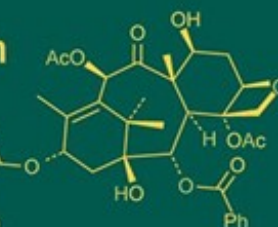
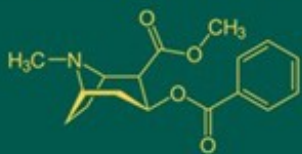


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## Performance of guava (*Psidium guajava* L.) cultivars for quality attributes under semi-arid conditions of Maharashtra

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**ABSTRACT**

The present investigation was conducted at the All India Coordinated Research Project on Fruits, Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra, during 2025–26 to evaluate ten guava cultivars for quality attributes under semi-arid conditions. The experiment was conducted in a Randomized Block Design with three replications and two plants per treatment. The investigation focused on fruit quality and pest and disease response. Results revealed considerable variation among the cultivars for the characters studied. Sardar recorded maximum fruit firmness (19.12 kg/cm<sup>2</sup>) and shelf life (5.32 days), while Arka Rashmi recorded maximum pulp weight (90.91 g/100 g fruit). Shweta recorded maximum TSS (12.32 °Brix) and ascorbic acid content (230.48 mg/100 g), along with minimum seed hardness (10.74 kg/cm<sup>2</sup>), number of seeds per fruit (212.67) and seed weight per fruit (2.23 g). Lalit recorded minimum fruit fly damage (19.33%) and fruit canker severity (9.19%). Based on these findings, Sardar, Shweta and Lalit showed promising overall performance for important quality attributes and pest and disease infestation and were identified as suitable cultivars for cultivation under semi-arid conditions of Maharashtra.

**Keywords:** Guava, Cultivars, Semi-arid conditions, Fruit quality, Pest and disease

**1. Introduction**

Guava (*Psidium guajava* L.) is an important fruit crop belonging to the family Myrtaceae. It is native to tropical America, particularly the region extending from Mexico to Peru. The genus *Psidium* comprises around 150 species (Hayes, 1974) [1], while cultivated guava varieties may be diploid (2n = 2x = 22) or triploid (2n = 3x = 33) (Atchinson, 1947) [2]. It is widely adapted to tropical and subtropical regions. In India, guava is cultivated over an area of about 3,58,000 ha with a production of approximately 5.26 million tonnes and an average productivity of 14.8 t ha<sup>-1</sup> and in Maharashtra, guava is cultivated over about 20,390 ha with a production of 2,57,860 tonnes (Anonymous, 2024) [3]. Major guava-growing districts in the state include Ahilyanagar, Pune, Buldhana, Beed, Satara, Chhatrapati Sambhajinagar, Amravati and Bhandara (Gavhane et al., 2024) [4].

Guava is recognized as a nutritionally valuable fruit, particularly for its abundant vitamin C content, reported to be 241.86 mg per 100 g of fruit (Bogha et al., 2020) [5]. The presence of pectin along with vitamin C further enhances its suitability for processing into products such as jelly, jam and juice (Das et al., 2019) [6]. The considerable genetic diversity in guava has resulted in variation among cultivars for important fruit quality attributes such as firmness, pulp weight, seed characteristics, TSS, titratable acidity, vitamin C and shelf life. Guava cultivars also differ in their response to important pests and diseases, which may affect fruit quality and marketability. Hence, the present study was undertaken to assess the performance of different guava cultivars for fruit quality under semi-arid conditions of Maharashtra.

**2. Materials and methods**

The study was carried out at the All India Coordinated Research Project on Fruits, Department of Horticulture, Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra, during the winter season. Ten guava cultivars, namely Arka Rashmi, CISH-GS14, IIHR-13-14, Allahabad Safeda, Lalit, Shweta, Dhawal, Sardar, GK.L2P5 and GK.L2P7, were evaluated in a guava orchard comprising six-year-old plants, maintained at a spacing of 3 m × 3 m. The experiment was conducted in a Randomized Block Design with three replications and two plants per treatment. Fruit firmness and seed hardness were determined using a Mecmesin Basic Force Gauge (BFG 1000N, England) fitted with a probe. Pulp weight was worked out from the recorded fruit, peel and seed weights, whereas seeds were separated from the pulp after boiling and counted manually. Seed weight was determined using an electronic balance. Total soluble solids were recorded using a digital refractometer. Titratable acidity and ascorbic acid content were estimated according to Ranganna (1986) [7].

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Shelf life was determined by storing 80 per cent matured green-ripe fruits under ambient conditions and observing them daily until they became unsuitable for consumption. Fruit fly damage was expressed as percentage of infested fruits, while fruit canker severity was assessed by rating visible symptoms on a 0-4 scale according to the affected fruit surface.

## 2.1 Statistical analysis

The experiment was laid out in a Randomized Block Design with ten treatments and three replications. The data recorded for fruit quality, pest and disease infestation were subjected to statistical analysis following the standard procedure described by Panse *et al.* (1985) [8].

## 3. Results and discussion

The data presented in following tables revealed considerable variation among the guava cultivars evaluated under semi-arid conditions of Maharashtra. The cultivars differed in fruit quality attributes and their response to major pest and disease. The results are discussed below.

### 3.1. Quality parameters

#### 3.1.1. Fruit firmness (kg/cm<sup>2</sup>)

The data depicted in Table 1 presents the variation in fruit firmness among different guava cultivars. Fruit firmness ranged from 12.02 to 19.12 kg/cm<sup>2</sup>, with a mean of 14.61 kg/cm<sup>2</sup>. The maximum fruit firmness was recorded in Sardar (19.12 kg/cm<sup>2</sup>), which was significantly superior over the remaining cultivars, followed by Allahabad Safeda (16.02 kg/cm<sup>2</sup>) and GK.L<sub>2</sub>P<sub>5</sub> (15.61 kg/cm<sup>2</sup>), whereas the minimum was recorded in Lalit (12.02 kg/cm<sup>2</sup>). Fruit firmness is an important quality attribute that determines the keeping quality and market acceptability of guava fruits. Cultivars with firmer fruits generally possess better storage and transport tolerance. The variation observed among the cultivars may be attributed to differences in their genetic constitution and structural characteristics of fruit tissues. Similar findings were reported by Kumar (2020) [9] and Tripathi (2025) [10].

#### 3.1.2 Pulp weight (g/100g fruit)

The observations on pulp weight of different guava cultivars are presented in Table 1. Pulp weight ranged from 86.18 to 90.91 g/100 g fruit, with a mean of 88.84 g/100 g fruit. The maximum pulp weight was recorded in Arka Rashmi (90.91 g/100 g fruit), which was statistically at par with Shweta (90.56 g/100 g fruit), IIHR-13-14 (90.30 g/100 g fruit) and CISH-GS14 (89.59 g/100 g fruit). The minimum pulp weight was recorded in Allahabad Safeda (86.18 g/100 g fruit). The variation in pulp weight among the guava cultivars may be attributed to differences in their genetic potential and pulp development during fruit growth. Better accumulation of edible pulp might have contributed to higher pulp recovery. Similar findings were reported by Sahoo *et al.* (2017) [11], Bodkhe (2019) [12] and Rahi (2019) [13].

#### 3.1.3 Seed hardness (kg/cm<sup>2</sup>)

The data depicted in Table 1 presents the variation in seed hardness among different guava cultivars. Seed hardness ranged from 10.74 to 15.02 kg/cm<sup>2</sup>, with a mean of 12.44 kg/cm<sup>2</sup>. The minimum seed hard-

ness was recorded in Shweta (10.74 kg/cm<sup>2</sup>), which was statistically at par with Allahabad Safeda (10.80 kg/cm<sup>2</sup>) and Dhawal (11.04 kg/cm<sup>2</sup>), whereas the maximum was recorded in Lalit (15.02 kg/cm<sup>2</sup>). Seed hardness is an important quality character in guava, with softer seeds preferred for fresh consumption. The variation among cultivars may be attributed to genotypic differences and seed development. Similar results were reported by Dubey *et al.* (2016) [14], Pandey *et al.* (2016) [15], Singh *et al.* (2017) [16] and Bodkhe (2019) [12].

#### 3.1.4 Number of seeds per fruit

The observations on the number of seeds per fruit of different guava cultivars are presented in Table 1. The number of seeds per fruit ranged from 212.67 to 363.05, with a mean of 273.96. The minimum number of seeds per fruit was recorded in Shweta (212.67), which was significantly lower than the remaining cultivars, followed by GK.L<sub>2</sub>P<sub>5</sub> (235.67) and Arka Rashmi (248.17). The maximum number of seeds per fruit was recorded in Sardar (363.05). The variation in the number of seeds per fruit among the guava cultivars may be attributed to differences in their genetic constitution and reproductive behaviour. Cultivars producing fewer seeds are generally preferred due to their higher consumer acceptability. Similar findings were reported by Das *et al.* (1995) [17] and Marak *et al.* (2007) [18].

#### 3.1.5 Weight of seeds per fruit (g)

The recorded values of seed weight per fruit of different guava cultivars are presented in Table 1. Seed weight per fruit ranged from 2.23 to 3.96 g, with a mean of 2.85 g. The minimum seed weight per fruit was recorded in Shweta (2.23 g), which was significantly lower than the remaining cultivars, followed by CISH-GS14 (2.45 g) and Dhawal (2.45 g). The maximum seed weight per fruit was recorded in Sardar (3.96 g). The variation in seed weight per fruit among the guava cultivars may be attributed to differences in their genetic constitution and seed development. Greater accumulation of reserve food materials during seed maturation might have contributed to higher seed weight. Similar findings were reported by Patil *et al.* (2015) [19], Singh *et al.* (2017) [16] and Bodkhe (2019) [12].

#### 3.1.6 Shelf life (days)

Considerable variation was observed in shelf life among the guava cultivars, as presented in Table 1. Shelf life ranged from 4.10 to 5.32 days, with a mean of 4.54 days. The maximum shelf life was recorded in Sardar (5.32 days), which was significantly superior over the remaining cultivars, followed by Allahabad Safeda (4.91 days) and GK.L<sub>2</sub>P<sub>5</sub> (4.86 days), whereas the minimum was recorded in Arka Rashmi and Dhawal (4.10 days each). The variation may be associated with differences in genetic constitution and post-harvest physiological behaviour. Better fruit firmness and slower metabolic activity may contribute to longer shelf life. Similar findings were reported by Singh *et al.* (2013) [20], Tiwari *et al.* (2016) [21], Dubey *et al.* (2016) [14] and Bodkhe (2019) [12].

**Table 1.** Performance of guava cultivars for fruit firmness, pulp weight, seed characteristics and shelf life.

| Sr. No.        | Treatments       | Fruit firmness (kg/cm <sup>2</sup> ) | Pulp weight (g/100 g) | Seed hardness (kg/cm <sup>2</sup> ) | No. of seeds/fruit | Weight of seeds/fruit | Shelf life (days) |
|----------------|------------------|--------------------------------------|-----------------------|-------------------------------------|--------------------|-----------------------|-------------------|
| T <sub>1</sub> | Arka Rashmi      | 12.46                                | 90.91                 | 11.22                               | 248.17             | 2.72                  | 4.10              |
| T <sub>2</sub> | CISH-GS14        | 14.36                                | 89.59                 | 14.25                               | 264.40             | 2.45                  | 4.46              |
| T <sub>3</sub> | IIHR - 13 - 14   | 15.26                                | 90.30                 | 13.25                               | 293.78             | 3.15                  | 4.76              |
| T <sub>4</sub> | Allahabad Safeda | 16.02                                | 86.18                 | 10.80                               | 345.89             | 3.69                  | 4.91              |
| T <sub>5</sub> | Lalit            | 12.02                                | 87.50                 | 15.02                               | 256.33             | 2.59                  | 4.15              |
| T <sub>6</sub> | Shweta           | 13.01                                | 90.56                 | 10.74                               | 212.67             | 2.23                  | 4.21              |
| T <sub>7</sub> | Dhawal           | 13.41                                | 88.37                 | 11.04                               | 258.27             | 2.45                  | 4.10              |

(continued on next page)

| Sr. No.         | Treatments                       | Fruit firmness (kg/cm <sup>2</sup> ) | Pulp weight (g/100 g) | Seed hardness (kg/cm <sup>2</sup> ) | No. of seeds/fruit | Weight of seeds/fruit | Shelf life (days) |
|-----------------|----------------------------------|--------------------------------------|-----------------------|-------------------------------------|--------------------|-----------------------|-------------------|
| T <sub>8</sub>  | Sardar                           | 19.12                                | 88.46                 | 14.60                               | 363.05             | 3.96                  | 5.32              |
| T <sub>9</sub>  | GK.L <sub>2</sub> P <sub>5</sub> | 15.61                                | 88.33                 | 11.27                               | 235.67             | 2.47                  | 4.86              |
| T <sub>10</sub> | GK.L <sub>2</sub> P <sub>7</sub> | 14.91                                | 88.25                 | 12.26                               | 261.43             | 2.82                  | 4.61              |
|                 | Mean                             | 14.61                                | 88.84                 | 12.44                               | 273.96             | 2.85                  | 4.54              |
|                 | SE(±)                            | 0.11                                 | 0.53                  | 0.15                                | 4.71               | 0.02                  | 0.10              |
|                 | CD @ 5%                          | 0.34                                 | 1.60                  | 0.45                                | 14.02              | 0.06                  | 0.31              |
|                 | CV (%)                           | 1.35                                 | 1.04                  | 2.09                                | 2.98               | 1.24                  | 3.96              |

### 3.1.7 Total soluble solids (°Brix)

The data from Table 2 present the variation in total soluble solids among different guava cultivars. TSS ranged from 10.09 to 12.32 °Brix, with a mean of 11.42 °Brix. The maximum TSS was recorded in Shweta (12.32 °Brix), which was significantly superior over the remaining cultivars, followed by Sardar (12.10 °Brix) and IIHR-13-14 (11.93 °Brix), whereas the minimum was recorded in GK.L<sub>2</sub>P<sub>7</sub> (10.09 °Brix). The variation may be attributed to differences in genetic constitution and accumulation of soluble sugars in the fruits. Similar variation in TSS among guava cultivars was reported by Dubey *et al.* (2016) [14], Tiwari *et al.* (2016) [21] and Shukla *et al.* (2017) [22].

### 3.1.8 Titratable acidity (%)

The data pertaining to titratable acidity of different guava cultivars are presented in Table 2. Titratable acidity ranged from 0.32 to 0.49 per cent, with a mean of 0.38 per cent. The minimum acidity was recorded in Shweta (0.32%), which was statistically at par with IIHR-13-14 (0.34%) and Arka Rashmi (0.35%), whereas the maximum was

recorded in GK.L<sub>2</sub>P<sub>7</sub> (0.49%). The variation may be attributed to differences in genetic makeup and organic acid metabolism among the cultivars. Lower acidity generally contributes to better fruit flavour and consumer preference. Similar variation was reported by Dubey *et al.* (2016) [14], Mehta *et al.* (2016) [23], Bodkhe (2019) [12] and Singh *et al.* (2023) [24].

### 3.1.9 Ascorbic acid (mg/100 g)

The observations on ascorbic acid content of different guava cultivars are presented in Table 2. Ascorbic acid content ranged from 141.67 to 230.48 mg/100 g, with a mean of 187.48 mg/100 g. The maximum ascorbic acid content was recorded in Shweta (230.48 mg/100 g), which was statistically at par with Sardar (223.82 mg/100 g), whereas the minimum was recorded in CISH-GS14 (141.67 mg/100 g). The variation may be attributed to differences in genetic constitution and the ability of cultivars to synthesize and retain ascorbic acid. Higher ascorbic acid content contributes to the nutritional value of guava fruits. Similar variation was reported by Rahi (2019) [13], Singh *et al.* (2023) [24] and Patel *et al.* (2024) [25].

**Table 2.** Performance of guava cultivars for biochemical parameters.

| Sr. No.         | Treatments                       | TSS (°Brix) | Titratable Acidity(%) | Vitamin C (mg/100g) |
|-----------------|----------------------------------|-------------|-----------------------|---------------------|
| T <sub>1</sub>  | Arka Rashmi                      | 11.70       | 0.35                  | 156.33              |
| T <sub>2</sub>  | CISH-GS14                        | 10.92       | 0.41                  | 141.67              |
| T <sub>3</sub>  | IIHR-13-14                       | 11.93       | 0.34                  | 211.67              |
| T <sub>4</sub>  | Allahabad Safeda                 | 11.87       | 0.37                  | 193.09              |
| T <sub>5</sub>  | Lalit                            | 11.82       | 0.38                  | 186.78              |
| T <sub>6</sub>  | Shweta                           | 12.32       | 0.32                  | 230.48              |
| T <sub>7</sub>  | Dhawal                           | 11.07       | 0.39                  | 178.06              |
| T <sub>8</sub>  | Sardar                           | 12.10       | 0.36                  | 223.82              |
| T <sub>9</sub>  | GK.L <sub>2</sub> P <sub>5</sub> | 10.41       | 0.47                  | 189.14              |
| T <sub>10</sub> | GK.L <sub>2</sub> P <sub>7</sub> | 10.09       | 0.49                  | 163.84              |
|                 | Mean                             | 11.42       | 0.38                  | 187.48              |
|                 | SE(±)                            | 0.03        | 0.01                  | 2.66                |
|                 | CD @ 5%                          | 0.10        | 0.03                  | 7.90                |
|                 | CV (%)                           | 0.51        | 4.76                  | 2.45                |

## 3.2 Pest and disease infestation

### 3.2.1 Fruit fly damage (%)

The data presented in Table 3 revealed considerable variation in fruit fly damage among the guava cultivars. Fruit fly damage ranged from 19.33 to 31.47 per cent, with a mean of 25.82 per cent. The minimum fruit fly damage was recorded in Lalit (19.33%), which was statistically at par with Shweta (20.83%), whereas the maximum was recorded in Dhawal (31.47%). The variation among cultivars may be attributed to differences in genetic makeup and fruit characteristics. Similar variation in fruit fly response among guava cultivars was re-

ported by Arora *et al.* (1998) [26], Reddy *et al.* (1999) [27], Kapoor (2000) [28] and Baradevanal Gundappa *et al.* (2018) [29].

### 3.2.2 Fruit canker severity (%)

The results presented in Table 3 showed variation in fruit canker severity among the guava cultivars. Fruit canker severity ranged from 9.19 to 30.05 per cent, with a mean of 16.51 per cent. The minimum fruit canker severity was recorded in Lalit (9.19%), which was statistically at par with IIHR-13-14 (10.20%), whereas the maximum was recorded in Dhawal (30.05%). The variation may be attributed to differences in genetic background and inherent resistance of the cultivars. Similar variation in response to fruit canker was reported by Gupta *et al.* (2016) [30] and Triwidodo *et al.* (2021) [31].

**Table 3.** Performance of guava cultivars for pest and disease infestation

| Sr. No.         | Treatments                       | Fruit fly damage (%) | Fruit canker severity (%) |
|-----------------|----------------------------------|----------------------|---------------------------|
| T <sub>1</sub>  | Arka Rashmi                      | 30.50 (33.51)        | 11.14 (19.45)             |
| T <sub>2</sub>  | CISH-GS14                        | 27.47 (31.60)        | 18.24 (25.17)             |
| T <sub>3</sub>  | IIHR-13-14                       | 22.77 (28.48)        | 10.20 (18.61)             |
| T <sub>4</sub>  | Allahabad Safeda                 | 27.52 (31.63)        | 25.43 (30.27)             |
| T <sub>5</sub>  | Lalit                            | 19.33 (26.08)        | 9.19 (17.60)              |
| T <sub>6</sub>  | Shweta                           | 20.83 (27.14)        | 11.17 (19.51)             |
| T <sub>7</sub>  | Dhawal                           | 31.47 (34.12)        | 30.05 (33.23)             |
| T <sub>8</sub>  | Sardar                           | 24.13 (29.42)        | 17.30 (24.53)             |
| T <sub>9</sub>  | GK.L <sub>2</sub> P <sub>5</sub> | 27.38 (31.54)        | 16.87 (24.22)             |
| T <sub>10</sub> | GK.L <sub>2</sub> P <sub>7</sub> | 26.85 (31.19)        | 15.53 (23.19)             |
|                 | Mean                             | 25.82 (30.47)        | 16.51 (23.58)             |
|                 | SE(±)                            | 0.51                 | 0.39                      |
|                 | CD @ 5%                          | 1.54                 | 1.19                      |
|                 | CV (%)                           | 2.93                 | 2.93                      |

\*Figures in the parenthesis are arc sine transformed values.

## Conclusion

The present study revealed considerable variation among guava cultivars for fruit quality and pest and disease infestation. Sardar, Shweta and Lalit showed desirable overall performance for important quality attributes and lower pest and disease infestation. These cultivars were identified as promising for cultivation under semi-arid conditions of Maharashtra.

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