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Assessment of physical characters of guava (*Psidium guajava* L.) cultivars under Marathwada conditions

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Abstract

This experiment aimed to examine the physical characteristics of various cultivars of Guava (*Psidium guajava* L.) under Marathwada conditions. Five guava cultivars viz., Lucknow-49, Taiwan Pink, Lalit, VNR Bihi and Thia-5 showed wide range of variation with respect to plant growth and quality traits of fruits were evaluated during the monsoon season of the years 2023-24. An experiment was carried out at, guava orchard, college of Agriculture, Latur, Vasantao Naik Marathwada Krishi Vidyapeeth, Parbhani. The results were obtained for the physical characters. The maximum flowering percentage (86.33%), fruit setting percentage (70.29%), fruit diameter (7.47 cm), fruit yield (73.49 kg/tree), fruit yield (204.14 q/ha) was noted in the cultivar Lucknow-49 While, the lowest flowering percentage (73.00%), fruit setting percentage (51.17%), fruit diameter (5.62 cm), fruit yield (21.34 kg/tree), fruit yield (51.29 q/ha) was recorded in the cultivar Lalit. The maximum fruit weight (256.93 gm) and volume of fruit (184.54 ml) was recorded in the cultivar Thia-5. While the lowest fruit weight (114.17 g) and volume of fruit (111.86 ml) was found in the cultivar Lalit. Whereas, the highest number of seed per fruit (191.62) and number of fruits per plant (324.44) was observed in the cultivar Lalit and Lucknow-49 respectively. The lowest number of seed per fruit (57.61) and number of fruits per plant (111.60) was observed in the cultivar VNR Bihi and Thia-5 respectively.

Keywords: Guava, physical attributes, lucknow-49, Marathwada conditions

Introduction

Fruit crops play a crucial role in agriculture. They are adapted to a wide range of soil and climatic conditions. The need for increasing fruit consumption has become a global priority in context to health, as world's most wide spread and debilitating nutritional disorders are caused due to diets lacking in vitamins and minerals. The fruit crops also provide scope for achieving bio-diversity, maintain ecological balance and create sustainable agriculture. Guava (*Psidium guajava* L.) often called the "apple of the tropics" is one of the most important tropical and subtropical fruit crops. It belongs to the Myrtaceae family of plants. It is the fourth most important fruit crop in area and production after mango, banana and citrus. It has chromosome number $2n=2x=22$ ($n=11$). Guava is native to tropical America, which stretches from Mexico to Peru. Their shade-loving nature, fruit-bearing capabilities, high vitamin C content, delightful flavor and pleasant aroma have led to their growing commercial importance in many countries.

Maharashtra is having 860.012 thousand hectares under different fruit crops with a production of 15174.55 thousand metric tons. Out of these, the area under guava cultivation is 19.39 thousand hectares with an annual production of 234.47 thousand tons and suggested by 2nd Advance Estimate of 2023-24. (Anonymous, 2024) [1]. Key guava cultivation regions in Maharashtra include Ahmednagar, Satara, Beed, Pune, Sambhaji Nagar, Amravati, Buldhana and Bhandara.

Guava fruits are consumed either fresh or processed in the form of product like jam, jelly, nectar and high-quality ready-to-serve beverages. Two types of wine, viz, guava juice wine and guava pulp wine can be manufactured from ripe fruits. The seeds contain 5-13% oil, rich in essential fatty acids, making it suitable for salad dressings. Furthermore, guava leaves possess medicinal properties and are used to treat diarrhea as well as in dyeing and tanning processes.

In the northern parts of India, guava undergoes two to three flowering cycles annually, namely "Ambe Bahar" in spring, "Mrig Bahar" during the monsoon and "Hast Bahar" in October. Fruits from Ambe Bahar mature from July to September, Mrig Bahar fruits ripen from November to February and Hast Bahar fruits ripen in the spring season, also known as summer. The fruit-bearing pattern is influenced by the growth of plants in different vegetative flushes, generally guided by climatic conditions (Dubey *et al.*, 2000)^[6].

Keeping the above facts in view, an experiment entitled "Comparative studies of guava (*Psidium guajava* L.) cultivars under Marathwada conditions", was conducted in the Department of Horticulture, College of Agriculture, Latur, Maharashtra, during 2023-24 with following objectives:

1. To assess the physico-chemical characters of guava cultivars under Marathwada conditions.
2. To find out better type of guava cultivars for commercial cultivation under Marathwada conditions.

Materials and Methods

The experiment was conducted at Instructional-cum-Research Farm, Department of Horticulture, College of Agriculture, Latur, VNMKV, Parbhani (M.S.). During monsoon season of 2023-2024, on well-established twelve years old orchard of guava planted at 6 × 6 m. Total five cultivars were identified for study viz., Lucknow-49, Taiwan Pink, Lalit, VNR Bihi and Thia-5. Among them one genotypes were pink fleshed and four cultivars were white fleshed. Ten fruits were randomly collected from each plant for observation. Uniform cultural practices were applied to all plants, which were irrigated as needed using the ring method. The harvested mature fruits from the mrig bahar were weighed separately. The observations were recorded on, flowering percentage, fruit set percentage, fruit weight (g), fruit length (cm), fruit diameter (cm), number of seed per fruit, volume of fruit (ml), number of fruits per plant (from October 2023 to December 2023), fruit yield (kg/tree) and fruit yield (q/ha). Statistical analysis of the data obtained in the different sets of experiments were calculated, as suggested by Panse and Sukhatme (1967)^[10].

Result and Discussion

There were wide variations among different cultivars with respect to flowering (%), fruit setting (%), fruit weight (gm), fruit length (cm), fruit diameter (cm), (Table 1) number of seed per fruit, volume of fruit (ml), number of fruits per plant, fruit yield (kg/tree) and fruit yield (q/ha) evaluated under the Marathwada condition of Maharashtra (Table 2).

The flowering percentage was highest in the cultivar Lucknow-49 (86.33%), followed closely by VNR Bihi (81.57%), Taiwan Pink (76.04%) and Thia-5 (74.81%). In contrast, the cultivar Lalit exhibited the lowest flowering (73.00%). The knowledge of flowering and fruiting behavior of fruit trees is indispensable for a fruit grower and breeder. Similar trend was observed in terms of flowering (%). These findings were conferred with the results suggested by Sarkar *et al.* (2016)^[16], Dolkar *et al.* (2014)^[5]. In terms of fruit setting percentage, Lucknow-49 again led with (70.29%), followed by VNR Bihi (60.22%), Taiwan Pink (54.86%) and Thia-5 (53.47%). The minimum fruit setting percentage was recorded in Lalit (51.17%). The variation in fruit set is entirely based on the genetic makeup of cultivars, pollen fertility and prevailing climatic conditions. The results are in accordance with the findings of Sharma *et al.* (2011)^[18], who recorded highest fruit set (82%) in cultivar Lucknow-49 (Sardar) under North Indian conditions.

The highest fruit weight was observed in the Thia-5 cultivar (256.93 g), followed by Lucknow-49 (226.33 g), VNR Bihi (189.40 g) and Taiwan Pink (155.53 g). Lalit had the lowest fruit weight (114.17 g). The increase in fruit weight might be associated with the increase the cells size and gathering of food materials in the intercellular spaces of the fruit. The results of present study were supported by the findings reported by various research workers viz., Sharma *et al.* (2010)^[17], Dolkar *et al.* (2014)^[5], Mehta *et al.* (2018)^[9], Patel *et al.* (2011)^[11], Ramniwas *et al.* (2023)^[13] and Dani, S. (2023)^[3] in Guava.

For fruit length, the maximum fruit length was recorded in the Thia-5 cultivar (8.20 cm), followed by VNR Bihi (7.45 cm), Lucknow-49 (7.08 cm). Lalit and Taiwan Pink measured 6.10 cm and 5.25 cm, respectively, with the shortest fruit length observed in Taiwan Pink. The variation in fruit size may be influenced by the number and size of the seeds within the fruit. The maximum number of seeds and larger seed size ultimately increase the overall size of the fruit. These findings are consistent with those reported by Dolkar *et al.* (2014)^[5], Kumari *et al.* (2016)^[8] and Ran *et al.* (2017)^[14].

Regarding fruit diameter, Lucknow-49 had the largest measurement (7.47 cm), which was statistically at par with the cultivar Thia-5 (7.42 cm). This was followed by VNR Bihi (7.08 cm), Taiwan Pink (6.35 cm) and Lalit (5.62 cm). The smallest fruit diameter was recorded in the Lalit cultivar (5.62 cm). These results were consistent with the findings proposed by Patel *et al.* (2007)^[12], Dolker *et al.* (2014)^[5], Deshmukh *et al.* (2013)^[4], Dani, S. (2023)^[3], Gurjar *et al.* (2018)^[7] and Mehta *et al.* (2018)^[9].

Table 1: Physical attributes of guava varieties

Varieties	Flowering (%)	Fruit setting (%)	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)
Lucknow-49	86.33	70.29	226.33	7.08	7.47
Taiwan pink	76.04	54.86	155.53	5.25	6.35
Lalit	73.00	51.17	114.17	6.10	5.62
VNR Bihi	81.57	60.22	189.40	7.45	7.08
Thia-5	74.81	53.47	256.93	8.20	7.42
SE (m)	2.22	1.71	9.95	0.20	0.22
CD (5%)	6.42	4.94	28.77	0.58	0.65
CV	6.94	7.21	12.93	7.18	8.06

The highest number of seeds per fruit was recorded in the Lalit cultivar (191.62), followed by Lucknow-49 (140.56), Taiwan Pink (112.83), Thia-5 (101.91) and VNR Bihi (57.61). The fewest seeds were observed in the VNR Bihi cultivar (57.61). Similar results were obtained by Dolkar *et al.* (2014)^[5], Deshmukh *et al.* (2013)^[4].

The highest fruit volume was recorded in the cultivar Thia-5 (184.54 ml), followed by Lucknow-49 (176.24 ml), VNR Bihi (153.85 ml), Taiwan Pink (136.14 ml). Conversely, Lalit exhibited the lowest fruit volume (111.86 ml). These results are in conformity with findings of Dani, S. (2023)^[3]. The highest number of fruits per plant was recorded in Lucknow-49 (324.43). This was followed by Taiwan Pink (210.29), VNR Bihi (188.58) and Lalit (187.24). In contrast, The Thia-5 cultivar had the lowest number of fruits per plant (111.60). The abundant production of fruits per plant could be attributed to increased vegetative growth, resulting in a substantial accumulation of carbohydrates, proteins and other essential nutrients through photosynthesis. These findings align closely with those reported by Deshmukh *et al.* (2013)^[4] and Bhalekar *et al.* (2017)^[2].

The cultivar Lucknow-49 yielded a significantly higher per-tree yield (73.49 kg/tree) compared to the other cultivars studied. Following Lucknow-49, VNR Bihi produced the next highest yield per tree (34.86 kg/tree); after that, Taiwan pink produced the (32.68 kg/tree) yield per tree; and after Taiwan Pink, Thia-5 produced the (29.45 kg/tree), while the lowest yield per tree was observed in the Lalit cultivar (21.34 kg/tree). The diverse genetic makeup of plants or the adaptability of cultivars to varying climates likely explains the wide range of growth and yield outcomes. These findings align closely with previous research by Ravi *et al.* (2019)^[15] and Gurjar *et al.* (2018)^[7].

In terms of yield per hectare, Lucknow-49 demonstrated the highest yield (204.14 q/ha), followed by VNR Bihi (96.82 q/ha), Taiwan Pink (90.78 q/ha), Thia-5 (81.79 q/ha) and Lalit, which had the lowest yield per hectare (59.29 q/ha). The fluctuations in fruit yield can be attributed to several factors, including variety, soil conditions, climate and effective management practices. These findings align closely with those of Bhalekar *et al.* (2017)^[2].

Table 2: Physical attributes of guava varieties

Varieties	Number of seed per fruit	Volume of fruit (ml)	Number of fruits per plant	Fruit yield (kg/tree)	Fruit yield (q/ha)
Lucknow-49	140.56	176.24	324.44	73.49	204.14
Taiwan pink	112.83	136.14	210.29	32.68	90.78
Lalit	191.62	111.86	187.24	21.34	59.29
VNR Bihi	57.61	153.85	188.58	34.86	96.82
Thia-5	101.91	184.54	111.60	29.45	81.79
SE (m)	4.08	4.07	8.55	2.88	8.01
CD (5%)	11.80	11.78	24.73	8.34	23.16
CV	8.26	6.54	10.24	18.40	18.41

Conclusion

The results of the current experiment indicate significant variations in physical parameters among different guava cultivars. Specifically, the physical parameters assessed. Including flowering percentage, fruit set percentage, fruit weight (g), fruit length (cm), fruit diameter (cm), number of seeds per fruit, fruit volume (ml), number of fruits per plant as well as yield metrics such as yield per tree and yield per hectare were notably higher in the cultivar Lucknow-49, followed by Thia-5.

Based on these promising results, it is recommended that the Lucknow-49 cultivar be selected for guava cultivation under Marathwada conditions.

Nevertheless, to reach a proper conclusion, several more trials need to be conducted.

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