



Plant Archives

Journal homepage: <http://www.plantarchives.org>DOI Url : <https://doi.org/10.51470/PLANTARCHIVES.2025.v25.no.2.380>

EVALUATION OF MANGO (*MANGIFERA INDICA* L.) VARIETIES FOR BIOCHEMICAL PARAMETERS

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(Date of Receiving-02-07-2025; Date of Acceptance-25-08-2025)

ABSTRACT

The present investigation was carried out during 2023–24 and 2024–25 at the College of Horticulture, Venkataramannagudem, Dr. YSR Horticultural University, to assess the biochemical parameters of nine mango (*Mangifera indica* L.) varieties, namely Alphonso, Amrapali, A.U. Rumani, Banganapalli, Kesar, Mallika, Ratna, Royal Special, and Totapuri. The study focused on evaluating ascorbic acid and total carotenoid content, which are vital determinants of nutritional quality, antioxidant potential, and consumer acceptance. Significant varietal differences were observed across both years and in pooled analysis. Totapuri (37.12 mg/100 g) and Banganapalli (45.00 mg/100 g) recorded the highest ascorbic acid contents in 2023–24 and 2024–25, respectively, while Kesar consistently exhibited the lowest values. In pooled data, Banganapalli (39.32 mg/100 g) and Totapuri (38.57 mg/100 g) were superior for ascorbic acid, whereas Kesar (21.73 mg/100 g) was inferior. For carotenoids, Amrapali (10.33 and 10.29 mg/g in 2023–24 and 2024–25, respectively) and Mallika (9.60 and 9.80 mg/g) maintained superiority, while Kesar recorded minimum values. The results highlight the strong influence of genetic factors on biochemical composition, particularly in regulating antioxidant synthesis and pigment accumulation, while environmental conditions also contributed to seasonal variation. Varieties such as Amrapali, Mallika, Banganapalli, and Totapuri emerged as promising genotypes for enhanced nutritional and commercial value, suggesting their suitability for both fresh consumption and processing.

Key word: Mango, Total Carotenoids, Alphonso, Ascorbic acid

Introduction

Mango (*Mangifera indica* L.) is one of the most important tropical and subtropical fruit crops grown between 23° North and 24.5° South latitudes of the world. It belongs to Anacardiaceae family with chromosome number 2n=40. It originated in Indo- Burma region and then gradually spread to the tropical and subtropical regions of the world (Singh *et al.*, 2011).. The region wise popular varieties grown in different parts of the country comprise of Alphonso and Kesar in western India, Banganapalli, Totapuri and Neelum in southern states, Bombai, Gulabkhas, Malda, Zardalu and Fazli in eastern

states and Dashehari , Langra and Chausa in northern states. The biochemical composition of mango is a major determinant of their sensory attributes, nutritional value, and postharvest performance. Among these, titratable acidity, carotenoids, and ascorbic acid are particularly important, as they influence flavor, color, antioxidant potential, and consumer acceptance. Carotenoids, a diverse group of plant pigments, are responsible for the characteristic yellow, orange, and reddish hues of ripe mango fruits. They contribute significantly to fruit appearance and nutritional quality, particularly as sources of provitamin A (β -carotene) and other antioxidants

(Mercadante & Rodriguez-Amaya, 1998; Araya *et al.*, 2013). The concentration and composition of carotenoids vary widely among mango cultivars, reflecting genetic differences as well as environmental influences during fruit development (Ndolo & Beta, 2013; Yahia, 2011). Ascorbic acid (vitamin C) is another key biochemical constituent in mango, valued for its antioxidant properties and role in human nutrition. It contributes to fruit flavor, delays oxidative browning, and enhances the health-promoting attributes of mango consumption (Iqbal *et al.*, 2006; Ribeiro & Schieber, 2010). The content of ascorbic acid differs among mango varieties and tends to decrease during ripening and storage, owing to its sensitivity to oxidation and degradation (Medlicott *et al.*, 1986; Lizada, 1993). Evaluating titratable acidity, carotenoids, and ascorbic acid in mango varieties provides critical insights into varietal suitability for fresh consumption and processing. Moreover, their dynamics during fruit development are closely linked with physiological and climatic factors, thereby influencing fruit quality and consumer acceptability (Yahia, 2011; Sogi *et al.*, 2012).

Material and Methods

The experimental site was located at Instructional farm in College of Horticulture, Venkataramannagudem, Dr.YSR Horticultural University, West Godavari District, Andhra Pradesh. The location falls under Agro-climatic zone-10, humid, East Coast Plain and hills with an average rainfall of 900 mm at an altitude of 34m above mean sea level. The experimental site is at 16°63'120"N latitude 81°27'568"E longitude. It experiences hot humid summer and mild winter.

Location of work	: College of Horticulture, Venkataramannagudem
Name of crop	: Mango
No. of. Treatments	: 9
No. of. replications	: 3
Statistical design	: RBD
Seasons	: 2

Treatments

T ₁	Alphonso;
T ₂	Amrapali
T ₃	A.U.Rumani
T ₄	Banganapalli
T ₅	Kesar
T ₆	Mallika
T ₇	Ratna
T ₈	Royal special
T ₉	Totapuri

Ascorbic acid (mg/ 100 g)

The ascorbic acid content in mango pulp was determined by 2, 6- dichlorophenol indophenol visual titration method as followed by Ranganna (1986) and expressed in mg/100 g.

Total Carotenoids (mg/100g FW)

A sample of 2 grams fresh pulp was taken and crushed in 10 ml acetone with the help of acid and alkali washed pestle and mortar. The supernatant was decanted into a conical flask and the process was repeated till the residue was colour less. The combined supernatant was then transferred to a separatory funnel and 10ml petroleum ether was added and mixed thoroughly. Thereafter, 25 ml 5 % anhydrous sodium sulphate solution was added and after shaking thoroughly it was kept standing for sometime till two layers separated out. The lower colourless layer was discarded and 10ml petroleum ether was added again to the retained coloured upper layer. 10 ml of petroleum ether was kept adding to the acetone layer containing Na₂SO₄ until the colour gets transferred into the petroleum ether layer. The lower colourless layer was discarded and the upper layer containing pigment was collected in a 100 ml volumetric flask and the final volume was made up to 100 ml by adding petroleum ether.

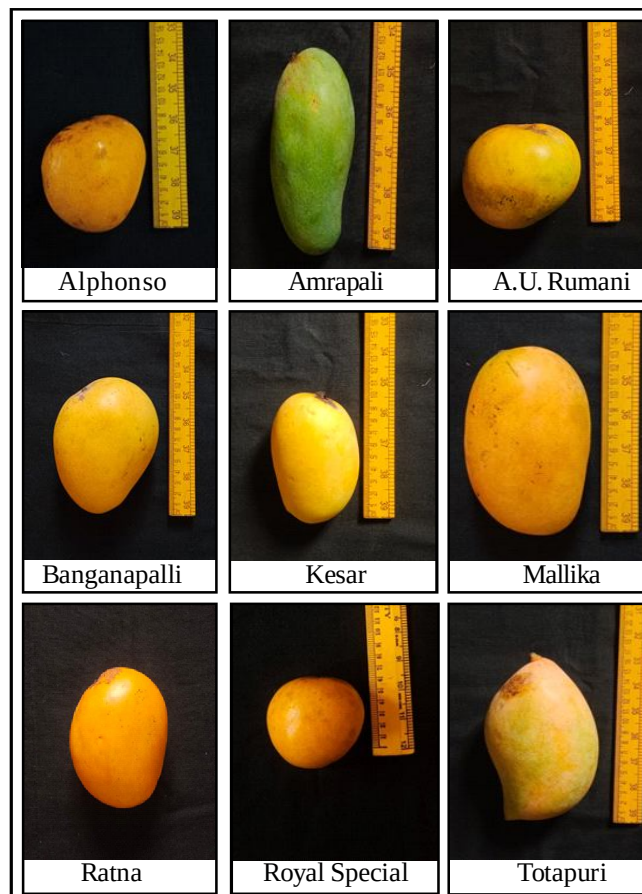


Plate 1: Different mango varieties.

Table 1: Influence of mango varieties on ascorbic acid (mg/100g).

Varieties	Ascorbic acid (mg/100g)		
	2023-24	2024-25	Pooled
Alphonso	33.57	30.13	31.85
Amrapali	30.76	28.93	29.85
A.U.Rumani	20.45	25.89	23.17
Banganapalli	33.63	45.00	39.32
Kesar	19.34	24.12	21.73
Mallika	29.12	31.12	30.12
Ratna	29.45	30.16	29.81
Royal special	34.21	32.86	33.54
Totapuri	37.12	40.01	38.57
SEm(+)	0.61	0.66	0.59
CD at 5%	1.86	2.00	1.80

The optical density was recorded at 452 nm using petroleum ether as blank. The total carotene content was calculated with the help of the following formula as suggested by Srivastava (1993).

$$\text{Total carotenoids (mg per 100 g pulp)} = \frac{3.857 \times \text{O.D.} \times \text{volume made up} \times \text{dilution} \times 100}{\text{Weight of sample} \times 1000}$$

Results and Discussion

Ascorbic Acid (mg/100g)

The data recorded on ascorbic acid in different mango varieties during the years 2023–24, 2024–25, and in pooled analysis are depicted in Table 1. A significant variation in ascorbic acid was observed among the varieties across both the years and in the pooled mean.

During 2023–24, *Totapuri* exhibited the maximum ascorbic acid content (37.12 mg/100g), which was followed by *Royal Special* (34.21 mg/100g). On the contrary, *Kesar* (19.34 mg/100g) showed significantly minimum values.

In 2024–25, *Banganapalli* showed the highest ascorbic acid value (45.00 mg/100g), and it is followed by *Totapuri* (40.01 mg/100g), whereas *Kesar* (24.12 mg/100g) showed lower ascorbic acid content.

Pooled data revealed *Banganapalli* (39.32 mg/100g) as the top-performing genotypes in terms of ascorbic acid, followed by *Totapuri* (38.57 mg/100g). In contrast, *Kesar* (21.73 mg/100g) was found to be inferior.

Marked varietal variation was recorded in ascorbic acid content among the mango cultivars during both crop seasons and in the pooled analysis, may be due to dominant role of genetic factors in regulating this trait. Genotypes consistently exhibiting higher levels of ascorbic acid likely possess stronger gene expression linked to the biosynthesis and accumulation of antioxidants, especially

Table 2: Influence of mango varieties on Total carotenoids (mg/g F.W.)

Varieties	Total carotenoids (mg/g F.W.)		
	2023-24	2024-25	Pooled
Alphonso	4.37	4.23	4.30
Amrapali	10.33	10.29	10.31
A.U.Rumani	2.08	2.00	2.04
Banganapalli	2.30	2.40	2.35
Kesar	1.86	1.99	1.93
Mallika	9.60	9.80	9.70
Ratna	7.42	7.12	7.27
Royal special	2.64	2.50	2.57
Totapuri	2.39	2.19	2.29
SEm(+)	1.32	1.26	1.28
CD at 5%	2.98	2.80	2.87

the L-galactono-1,4-lactone dehydrogenase enzyme that catalyzes the final step in vitamin C biosynthesis. These differences are governed by cultivar-specific metabolic regulation, which determines the capacity for ascorbic acid synthesis and retention during fruit development. Apart from genetic makeup, environmental conditions significantly influenced the expression and accumulation of ascorbic acid (Bora *et al.*, 2017).

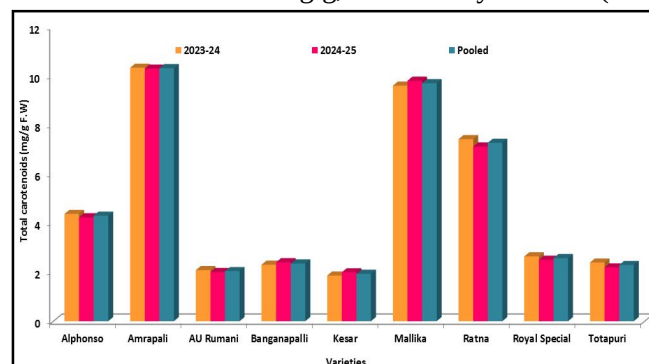
The results revealed in present investigation are in close conformity with the earlier findings of Muhammad *et al.*, (2004), Abourayya *et al.*, (2011) in mango.

Total Carotenoids (mg/g F.W.)

The influence of various mango varieties on total carotenoids during the years 2023–24, 2024–25, and pooled data is presented in Table 2 and Figure 1. Significant differences were observed among the varieties in both individual years and pooled analysis.

In the year 2023–24, the highest total carotenoid content was recorded in Amrapali (10.33 mg/g), followed by Mallika (9.60 mg/g). On the contrary, Kesar (1.86 mg/g) showed the lowest total carotenoids content.

During 2024–25, Amrapali have the highest total carotenoid with 10.29 mg/g, followed by Mallika (9.80 mg/g).

**Fig. 1:** Total carotenoids (mg/g F.W.) in mango varieties.

mg/g). The lowest carotenoid contents were observed in Kesar (1.99 mg/g).

The pooled analysis confirmed the consistency of varietal performance across years. Amrapali (10.31 mg/g) recorded highest total carotenoid followed by Mallika (9.70 mg/g) retained their superior positions, whereas Kesar (1.93 mg/g) recorded lowest total carotenoid content.

The variation in carotenoid content among mango varieties is may due to differences in genetic potential regulating carotenoid biosynthetic enzymes, including phytoene synthase, lycopene β -cyclase, and β -carotene hydroxylase. Varieties such as Amrapali and Mallika exhibited superior carotenoid synthesis and accumulation, contributing to their attractive pulp color and nutritional quality. In contrast, varieties like Kesar and A.U. Rumani are genetically predisposed to produce less carotenoid pigment due to lower enzyme activity or altered gene expression (Dutta *et al.*, 2021). The results of present investigation are supported by the findings of Fiyas *et al.*, (2012), Haque *et al.*, in mango.

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