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Evaluation of guava (*Psidium guajava* L.) cultivars for morphological, yield and quality attributes under Malwa plateau conditions

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Abstract

Present investigation deals with evaluation of ten cultivars with respect to growth, yield and quality traits of guava (*Psidium guajava* L.) during the winter season of 2017-18. Plant height was higher in Nasik and L-49 but plant spread was higher in apple colour and chittidar. Maximum flower and number of flowers were noted in Rewa-72. Maximum fruit length and diameter and fruit weight were observed in L-49 and Apple colour. The maximum pulp percentage was noted in chittidar and minimum number of seed per fruit and minimum acidity was found in strawberry. The highest yield was recorded in L-49 followed by Rewa-72 and Apple Colour. Maximum total soluble solids was noted Lucknow-49.

Keywords: Guava, apple colour, chittidar, dharidar

Introduction

Guava is the most important protective fruit in India because of highest vitamin C (299 mg/100g) among table fruits (Bal *et al.*, 2014) [2]. Guava fruit is very popular owing to its delicious taste, high nutritional value and low price. The fruit is a rich source of citric acid, minerals and vitamins particularly vitamin C, which is even higher than oranges (Rahman *et al.*, 2003) [10]. Guava cultivars however, display a greater diversity in tree size, bearing habit and yield, as well as in fruit size, shape, quality and ripening season. An accurate knowledge of genetic diversity available and the origin of cultivars would assist in the selection of parents in a hybridization programme. A careful study of genotypes would also help to eliminate duplicates in the genotypes collection, thus saving land, space and time. Morphological features of fruit and plant parts are the major components of identification of genotypes. It is required to select the better genotypes out of the existing new available material and characterize them for morphological and biochemical traits for their identification which will help the orchardists to select suitable cultivars in relation to flowering and fruiting with good fruit set, little tendency to fruit drop and to adjust cultural operations according to market demand. The Guava is cross pollinated crop and out of the seedling population elite type may be characterized on the basis of morphological, physico-chemical, yield and quality attributes. Although, the performance of different guava accessions varies significantly with cultivars, location, agro-climate and soil type etc. The variation with regard to growth and bearing habits, yield, flesh colour and quality among different guava cultivars were also reported by Chadha *et al.* (1981) [3] and Ojha *et al.* (1985) [7] in different parts of the country. In general, the cultivars are location-specific and the commercial cultivars of one region do not do so well when grown in other areas. Madhya Pradesh is divided into 11 agro-climatic zones in which Mandsaur comes under Zone-I Malwa, therefore, there is need to evaluate the recommend variety which can be successfully grown as well as prove to be profitable for this zone. Keeping in view the above facts and the paucity of research on these aspects in the sub-tropical region, the present study has been proposed.

Material and Methods

The experiment was conducted at the experimental farm, Department of Fruit Science, K.N.K. College of Horticulture, Mandsaur (M.P.), Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Gwalior (M.P.) during the year 2018-19. It is situated at 23.45° to 24.13° N latitude and 74.44° to 75.18° E longitudes at an altitude of 435 m MLS. It has a subtropical climate with hot summer and cool winter. The temperature rises up to 46 °C during summer and falls to 3.6 °C during winter with an occasional occurrence of frost. The average rainfall is 579.2 mm, most of which occurred during July to September, winter and summer rains are uncommon. The experiment was laid out in Randomized Block Design (RBD) with three

replications and ten treatments as described by Panse and Sukhatme (1963)^[8]. Varieties were Dharidar, Chittidar, and Apple colour, Strawberry, Nasik, L-49, G-27, Rewa 72, Surkhi and Webber Supreme.

Each variety replicated thrice and planted at a distance of 6 X 6 m. One tree served as a unit of treatments in each replication. All the selected plants were uniform in shape and size and all the cultural practices uniformly followed. Randomly harvested ten fruits from each plant were kept for recording observation. Morphological were taken in terms of Plant height, Canopy spread (E-W & N-W), fruiting parameters i.e. Number of flowers, fruit length (cm), fruit diameter (cm), pulp percentage and number of seeds per fruit yield parameters i.e. fruit weight (g), Number of fruits per plant and yield per plant (kg). The fruit quality was studied in terms of Total Soluble Solids (^oB) and Acidity (%). Total soluble solids were determined with the help of digital refractometer. Whereas Acidity was determined by the help of method given in A.O.A.C. (2000).

Results and Discussion

The results obtained in this investigation are presented with heads of morphological, fruiting, yield and quality parameters. These parameters are significantly differing among the cultivars.

Morphological parameters

It is evident from the data that the maximum plant height was recorded in genotype V₅-Nasik (5.94 m) followed by V₇-Gwalior-27 (5.57 m) but statistically these two genotypes were at par with each other. On the other hand, the minimum plant height was recorded in V₄-Strawberry (2.15 m). The North-South canopy spread was recorded maximum in genotype V₃-Apple colour (7.03 m) followed by V₇-Gwalior-27 (6.52 m), V₅-Nasik (6.05 m). Whereas, the minimum spread of North-South was recorded in V₄-Strawberry (2.33 m). The variability in growth due to genetic makeup of genotypes which developed through open pollinated seed. On the other hand, soil and micro-climate of the region also contributed in expressing the inherent characters of different genotypes. The habit of tree growth and their use for vegetative growth are important diagnostic characters for selection of genotypes as reported by Singh *et al.*, (2016)^[3, 12, 13, 16] and Singh and Singh (2000)^[3, 12, 13, 16] and Reddy *et al.*, (1999)^[11].

Fruit parameters

The fruit parameters of guava germplasm, there was significant difference in the Number of flowers, fruit diameter, fruit length, fruit width, pulp percentage and number of seeds per fruit was observed with regard to different cultivars.

The maximum number of flowers per plant V₇-Gwalior-27 (1133.00) was followed by V₈-Rewa-72 (1130.00), V₆ - Lucknow-49 (1126.67) and V₁-Dharidar (1125.33). Whereas, the minimum number of flower per plant was recorded in V₄-Strawberry (583.33). These results are in accordance with findings of Dwivedi *et al.*, (1991)^[4] were also reported in term of the seasonal influence was very much pronounced on the number of flower born. Fruit length and diameter varied significantly among the genotypes. Lucknow-49 (7.58 cm) recorded significantly highest fruit length and it is also followed by V₂-Chittidar (7.25 cm), whereas, least fruit length was recorded in V₄-Strawberry (2.77 cm). The maximum fruit diameter was noted in V₆-Lucknow-49 (7.17 cm), it is also

followed by V₂-Chittidar (6.94 cm), V₁-Dharidar (6.81 cm) and V₈-Rewa-72 (6.25 cm). While, the minimum fruit diameter was recorded with V₄-Strawberry (2.31 cm). The variation among cultivars as regard to physical characters could be due to genetic variability, inherent characters and climatic adaptability in a particular region, which might prove to be an important diagnostic character for selection of germplasm for local conditions. Although, size of the fruit is a varietal character it may be to some extent influenced by the total number of fruits borne on the tree, soil moisture, source sink relation and other factors suggested by Dolkar *et al.*, (2014)^[5]. Significantly maximum number of seeds per fruit was received in variety V₈ Rewa-72(430.67) is also followed by V₁-Dharidar (413.99). The minimum number of seeds per fruit was recorded with V₄ Strawberry (188.00). Variety V₂-Chittidar had significantly higher pulp percentage (97.03 %). Beside this, V₆-Lucknow-49 (96.86 %), V₈-Rewa-72 (96.72%) and V₁-Dharidar (96.11%) were also recorded significantly at par with V₂-Chittidar. Whereas, lower pulp percentages (90.82%) were recorded in V₄-Strawberry). Thonte and Chakrawar (1982)^[15] concluded that the quantification of traits could help to understand the potential of germplasm in selection of potential parent for their future utilization in breeding programmes. The present study showed a high degree of variation among analyzed guava genotypes indicating that existing guava germplasms are important source of genetic diversity that can be used in the guava improvement programme.

Yield parameters

The yield is known to be a polygenic character where genetic makeup distinct growing condition management practices and fruiting season has influenced. The maximum average fruit weight was found under V₆-Lucknow-49 (218.67 g) followed by V₁-Dharidar (217.45 g) and V₈-Rewa-72 (205.67 g). Whereas, the minimum fruit weight was found in variety V₄-Strawberry (13.27 g). Change in geographical location or inherent genetics characters were the reasons behind variation in fruit weight among different genotypes. Raghav and Tiwari (2008)^[7, 9, 16] had also reported similar findings. The highest number of fruits per plant was recorded in V₆-Lucknow-49 (660.00) and V₈-Rewa-72 (686.67) followed by V₂-Chittidar (633.33). While, the least number of fruits was recorded in V₄-Strawberry (276.67). These findings are confounding with the findings of Deshmukh *et al.*, (2013)^[6] reported that this type of variation may be due to phenotypic and genotypic interactions among the cultivars under test condition. The maximum yield was obtained with V₆-Lucknow-49 (142.75 kg) followed by V₈-Rewa-72 (141.21 kg) respectively while the minimum yield was obtained in V₆-Strawberry (3.64 kg). These findings are confounding with the findings of Sahoo *et al.*, (2017)^[14] reported that the differences in yield per tree in various cultivars of guava may be ascribed to the different fruit yielding potential of the varieties under study. In some of the cultivars though the number of fruits per plant was more, but fruit yield was not so accordingly, which may be due to distribution and diversion of available assimilates in more number of fruits.

Physico-chemical parameters

Analysis of physico-chemical parameters of guava, it was observed that there was significant difference in the TSS, acidity with regard to different cultivars Highest total soluble solids was noticed in V₆-Lucknow-49 (12.71 ^oBrix) followed by V₂-Chittidar (12.20 ^oBrix), V₈-Rewa-72 (12.07 ^oBrix) and

V₅-Nasik (11.90 °Brix). Whereas, the lowest was found in V₄ Strawberry (10.30 °Brix). V₆Lucknow 49 recorded the minimum acidity (0.37%). Although, V₃ – Apple colour and V₇ –Gwalior 27 (0.42 %) and V₂.Chittidar (0.43%) was also observed significantly at par with V₆. Lucknow 49. The maximum acidity was recorded in V₄.Strawberry (0.60%). These findings are confounding with the findings of Tiwari *et al.*, (2016) [7, 9, 16] reported that It might have necessitated

consumption of nutrients and diverting more carbohydrates into the fruits, this in turns produced larger fruits with more TSS which ultimately reduced acidity. Singh *et al.*, (2016) [3, 12, 13, 16] concluded that these variations may be due to the genetic makeup of the cultivars and adaptation to climatic conditions. The findings are in also conformity with the results reported by Deshmukh *et al.*, (2013) [6].

Table 1: Evaluation of guava (*Psidium guajava* L.) cultivars for morphological, yield and quality attributes

Symbol	Treatments	Plant height (m)	Canopy spread (m)		Total number of flowers per plant	Fruit length (cm)	Fruit diameter (cm)	Number of seeds per plant	Pulp percentage	Average fruit weight (g)	Number of fruit per plant	Yield per plant (kg)	TSS	Acidity
			East-west	North-south										
V ₁	Dharidhar	4.54	5.93	4.89	1125.33	7.07	6.81	413.99	96.11	217.45	620.00	134.75	11.27	0.48
V ₂	Chittidar	5.11	7.10	5.50	1093.33	7.25	6.94	349.37	97.03	175.00	633.33	110.82	12.20	0.43
V ₃	Apple colour	4.41	6.42	7.03	1106.67	6.35	5.96	335.19	95.36	189.33	503.33	95.37	11.13	0.42
V ₄	Strawberry	2.15	2.42	2.33	583.33	2.77	2.31	188.00	90.82	13.27	276.67	3.64	10.30	0.60
V ₅	Nasik	5.94	6.12	6.05	962.67	6.13	5.08	329.34	95.08	162.00	440.00	71.48	11.90	0.48
V ₆	L-49	4.54	5.70	5.49	1126.67	7.58	7.17	405.33	96.86	218.67	660.00	142.75	12.71	0.37
V ₇	G-27	5.57	5.57	6.52	1133.00	6.44	6.23	328.09	95.52	158.67	490.00	77.78	11.34	0.42
V ₈	Rewa-72	4.22	5.85	5.32	1130.00	6.54	6.25	430.67	96.72	205.67	686.67	141.21	12.07	0.48
V ₉	Surkhi	4.69	5.77	5.55	953.33	6.12	4.93	329.86	91.66	99.41	400.00	39.79	10.77	0.49
V ₁₀	Webber supremes	4.65	5.82	5.48	950.00	6.16	4.67	327.57	95.02	117.67	383.33	45.11	11.27	0.45
	Mean	4.58	5.67	5.42	1016.43	6.24	5.63	343.74	95.02	155.71	509.33	86.19	11.50	0.46
	CD@0.05%	0.74	1.07	1.23	21.64	0.72	0.72	23.22	1.23	13.30	39.62	7.99	1.12	0.06
		0.24	0.36	0.41	7.28	0.24	0.24	7.81	0.41	4.47	13.33	2.69	0.37	0.02

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