	T ₆	CGBM-42	38.57
7.	T ₇	CGBM-49	38.38
8.	T ₈	CGBM-51	31.56
9.	T ₉	CGBM-55	39.87
10.	T ₁₀	CGBM-57	40.71
11.	T ₁₁	CGBM-61	38.48
12.	T ₁₂	CGBM-65	37.30
13.	T ₁₃	CGBM-72	42.31
14.	T ₁₄	CGBM-73	38.98
15.	T ₁₅	CGBM-74	41.25
16.	T ₁₆	CGBM-75	34.65
17.	T ₁₇ (Check variety)	Neelum	32.92
S.E. m ±			0.712
C.D. at 5 %			2.030

estimated by the method as described by A.O.A.C (1980)-

Total sugar (%)

Total sugar calculated using formula stated below and expressed as percentage (%)

$$\text{Total sugar} (\%) = \frac{\text{Factor} \times \text{Dilution}}{\text{Weight of sample} \times \text{titre reading}} \times 100$$

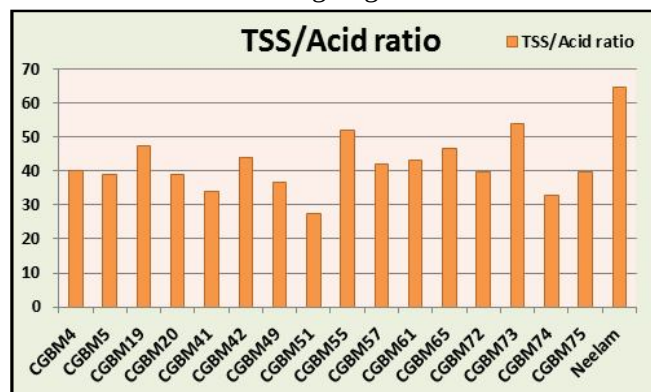
Reducing sugar (%)

The results were calculated using formula stated below and expressed as percentage (%) of reducing sugars.

$$\text{Reducing sugar} (\%) = \frac{\text{Factor} \times \text{Dilution}}{\text{Weight of sample} \times \text{titre reading}} \times 100$$

Non-reducing sugar (%):

The value of reducing sugar was eliminated from

**Fig. 4:** TSS/Acid ratio of mango genotypes.

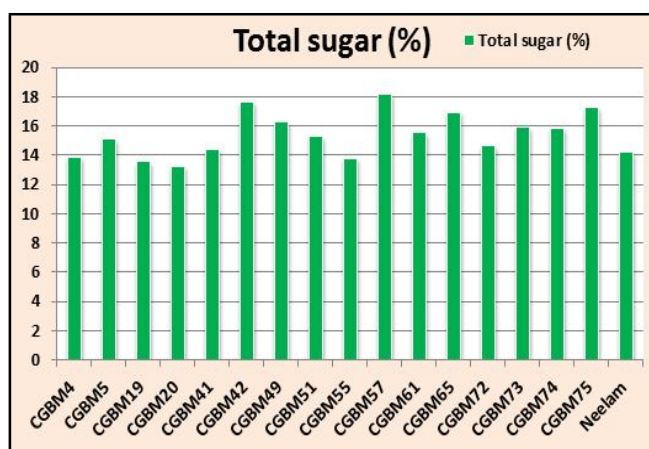


Fig. 5: Total sugar (%) of different mango genotypes.

total sugar to determine the value of non-reducing sugar. A percentage (%) was used to indicate the non-reducing sugar.

Non-reducing sugar (%) = Total sugar (%) - Reducing sugar (%)

Ascorbic acid (mg/100 g)

The ascorbic acid 2-6 dichlorophenol-indophenol (dye) visual titration method, somewhat modified from that described by Ranganna (1986), was used to assess the ascorbic acid concentration in fruit pulp.

$$\text{Ascorbic acid (mg/100g pulp)} = \frac{\text{Titre} \times \text{Dye factor} \times \text{Volume made up} \times 100}{\text{Aliquot taken for estimation} \times \text{Amount of sample taken for estimation}}$$

Results and Discussion

The data of physico-chemical properties of mango genotypes presented in following Tables-

Physico-chemical parameters

Physical parameters:

The physical characteristics of fruits summarized in (Table 1). As regards to fruit weight maximum value was noted in CGBM-65(413.47gm) which was superior

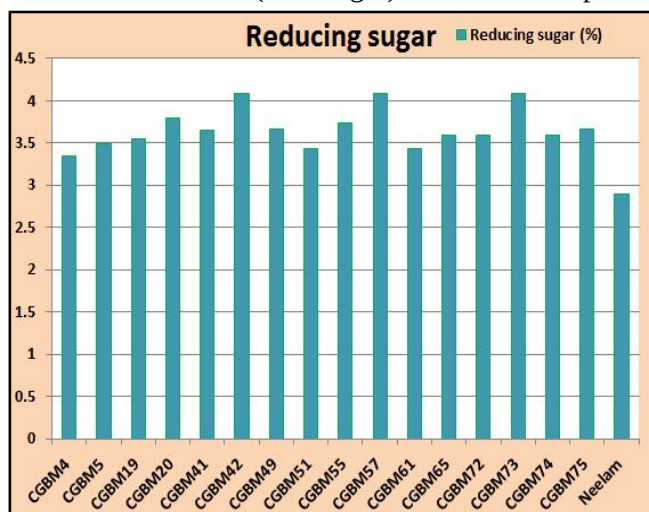


Fig. 6: Reducing sugar (%) of different mango genotypes.

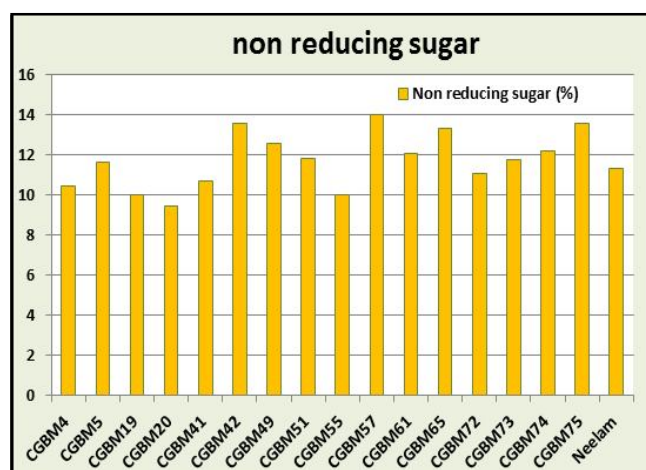


Fig. 7 : Non-reducing sugar (%) of different mango genotypes. regarding in fruit weight whereas minimum weight recorded in CGBM-51(122.80gm). The significantly maximum fruit pulp weight was recorded in genotype CGBM-65 (184.47gm) and minimum in CGBM-55(52.52gm). Similar findings were reported by Bora *et al.*, (2017) and Hada *et al.*, (2017).

Chemical characteristics:

The chemical characteristics of fruits summarized in (Table 2, 3 & 4). The significant maximum TSS was noted in CGBM-75 (20.35 °Brix) while the minimum TSS recorded in CGBM-74 (13.55 °Brix). The significantly highest acidity percent was recorded in CGBM-49 (0.51 %) while minimum acidity recorded in CGBM-73 (0.33 %). The significantly maximum value for total sugar (%) was recorded in CGBM-57 (18.12 %) whereas, the lowest value was recorded in Neelum (14.22 %). Significantly maximum value for Ascorbic acid was recorded in CGBM-72 (42.31mg/100g) whereas minimum ascorbic acid(mg/100g) in mango genotypes was recorded in CGBM-19 (29.88 mg/100g). Sridhar *et al.*, (2018) and Khan *et al.*, (2021) also reported variation for total sugar in mango varieties.

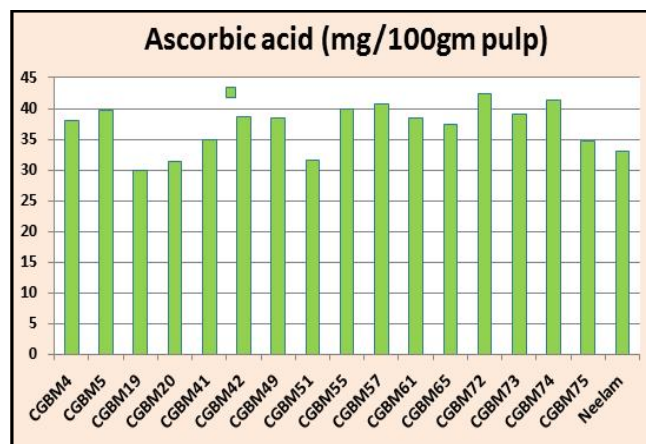


Fig. 8 : Ascorbic acid (mg/100gm pulp) of different mango genotypes.

Conclusion

The present study confirms that the wide variation that exist among different genotypes of mango. On the basis of findings of the present investigation mango genotypes Among the different genotypes, CGBM-65 followed by CGBM-61 was found superior in most of the physical characteristics and among the different mango genotypes like CGBM-75, CGBM-5, CGBM-49 were found superior in terms of chemical characteristics.

Acknowledgement

We are grateful to the dean and all of the teaching staff at Krantikari Debridhur College of Horticulture and Research Station, Jagdalpur, Bastar (C.G.) for providing the required authorization during the study time. The writers sincerely thank each and every one of you.

References

- Anonymous (2024). Area and production of horticultural crops: All India (2024-25), National Horticulture Board.
- Anonymous (2024). Department of agriculture and farmers welfare.
- Anonymous (2024). Department of Agriculture, Govt. of C.G. Raipur.
- A.O.A.C. (1980). Official Methods of Analysis. Association of Official Analytical Chemist, AOAC, Benjamin Franklin Station, Washington, DC:112.
- Bora, L., Singh A.K. and Singh C.P. (2017). Characterization of mango (*Mangifera indica* L.) genotypes based on physio-chemical quality attributes. *Journal of Applied and Natural Science*, **9(4)**, 2199-2204
- Hada, T.S. and Singh A.K. (2017). Evaluation of potentiality of mango cultivars for physico-chemical attributes of fruit. *International Journal of current Microbiology and Applied Sciences*, **6(6)**, 1080-1086.
- Jain, S., N R. and Sankaran M. (2024). Mango Peel: An Eminent Food Source. *Nutrition and Food Processing*, **7(3)**, 2637-8914.
- Khan, S.M., Ranpise S.A., Palepad K.B. and Dhakare B.B. (2021). Biochemical characterization of hybrid progenies of mango (*Mangifera indica* L.). *The Pharma Innovation Journal*, **10(7)**, 861-866.
- Khurshid, R., Ansari F.A. and Ali S. (2015). Processing and preservation of mango fruit. *International Journal of Agriculture and Biology*, **17(6)**, 1071-1078.
- Ranganna, S. (1986). Handbook of Analysis and Quality Control for Fruit and Vegetable Products. Tata Mc Graw-Hill Publishing Company, New Delhi, 1112.
- Sridhar, D., Ghosh B., Kundu S., Hasan M.A. and Das N.C. (2018). Genetic variability and heritability studies of mango cultivars. *International Journal of Current Microbiological Applied Science*, **7(9)**, 752-756.