



## Evaluation of guava (*Psidium guajava* L.) germplasm under semi-arid environment of central Gujarat

D. S. Mishra, Sanjay Singh, A. K. Singh, Vikas Yadav and P. L. Saroj  
ICAR-CIAH Regional Station Central Horticultural Experiment Station,  
Vejalpur, Panchmahal, (Godhra), Gujarat-389340  
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### Abstract

The growth, yield and fruit quality characters of twenty one germplasm including varieties of guava were evaluated during the winter season of 2018-19. Plant growth habit of most of the guava genotypes found to be upright growing followed by Semi spreading and spreading. Plant height was observed higher in CHESG-11 followed by CHESG-5 whereas plant spread and stem diameter were higher in CHESG-16 and CHESG-24 respectively. The highest yield tree<sup>-1</sup> was recorded in fruit yield/tree was recorded in CHESG-21 followed by CHESG-15 while the minimum fruit yield was found in Dhawal. All the evaluated germplasm had white flesh except Lalit, CHESG-2, CHESG-15, CHESG-16, CHESG-21 and CHESG-24. The maximum fruit weight was observed in MPUAT-2 (322.33 g) while the minimum fruit weight was recorded in Dhawal (97.66 g) followed by MPUAT-1 (106.83 g). The maximum fruit length was recorded in CHESG-21 (8.82 cm) followed by Thai guava (8.22 cm) while the highest width was found in MPUAT-2 (8.71 cm) followed by Thai guava (8.22 cm). MPUAT-2 also recorded the maximum seed core diameter (6.0 cm) and pulp thickness (1.70 cm). The highest 100 seed weight was noted in VNNR Vihi1 (1.97 g) followed by CHESG-2 (1.56 g) while it was recorded least in CHESG-15 (0.87 g). The highest TSS was recorded in Dhawal (20.0 °Brix), however, the highest TSS:acidity was observed in CHESG-15 (29.64). The maximum acidity (0.95 %) and ascorbic acid (283.20 mg/100 g<sup>-1</sup>) were recorded in CHESG-21 while the minimum acidity (0.49 %) and ascorbic acid (67.98 mg/100 g) were found in L-49 and CHESG-28 respectively.

**Keywords:** Environment, evaluation, germplasm, guava

### Introduction

The guava (*Psidium guajava* L.) popularly known as apple of tropics, belongs to the family Myrtaceae, extensively cultivated in the tropical and sub tropical parts of India. Owing to its high nutritive value, wider adaptability to diverse agro-climatic conditions, early and prolific bearing with a high monetary return (Mishra *et al.*, 2018), guava is becoming popular as a commercial crop in western part of India. The fruit is a rich source of vitamin C, calcium, iron, pectin and is common raw material in fruit processing industry. In India, it is the fourth and fifth most important fruit crop by area and production, respectively. It occupies an area of 0.27m ha with a total production of 3.67 mt. In Gujarat, it is mainly grown in Ahmadabad, Vadodara, Anand, Bhavnagar, Rajkot and Bharuch districts with a total production 140.80 thousand tonnes from an area of 10.80 thousand ha; the average productivity is 13.0 t ha<sup>-1</sup> (Anonymous, 2014). Guava exhibits high levels of genetic diversity due to prevalence of seed propagation (Mishra *et al.*, 2018). Therefore, survey was conducted in different parts of Gujarat to select elite seedlings from existing heterozygous seedling population having desirable horticultural traits. Selected genotypes were collected in the form of air-layers during 2016-17 and planted in the field gene repository for evaluation on the basis of growth, yield and quality characters.

### Materials and Methods

Twenty one genetically diverse genotypes including

cultivars were evaluated for growth, yield and fruit quality attributes at the ICAR-CIAH, Bikaner regional station CHES, Godhra planted during 2016-17 at a spacing of 5 m x 5 m in randomized block design, replicated thrice. Winter crop 2018-19 was taken for recording the data on fruit yield and quality attributing characters. Three uniform trees of each genotype/cultivar was selected for recording observations on growth in terms of plant height (m), stem diameter (cm) and plant spread (m). Average fruit weight (g) was calculated by weighing the fruits in an electronic balance. The yield (kg tree<sup>-1</sup>) was obtained through the weighing the harvested fruits. However, for measuring physical parameters like fruit weight, seed weight and fruit size were recorded as per standard procedures with the help of an electronic balance and vernier caliper respectively. The total soluble solids (TSS) were determined with Hand Refractometer (0-32°Brix). The titratable acidity (%) and ascorbic acid content were determined by method of AOAC (1980). The average data were subjected to statistical analysis as per the method outlined by Gomez and Gomez (1984). Least significant difference at 5% level was used for testing the significant differences.

### Results and Discussion

Plant growth habit of most of the guava genotypes found to be upright (CHESG-2, CHESG-4, CHESG-5, CHESG-11, CHESG-15, CHESG-19, CHESG-24, CHES-28, Sweta, Dhawal, MPUAT-2) followed by Semi spreading

(CHESG-1, CHESG-21, CHESG-23, Allaahabad Safeda, Lalit, VNR Vihi1, Thai guava, MPUAT-1 and spreading (CHESG-16, L-49). The maximum plant height was recorded in CHESG-5 (3.0 m) followed by CHESG-5 (2.80 m) and CHESG-15 (2.76 m) while the minimum plant height was noted in Sweta (1.46 m). However, the maximum plant spread was observed in both the directions (N-S 2.98 m and E-W 3.0 m) in CHESG-16 followed by CHESG-5 and MPUAT-1 in N-S direction (1.80 m) whereas in E-W direction, it was found in CHESG-15 and MPUAT-2 (2.73 m). The minimum plant spread in both the directions was found to be in Lalit (1.60 & 1.66 m). However, the maximum stem girth was recorded in CHESG-24 (7.53 cm) followed by CHESG-11 (7.11 cm) while the minimum stem girth was measured in Thai guava (Table 1). Genetic makeup of the plants and adaptability of diverse genotypes under different climatic conditions could be the possible reason for the wide variation with respect to growth and plant spread. The results of present findings are in agreement with Babu *et al.* (2007) and Singh *et al.* (2016).

Significantly the maximum number of fruits tree<sup>-1</sup> was observed in CHESG-21 (85) followed by MPUAT-1 (75) and CHESG-15 (65) and it was found minimum in Dhawal and MPUAT-2 (16.66). Whereas the maximum fruit yield tree<sup>-1</sup> was recorded in CHESG-21 (13.57 kg) followed by CHESG-15 (10.03 kg) while the minimum fruit yield was found in Dhawal (1.68 kg). All the evaluated germplasm had white

flesh except Lalit, CHESG-2, CHESG-15, CHESG-16, CHESG-21 and CHESG-24 (Table 1). The rich diversity in these characters may be due to highly heterozygous and diverse genetic background of parents (Singh *et al.*, 2016, Mishra *et al.*, 2018).

Physico-chemical characters of all the evaluated germplasm are depicted in Table 2. The maximum fruit weight was observed in MPUAT-2 (322.33 g). Although, fruit weight = 200 g was recorded in CHESG-21, CHESG-28, Thai guava and VNR Vihi1. However, the minimum fruit weight was recorded in Dhawal (97.66 g) followed by MPUAT-1 (106.83 g). The maximum fruit length was recorded in CHESG-21 (8.82 cm) followed by Thai guava (8.22 cm) while the highest width was found in MPUAT-2 (8.71 cm) followed by Thai guava (8.22 cm). However, the minimum fruit length and width were observed in MPUAT-1 (5.25 cm) and Dhawal (5.44 cm) respectively. MPUAT-2 recorded the maximum seed core diameter (6.0 cm) and pulp thickness (1.70 cm). However, Thai guava, VNR Vihi1, CHESG-28, CHESG-2, and CHESG-23 recorded pulp thickness = 1.50 cm. The highest 100 seed weight was noted in VNNR Vihi1 (1.97 g) followed by CHESG-2 (1.56 g) while it was recorded least in CHESG-15 (0.87 g). Similar variations in fruit size, seed core dia, pulp thickness and seed weight among diverse guava genotypes were reported by Yadav and Shankar (2007) and Mishra *et al.* (2018).

Table 1. Vegetative growth characters, pulp colour and yield of guava germplasm.

Germplasm	Growth habit	Plant height (m)	Canopy spread		Stem girth (cm)	No. of fruits/tree	Yield/tree (kg)	Pulp colour
			N-S (m)	E-W (m)				
CHESG-1	Semi spreading	2.43	2.55	2.61	5.53	55.66	8.11	White
CHESG-2	Upright	2.26	2.07	2.26	6.42	30.0	5.33	Pink
CHESG-4	Upright	2.08	2.17	2.62	4.51	40.0	6.45	White
CHESG-5	Upright	2.80	2.8	2.7	5.67	46.66	7.99	White
CHESG-11	Upright	3.00	2.58	2.7	7.11	28.33	4.35	White
CHESG-15	Upright	2.76	2.53	2.73	6.01	65.0	10.03	Pink
CHESG-16	Spreading	2.66	2.98	3	7.06	22.33	3.52	Pink
CHESG-19	Upright	2.23	2.58	2.4	4.78	41.66	5.61	White
CHESG-21	Semi spreading	2.40	2.5	2.4	5.28	85.0	13.57	Pink
CHESG-23	Semi spreading	2.13	2.2	2.23	5.01	21.66	3.51	White
CHESG-24	Upright	2.4	2.53	2.43	7.53	20.0	3.83	Pink
CHESG-28	Upright	1.90	1.93	1.76	4.26	25.0	5.61	White
Allahabad Safeda	Semi spreading	2.02	2.53	2.3	4.57	23.33	3.05	White
L-49	Spreading	1.80	2.5	2.48	4.63	60.0	11.15	White
Lalit	Semi spreading	1.86	1.6	1.66	3.96	35.0	3.57	Pink
Sweta	Upright	1.46	1.73	1.9	3.74	26.6	3.08	White
Dhawal	Upright	2.16	1.96	2.32	5.37	16.66	1.68	White
Thai Guava	Semi spreading	1.80	2.25	2.43	3.45	45.0	11.33	White
VNR Vihi1	Semi spreading	1.96	2.06	2.17	4.35	40.0	10.01	White
MPUAT-1	Semi spreading	2.38	2.8	2.73	4.6	75.0	7.99	White
MPUAT-2	Upright	2.60	2.7	2.8	5.52	16.66	5.39	White
Sem±	-	0.08	0.12	0.14	0.33	2.19	0.59	-
CD 0.05	-	0.22	0.34	0.4	0.94	6.26	1.70	-
CV (%)	-	5.96	8.65	10.1	10.92	9.73	16.05	-

There was a significant difference among the varieties with regard to chemical quality characteristics of guava fruits (Table 2). The highest TSS was recorded in Dhawal (20.0 °Brix) followed by CHESG-11(19.50 °Brix) while the minimum TSS was observed in MPUAT-1 (12.83 °Brix) followed by CHESG-1 (13.33 °Brix). The maximum acidity (0.95 %) and ascorbic acid (283.20 mg/100 g) were recorded in CHESG-21 while the minimum acidity (0.49 %) and ascorbic acid (67.98 mg/100 g) were found in L-49 and

CHESG-28 respectively. However, the highest TSS:acidity was observed in CHESG-15 (29.64) followed by L-49 (28.79) while it was found minimum in CHESG-16 (16.91). Similar kind of variation is recorded by Singh *et al.* (2016), Mishra *et al.* (2018) in guava and Mishra *et al.* (2018) in acid lime.

Based on the present findings, guava genotypes like CHESG-15 and CHESG-21 and cultivar L-49 found better in terms of yield and fruit quality parameters. The above findings are preliminary and needs to be studied further.

Table 2: Physico-chemical characters of guava germplasm.

Germplasm	Fruit weight (g)	Fruit length (cm)	Fruit width (cm)	Seed core dia. (cm)	Pulp thickness (cm)	100 seed weight (g)	TSS (°B)	Acidity (%)	TSS:acidity	Ascorbic acid (mg/100g)
CHESG-1	146.28	7.56	6.20	3.73	1.30	1.08	13.33	0.53	26.61	155.58
CHESG-2	176.83	6.27	6.84	4.66	1.56	1.54	15.16	0.76	19.98	265.97
CHESG-4	159.83	6.19	6.87	4.96	1.28	1.19	17.50	0.74	23.48	252.23
CHESG-5	172.33	6.57	6.56	4.73	1.16	1.23	17.50	0.75	23.23	183.76
CHESG-11	155.0	8.18	6.18	3.53	1.36	1.25	19.50	0.86	22.67	192.46
CHESG-15	154.0	6.07	6.60	4.07	1.23	0.87	17.16	0.58	29.64	201.86
CHESG-16	156.66	6.04	6.44	4.76	1.46	0.96	16.63	0.76	22.28	230.85
CHESG-19	134.83	7.85	5.86	3.43	1.26	0.99	15.33	0.70	21.92	213.81
CHESG-21	215.66	8.82	7.16	4.66	1.33	1.22	16.16	0.95	16.91	283.20
CHESG-23	161.50	8.02	6.42	3.80	1.50	1.13	15.93	0.57	27.77	177.76
CHESG-24	190.50	6.44	7.06	4.60	1.46	1.45	14.6	0.69	21.17	174.47
CHESG-28	227.16	7.66	7.15	4.43	1.56	1.27	15.63	0.64	24.46	67.98
Allahabad Safeda	132.16	5.75	6.05	4.50	1.33	1.29	15.26	0.69	22.15	192.74
L-49	190.93	6.95	6.37	4.10	1.28	1.42	14.06	0.49	28.79	193.81
Lalit	126.16	5.75	6.05	3.86	1.20	0.94	14.66	0.53	27.51	146.83
Sweta	115.73	6.17	5.91	3.53	1.26	0.93	14.96	0.77	19.33	162.51
Dhawal	97.66	5.63	5.44	3.33	1.23	1.41	20.00	0.74	26.81	91.66
Thai Guava	257.66	8.22	7.81	4.70	1.53	1.28	15.23	0.64	23.82	69.81
VNR Vihil	251.17	7.61	7.73	4.5	1.63	1.97	14.33	0.73	19.67	158.74
MPUAT-1	106.83	5.25	5.93	3.40	1.23	1.24	12.83	0.60	21.34	200.57
MPUAT-2	322.33	8.14	8.71	6.00	1.70	1.27	14.00	0.60	23.36	282.52
Sem±	13.38	0.24	0.19	0.14	0.05	0.04	0.62	0.04	1.55	9.11
CD <sub>(0.05)</sub>	38.26	0.69	0.55	0.42	0.15	0.12	1.77	0.11	4.45	26.04
CV (%)	13.34	6.03	4.99	5.98	6.86	6.16	6.81	9.74	11.48	8.5

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