

Variability Studies in Guava (*Psidium guajava* L.) Genotypes for Growth, Yield and Quality Attributes at mid-hills of Meghalaya

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Abstract

Eleven guava genotypes of five years old viz., RCG-1, RCG-2, RCG-3, RCG-11, RCGH-1, RCGH-4, RCGH-7, Allahabad Safeda, L-49, Lalit and Sangam were showed wide range of variation with respect to plant growth, yield and quality traits of fruit at sub tropics of Meghalaya. However, RCGH-1 was found superior in plant height (3.07m), stem diameter (6.65 cm), fruit yield (14.18 kg/tree) and highest ascorbic acid (246 mg/100 g) content. The hybrid RCGH-4 was found better in fruit weight (184.50 g) and fruit diameter (7.08 cm) whereas, the cultivar RCG-11 recorded least number of seed (53.29 Nos/100 g fruit weight) with highest pulp: seed ratio (94.25%) and T.S.S (11.88%). The RCGH-7 was found superior in quality attributes like lowest acidity (0.45%) and highest total sugar (8.39%) and pectin content (1.38 %). The genotypes viz., RCGH-1, RCGH-7 and RCG-11 were outscore other cultivars for growth, yield and quality attributes.

Keywords: guava genotypes, variability, fruit quality.

Introduction

Guava (*Psidium guajava* L.) belongs to the family Myrtaceae is one of the important fruit crop of India. Besides India, it is grown widely throughout the tropics of the world. Because of its better adoptability, guava is eulogized as 'the apple of tropics. It is a hardy fruit crop thriving well under a wide range of soil type varying from sandy loam to clay loam with a pH of 4.5 to 8.2. Guava fruit is rich in 'vitamin-C', minerals like calcium, iron and phosphorous with pleasant aroma and flavour (Dhaliwal and Dhillon 2003).

North Eastern Hill Region of India is bestowed with a heavy downpour with good distribution for about nine months a year provide immense scope for the commercial cultivation of guava (Singh 1983). The yield and quality of local

cultivars grown by the farmers is quite poor. So that it is requisite to trace the guava genotypes with higher yield and good quality. Hence, attempts were made to test genotypes suitable for mid-hill situation of Meghalaya.

Materials and methods

Eleven genetically diverse guava genotypes of five years old viz., RCG-1, RCG-2, RCG-3, RCG-11, RCGH-1, RCGH-4, RCGH-7, Allahabad Safeda, L-49, Lalit and Sangam were evaluated with respect to growth, yield and quality traits of fruit at ICAR Research Complex for NEH Region, Umiam (Meghalaya) during 2007-08. Three trees per replication of each genotype were selected from established bearing orchard and data were taken from selected plants with respect to growth, yield and quality attributes. Ten fruits were randomly harvested from each replication. Growth, yield and physico-chemical study was made in terms of plant height (m), stem diameter (cm), canopy spread (m²), shoot length (cm), shoot diameter (mm), number of leaves/shoot, yield (kg/tree), fruit weight (g), fruit length (cm), fruit diameter (cm), number of seed/100 g fruit, test weight (100 seed in g), pulp to seed ratio, TSS (%), acidity (%), ascorbic acid (mg/100g), total sugar (%), pectin (%), phenol (mg GAE/100 g FW) and dietary fibre (%). Plant growth, yield and physico-chemical attributes are important parameters to study the variability among the different fruit crops (Aulakh 2005, Pandey *et al.* 2007, Patel *et al.* 2007). Total soluble solid (TSS) was determined with the help of digital refractometer. Acidity was determined by titrating the juice against N/10 NaOH and expressed as per cent citric acid. Ascorbic acid content and dietary fibre content of fruit was determined with the help of the method given in A.O.A.C. (1970) and sugars were analyzed as per method given by Lane and Eynon (1943). The total pectin content of guava fruit was estimated as per method given by Ranganna (1997) and total phenol content was determined using the Folin-Ciocalteu's reagent (Singleton and Rossi 1965). The data was statistically analysed by method of analysis of variance using RBD as described by Panse and Sukhatme (1985).

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Results and discussion

Data showed (Table 1) that genotypes differed significantly with respect to their growth, yield and quality attributes. Plant growth was recorded in terms of plant height, stem diameter, canopy spread, shoot length and diameter. The maximum plant height was noticed in RCGH-1 (3.07 m) followed by Allahabad Safeda (2.93 m), RCG-2 (2.79 m), RCGH-4 (2.76 m) and RCG-3 (2.70 m) with minimum in L-49 (2.04 m). The maximum stem diameter was recorded in RCGH-1 (6.65 cm) followed by RCG-2 (6.26 cm) and Allahabad Safeda (6.20 cm) while, minimum in Sangam (4.17 cm). Canopy spread varied from 2.35 m² in RCG-3 to 7.66 m² in Lalit. The maximum shoot length was recorded in RCG-3 (96.83 cm) whereas minimum shoot length was noticed in Lalit (61.75 cm). The shoot diameter dose not showed any significant variation among the genotypes, but the highest shoot diameter was recorded in RCG-3 (11.57 mm) with lowest in RCGH-7 (9.80 mm). The number of leaves/shoot varied from 36.83 in RCGH-4 to 45.50 in RCG-3. The maximum fruit yield was obtained in RCGH-1 (14.18 kg/tree) followed by Lalit (14.12 kg/tree), whereas, minimum in Sangam (5.40 kg/tree) followed by RCG-11 (7.44 kg/tree). Similar results were also reported by Patel *et al.* (2007) in guava cv. Hybrid-11

Physical characteristics of the fruits (Table 2) revealed that the highest fruit weight was recorded in cultivar RCGH-4 (184.50 g) whereas, lowest fruit weight was found in Sangam (92.48 g). Similar finding was also reported by Singh (2003) in guava cv. Lucknow-49 under Tripura condition. The fruit length varied from 5.16 cm in Sangam to 7.08 cm in RCG-2. The maximum fruit diameter was recorded in RCGH-4 (7.08 cm) whereas, minimum in RCG-1 (5.25 cm). The RCG-11 (53.29 Nos.) recorded minimum number of seed/100 g fruit weight whereas maximum in RCG-2 (361.44 Nos.) followed by RCG-3 (358.08 Nos.) and RCG-1 (310.32 Nos.). This study was in close conformity with the findings of Babu *et al.* (2002) in RCG-11 and Patel *et al.* (2007) in RCGH-1. The test weight of 100 seeds was recorded and it was found that the RCG-1 had the minimum test weight (0.96 g) followed by RCG-2 (1.00 g), RCGH-4 (1.05 g), Sangam (1.09g) and RCG-3 (1.10 g). The highest pulp: seed ratio was recorded in RCG-11 (94.25) however, lowest in RCG-1 (27.27).

The chemical analysis of fruit (Table 3) in terms of TSS, acidity, ascorbic acid (mg/100g), total sugar (%), pectin (%), phenol (mg GAE/100 g FW) and dietary fibre (%) revealed that the highest TSS was recorded in RCG-11 (11.88%) followed

by RCGH-1 (10.78%) and RCGH-7 (10.20%) and lowest in Lalit (9.35%). The minimum acidity was recorded in RCGH-7 (0.45%) followed by RCG-11 (0.46%), RCG-1 (0.48%), RCG-2 (0.49%), RCGH-1 (0.51%), RCG-3 (0.52%) and L-49 (0.55%) while, Sangam (0.65%) recorded maximum acidity. These results are in tune with Babu *et al.* (2002) who reported highest TSS content in RCG-11. The variety RCGH-1 (246 mg/100 g) showed significantly higher ascorbic acid content in comparison with others however, lowest content was in RCG-3 (149.13 mg/100 g). The maximum total sugar was recorded in RCGH-7 (8.39%) followed by RCGH-1 (8.28%) and RCG-11 (8.12%), while minimum in RCG-3 (6.04%). The pectin content was recorded highest in RCGH-7 (1.38 %) followed by RCGH-1 (1.35%), RCG-3 (1.30%) and RCG-11 (1.29%) however, lowest in RCG-2 (0.82%) followed by RCG-1 (0.87%). The phenol content was found maximum in RCG-3 (377.45 mg GAE/100g) followed by RCGH-7 (365.85 mg GAE/100g) while, minimum in RCGH-4 (250.50 mg GAE/100g). The dietary fibre did not show any significant variation among the hybrids/cultivars but, the highest dietary fibre was in RCG-1 (4.70%) with lowest in RCG-11 (2.38%). These findings are in line with Babu *et al.* (2002) who reported that the Selection-11, Selection-7, Lucknow-49 and Allahabad Safeda gave high quality fruits.

In the present investigation, it was observed that physico-chemical characteristics of fruits differed due to varied climatic condition of Meghalaya as compared to other part of the country which was also reported by Chadha *et al.* (1981), Ojha *et al.* (1985), Singh *et al.* (1976) and Teotia *et al.* (1962).

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Table 1: Plant growth and yield performance of guava genotypes at 5th years of planting

Genotype	Plant height (m)	Stem dia. (cm)	Canopy spread (m ²)	Shoot length (cm)	Shoot dia. (mm)	No. of leaves/shoot	Yield (kg/tree)
RCG-1	3.00	5.62	4.50	76.67	10.90	39.83	8.03
RCG-2	2.79	6.26	4.81	88.73	10.30	42.00	9.72
RCG-3	2.70	4.89	2.35	96.83	11.57	45.50	10.38
RCG-11	2.47	4.50	6.42	64.17	10.70	37.83	7.44
RCGH-1	3.07	6.65	3.72	91.17	10.53	44.83	14.18
RCGH-4	2.76	5.45	7.21	66.50	10.55	36.83	10.55
RCGH-7	2.23	4.86	4.43	93.58	9.80	41.33	7.63
Allahabad Safeda	2.93	6.20	4.32	95.50	11.15	43.83	11.54
Lucknow-49	2.04	4.42	6.75	65.25	10.40	41.42	10.03
Lalit	2.32	4.97	7.66	61.75	10.47	40.50	14.12
Sangam	2.33	4.17	4.87	80.75	11.03	43.33	5.40
SEM±	0.14	0.23	0.82	6.75	0.46	1.68	0.72
CD (P= 0.05)	0.40	0.68	2.42	19.91	NS	4.97	2.11

Table 2: Physical parameters of guava fruit genotypes at 5th years of planting

Genotype	Fruit weight (g)	Fruit length (cm)	Fruit dia. (cm)	No. of seeds/100 g fruit weight	Test weight 100 seed (g)	Pulp:seed weight ratio
RCG-1	115.00	6.85	5.25	310.32	0.96	27.27
RCG-2	117.20	7.08	5.38	361.44	1.00	29.30
RCG-3	142.40	6.58	5.62	358.08	1.10	35.56
RCG-11	92.95	5.33	5.33	53.29	2.07	94.25
RCGH-1	168.44	6.15	6.25	148.16	1.46	37.41
RCGH-4	184.50	6.70	7.08	187.93	1.05	50.34
RCGH-7	125.25	5.99	5.89	115.42	1.69	51.83
Allahabad Safeda	112.52	5.67	5.77	145.52	1.37	54.91
Lucknow-49	100.75	5.66	5.80	137.72	1.40	52.76
Lalit	116.50	5.70	5.26	174.60	1.24	56.80
Sangam	92.48	5.16	5.36	202.40	1.09	57.33
SEM±	4.89	0.049	0.06	20.59	0.08	4.53
CD (P= 0.05)	14.39	0.15	0.17	60.72	0.24	13.37

Table 3 Bio-chemical composition of guava fruit genotypes at 5th years of planting

Genotypes	TSS (%)	Acidity (%)	Ascorbic acid (mg/100 g)	Total sugar (%)	Pectin (%)	Phenol (mg GAE/100 g)	Dietary fibre (%)
RCG-1	9.82	0.48	185.12	7.01	0.87	326.40	4.70
RCG-2	9.48	0.49	178.40	6.70	0.82	319.75	4.25
RCG-3	9.60	0.52	149.13	6.04	1.30	377.45	3.85
RCG-11	11.88	0.46	215.33	8.12	1.29	330.65	2.38
RCGH-1	10.78	0.51	246.00	8.28	1.35	265.40	3.50
RCGH-4	9.50	0.58	198.00	6.71	0.82	250.50	2.81
RCGH-7	10.20	0.45	213.13	8.39	1.38	365.85	2.44
Allahabad Safeda	9.67	0.59	181.00	6.95	0.98	342.30	3.11
Lucknow-49	9.93	0.55	199.35	7.00	1.00	278.60	2.86
Lalit	9.35	0.61	179.00	6.92	1.12	352.40	2.97
Sangam	9.70	0.65	190.37	6.96	0.97	352.40	2.41
SEm±	0.18	0.04	2.29	0.14	0.04	3.99	0.84
CD (P= 0.05)	0.52	0.12	6.76	0.40	0.11	11.77	NS

GAE= Gallic acid equivalent