

International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
IJABR 2026; SP-10(8): 1985-1988
www.biochemjournal.com
Received: 25-05-2026
Accepted: 30-06-2026

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Performance of tomato varieties for yield and quality characters under Nagpur conditions

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DOI: <https://www.doi.org/10.33545/26174693.2026.v10.i8Sv.9702>

Abstract

The present investigation entitled "Performance of Tomato Varieties for yield and quality characters under Nagpur Conditions" was conducted during the rabi season of 2025-26 at the PG Research Farm, Horticulture Section, College of Agriculture, Nagpur, Maharashtra, to identify suitable tomato varieties with superior yield, fruit quality and economic performance under Nagpur conditions. Eight tomato (*Solanum lycopersicum* L.) varieties, namely Kashi Adarsh, Kashi Chayan, Kashi Vishesh, Kashi Aman, Arka Vikas, Phule Kesari, Gujarat Tomato-7 and PKM-1s were evaluated in a Randomized Block Design with three replications. Kashi Aman recorded the maximum number of fruits plant⁻¹ (45.18), fruit weight (60.18 g), yield plant⁻¹ (2.74 kg), yield plot⁻¹ (82.21 kg) and yield hectare⁻¹ (608.86 q). Regarding fruit quality, maximum fruit length (7.48 cm) and fruit diameter (5.87 cm) were recorded in Kashi Aman, whereas the highest vitamin C content (21.42 mg/100 g) was recorded in Kashi Chayan. Economic analysis revealed that Kashi Aman recorded the highest benefit:cost ratio (2.78). The results indicated considerable variation among the varieties for yield, quality and economic parameters. Overall, Kashi Aman exhibited superior performance and may be considered a promising variety for commercial cultivation under Nagpur conditions.

Keywords: Tomato, varieties, yield, fruit quality, vitamin C, benefit: cost ratio, Nagpur conditions

Introduction

Tomato (*Solanum lycopersicum* L.) is one of the most important vegetable crops cultivated worldwide and is valued for its nutritional, economic and culinary importance. The fruit is consumed fresh as well as processed into products such as puree, ketchup, sauces and other value-added products. It is an important source of vitamins, minerals, dietary fibres and antioxidant compounds, particularly lycopene and β -carotene which contribute to its nutritional significance. Consequently, improvement in tomato productivity and fruit quality is important for both nutritional security and farm profitability.

The productivity and quality of tomato are influenced by genetic constitution, environmental conditions and crop management practices. Among these factors, selection of a suitable variety is particularly important because varieties differ considerably in plant growth, flowering behaviour, fruit characteristics, yield potential and nutritional quality. Modern breeding programmes have resulted in the development of numerous improved tomato varieties with specific characteristics such as higher productivity, better fruit quality and resistance or tolerance to important biotic and abiotic stresses.

However, the performance of a variety is not necessarily consistent across different agro-climatic regions. Temperature, soil characteristics, moisture availability and seasonal conditions can substantially influence vegetative growth, flowering, fruit setting and yield. Therefore, evaluation of promising varieties under specific local conditions is essential for identifying genotypes with better adaptability and productive potential. ICAR also emphasizes evaluation and development of cultivars suited to diverse agro-ecological conditions.

Nagpur, located in the Vidarbha region of Maharashtra, represents an important agro-climatic environment for vegetable production. However, comparative information on the performance of different tomato varieties under Nagpur conditions is relatively limited. Hence, systematic varietal evaluation is necessary to identify superior varieties possessing desirable growth, yield and fruit quality characteristics.

Materials and Methods

The experiment was conducted during the Rabi season of 2025-26 at the PG Research Farm, Horticulture Section, College of Agriculture, Nagpur, Maharashtra, India. The experimental site is situated at 21.10°N latitude and 79.19°E longitude at an altitude of 310.26 m above mean sea level and represents the subtropical agro-climatic conditions of the Vidarbha region.

Eight tomato (*Solanum lycopersicum* L.) varieties, viz., Kashi Adarsh, Kashi Chayan, Kashi Vishesh, Kashi Aman, Arka Vikas, Phule Kesari, Gujarat Tomato-7 and PKM-1, were evaluated. The experiment was laid out in a Randomized Block Design (RBD) with three replications, comprising 24 experimental plots. Each plot accommodated 30 plants at a spacing of 60 × 60 cm with a gross plot size of 3.60 × 3.00 m and net plot area of 4.32 m².

Observations were recorded on yield, fruit quality and economic parameters. Number of fruits per plant, fruit weight, yield and fruit dimensions were assessed using standard procedures. Vitamin C content was estimated using the 2,6-dichlorophenol indophenol titration method as described by A.O.A.C. (1970). The benefit: cost ratio was calculated based on the treatment-wise cost of cultivation and returns. The recorded data were subjected to analysis of variance (ANOVA) appropriate for a Randomized Block Design (RBD) following the procedure described by Panse and Sukhatme (1967).

Result and Discussion

1. Yield parameters

The data from Table 1 exhibited the significant difference among the varieties on yield parameters.

1.1 Number of fruits plant⁻¹

Kashi Aman (45.18) recorded the maximum number of fruits plant⁻¹ and was at par with Kashi Chayan (42.49), Phule Kesari (41.62) and Kashi Adarsh (40.88). PKM-1 recorded the minimum number of fruits plant⁻¹ (26.14). Such variation may be due to genotypic differences affecting fruit setting and retention. Similar results were reported by Vidya and Kanaujia (2014) ^[18] in tomato, Gautam *et al.* (2013) ^[4] in tomato and Rehman *et al.* (2000) ^[12] in tomato.

1.2 Weight of fruit

Kashi Aman recorded the highest fruit weight (60.18 g) and was at par with Gujarat Tomato-7 (58.27 g), Arka Vikas (58.11 g), Kashi Chayan (57.89 g) and Phule Kesari (57.24 g). PKM-1 recorded the lowest fruit weight (52.23 g). The variation could be attributed to differences in genotype and assimilate partitioning. Similar findings were reported by Anita *et al.* (2018) ^[2] in tomato, Hossain *et al.* (2017) ^[5] in tomato and Jatav *et al.* (2017) ^[6] in tomato respectively.

1.3 Yield plant⁻¹

The highest yield plant⁻¹ was recorded in Kashi Aman (2.74 kg) and was at par with Kashi Chayan (2.46 kg) while PKM-1 recorded the lowest yield plant⁻¹ (1.38 kg). The higher yield in Kashi Aman was mainly associated with its greater fruit number and fruit weight. Similar results were reported by Kumar *et al.* (2018) ^[2] in tomato, Hossain *et al.* (2017) ^[5] in tomato and Jatav *et al.* (2017) ^[6] in tomato.

1.4 Yield plot⁻¹

Kashi Aman recorded the maximum yield plot⁻¹ (82.21 kg) and was at par with Kashi Chayan (73.78 kg). The minimum yield was recorded in PKM-1 (41.26 kg). Differences in plot yield were mainly related to fruit number and fruit weight. Similar findings were reported by Mounica *et al.* (2022) ^[11] in tomato, Lokesh *et al.* (2020) ^[7] in tomato and Sindhu *et al.* (2020) ^[13] in tomato.

1.5 Yield hectare⁻¹

Kashi Aman recorded the highest yield hectare⁻¹ (608.86 q ha⁻¹) and was at par with Kashi Chayan (546.64 q ha⁻¹), whereas PKM-1 recorded the lowest yield (305.91 q ha⁻¹). The superior performance of Kashi Aman may be attributed to its higher fruit-bearing capacity and fruit weight. Similar results were reported by Maurya *et al.* (2024) ^[9] in tomato, Sindhu *et al.* (2020) ^[13] in tomato and Gautam *et al.* (2013) ^[4] in tomato.

2. Quality parameters

The data from Table 1 exhibited the significant difference among the varieties on quality parameters.

2.1 Length of fruit (cm)

The highest fruit length was recorded in Kashi Aman (7.48 cm) which was at par with Phule Kesari (7.13 cm). The lowest value was in PKM-1 (3.62 cm). Variation in fruit length reflects genetic differences among varieties affecting fruit development and size. Similar findings were reported by Mehraj *et al.* (2014) ^[10] in tomato, Mounica *et al.* (2022) ^[11] in tomato and Sindhu *et al.* (2020) ^[13] in tomato.

2.2 Diameter of fruit (cm)

Fruit diameter also showed significant variation. The maximum was recorded in Kashi Aman (5.87 cm) which was at par with Gujarat Tomato-7 (5.75 cm), Arka Vikas (5.63 cm) and Kashi Chayan (5.42 cm). The lowest fruit diameter was observed in PKM-1 (5.03 cm). Differences in fruit diameter are mainly due to genetic variability influencing fruit morphology. Larger fruit size in Kashi Aman may have contributed to better market and yield performance. These results agree with Mehraj *et al.* (2014) ^[10] in tomato, Sindhu *et al.* (2020) ^[13] in tomato and Rehman *et al.* (2000) ^[12] in tomato.

2.3 Vitamin C content (mg/100 g)

Significant differences were observed for vitamin C content. The highest value was recorded in Kashi Chayan (21.42 mg/100 g) which was at par with Kashi Aman (20.86 mg/100 g), Kashi Vishesh (20.29 mg/100 g) and Phule Kesari (19.13 mg/100 g). The lowest content was in PKM-1 (17.34 mg/100 g). Variation in vitamin C content indicates genetic influence on nutritional quality. Similar results were reported by Anita *et al.* (2018) ^[2] in tomato, Sonam and Hussain (2018) in tomato, Jatav *et al.* (2017) ^[6] in tomato and Vidya and Kanaujia (2014) ^[18] in tomato.

3. Economic parameter

The data from Table 1 exhibited the significant difference among the varieties on economic parameter.

3.1 Benefit: Cost ratio

Significant variation was observed among the tomato varieties for benefit: cost ratio. The maximum B:C ratio was

recorded in Kashi Aman (2.78) followed by Kashi Chayan (2.50) and Phule Kesari (2.43). The minimum B:C ratio was recorded in PKM-1 (1.39). The higher B:C ratio obtained with Kashi Aman indicates its greater economic efficiency under the agro-climatic conditions of Nagpur. The superior economic return of this variety may be attributed mainly to

its higher productivity, which resulted in greater gross returns in relation to the cost of cultivation. The present findings are in agreement with the results reported by Malathi *et al.* (2021) [8] and Singh *et al.* (2019) [15] in tomato, who also observed variation in economic returns and B:C ratio among tomato varieties.

Table 1: Yield, Quality and Economic Parameters of different varieties of Tomato

Treatments	Number of fruits plant ⁻¹	Weight of fruit (g)	Yield plant ⁻¹ (kg)	Yield plot ⁻¹ (kg)	Yield hectare ⁻¹ (q)	Length of fruit (cm)	Diameter of fruit (cm)	Vitamin C content (mg/100 g)	B:C ratio
T ₁ -Kashi Adarsh	40.88	54.84	2.23	67.03	496.27	4.54	5.17	18.55	2.27
T ₂ -Kashi Chayan	42.49	57.89	2.46	73.78	546.64	4.91	5.42	21.42	2.50
T ₃ -Kashi Vishesh	34.63	55.73	1.91	57.30	424.42	5.61	5.31	20.29	1.94
T ₄ -Kashi Aman	45.18	60.18	2.74	82.21	608.86	7.48	5.87	20.86	2.78
T ₅ -Arka Vikas	27.36	58.11	1.57	47.10	348.87	5.76	5.63	17.76	1.59
T ₆ -Phule Kesari	41.62	57.24	2.40	72.08	533.30	7.13	5.38	19.13	2.43
T ₇ -Gujarat Tomato-7	30.52	58.27	1.76	52.76	391.09	5.24	5.75	18.87	1.79
T ₈ -PKM-1	26.14	52.23	1.38	41.26	305.91	3.62	5.03	17.34	1.39
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	-
SE (m)±	1.74	1.47	0.10	3.03	22.45	0.36	0.16	0.78	-
CD at 5%	5.28	4.41	0.31	9.19	68.11	1.08	0.48	2.35	-

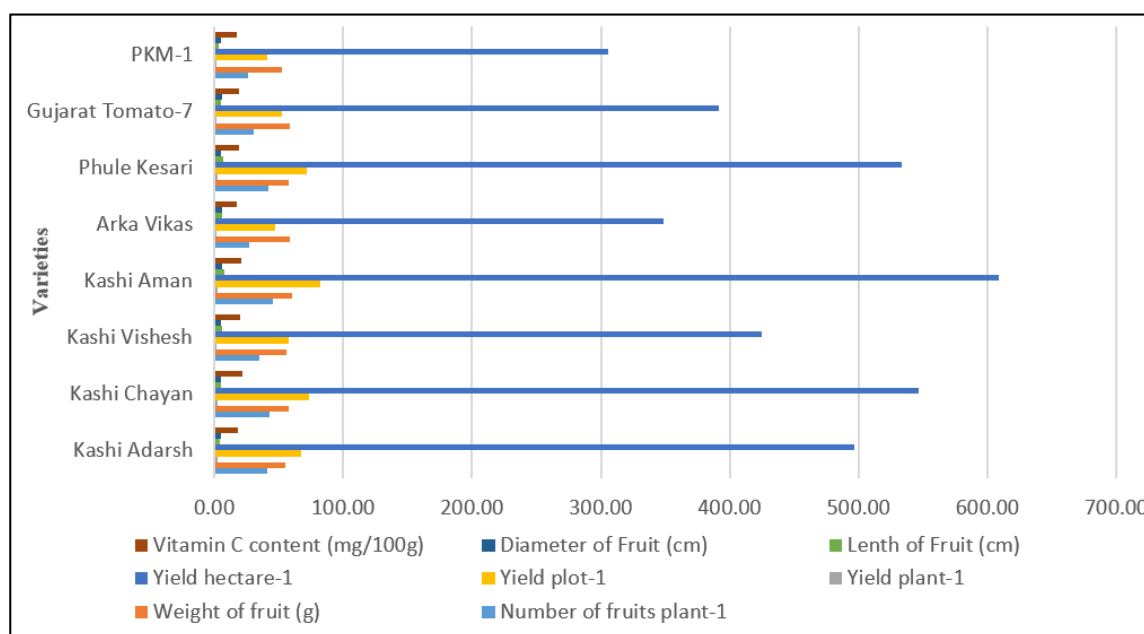


Fig 1: Yield, Quality and Economic Parameters of different varieties of Tomato

Conclusion

Overall, Kashi Aman exhibited superior performance and the highest benefit:cost ratio (2.78) may be recommended for commercial cultivation under Nagpur conditions.

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