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# Variability studies in guava (*Psidium guajava* L.) genotypes for growth and yield attributes at Chhattisgarh plains

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**Abstract**

Eighteen guava genotypes viz., BSPG-1, BSPG-2, BSPG-3, BSPG-4, BSPG-5, BSPG-6, BSPG-7, BSPG-8, BSPG-9, RJMG-1, RJMG-2, RJMG-3, RJMG-4, RJMG-5, RJMG-6, RJMG-7, RJMG-8 and RJMG-9 were showed wide range of variation with respect to plant growth and yield attributes. The result revealed a great variability for various characters which helped to identify the most promising genotypes. The tree height varied from 3.50–4.43 m, trunk girth varied from 39.25–55.44 cm, North-South spread ranged from 5.11–7.78 m, while East-West spread varied from 5.10–7.84 m. Number of fruits per tree varied from 55–121 and fruit yield per tree varied from 8.16–21.32 kg, fruit length (6.23 to 7.84 cm), fruit width (6.41 to 7.66 cm), fruit weight (130.00 to 229.17 g), pulp weight (112.33 to 205.55 g), seed weight (2.32 to 3.70 g), number of seeds per fruit (177 to 346.67).

**Keywords:** Guava, genotypes, variability, growth, yield

**Introduction**

Guava (*Psidium guajava* L.) Popularly known as “Apple of Tropics” is a tropical fruit but also grows well under sub-tropical condition. It is one of the most common fruits in India and considered the fifth most important fruit in area and production after mango, citrus, banana and apple. Guava is a hardy, prolific bearer and highly remunerative fruit. It is found favour with the fruit growers due to its wide adaptability and higher return per unit area. Guava is such a fruit which is grown all over the country in the kitchen gardening, near the well and tubewell premises and on a commercial scale (Bal, 2014). It is believed to be introduced in India early in the 17<sup>th</sup> century, it belongs to family Myrtaceae and genus *Psidium* contains about 150 species (Hayes, 1970). In India, guava occupies an area of 2.51 Lakh ha and production of 40.83 Lakh M.T. with productivity 16.3 M.T./ha (Anon., 2015). Its cultivation is common in India, which is concentrated mainly in Uttar Pradesh, Bihar, Madhya Pradesh, Maharashtra and Chhattisgarh. It is widely distributed with highest productivity in M.P. (Anon., 2015), although best quality fruits are produced in Uttar Pradesh. Uttar Pradesh is one of the most important states of India where about half of the total area is under guava and the district Allahabad has reputation of growing the best quality guava in the country as well as in the world (Bose and Mitra, 1985). Chhattisgarh covered an area of 0.21 Lakh ha and annual production of 1.74 Lakh M.T. with productivity 8.56 M.T./ha (Anon., 2015). Guava being a cross-pollinated crop has large variability in size of fruit as well as colour of pulp. This natural variability available within the species is often exploited to identify superior genotypes. Chhattisgarh plains has availability of lines of guava and exists in the form of land races, hence there exists a lot of scope to identify best one amongst wild strains available in plenty.

**Material and methods**

The details of the experimental material used, methods followed and techniques adopted during the course of investigation entitled “Collection and Evaluation of Guava (*Psidium guajava* L.) Genotypes in Chhattisgarh plains” was undertaken during the year 2016-2017. The survey was conducted in two District viz., Bilaspur and Dhamtari to identify superior guava genotypes in Chhattisgarh plains. Bilaspur district is situated between 22.09° North Latitudes and 82.15° East Longitudes. The district is surrounded by Korea in the North, Anuppur and Dindori Districts of Madhya Pradesh on the west, Kawardha on the South-West and Durg and Raipur on the South and Korba and Janjgir-Champa on the East.

The survey work was conducted in village Kodasar of Takhatpur block. Dhamtari is situated in the central part of Chhattisgarh and lies 20.63° North Latitude and 82.05° East longitude and surrounded by Mahasamund, Raipur and Gariyaband District of Chhattisgarh. The survey work was conducted in village Chandrasur of Magarlod block. The experiment consists of 18 guava genotypes aged about 8- 10 years from two district bilaspur and dhamtari in Chhattisgarh plains. Eighteen genotypes of guava viz., BSPG-1, BSPG-2, BSPG-3, BSPG-4, BSPG-5, BSPG-6, BSPG-7, BSPG-8, BSPG-9, RJMG-1, RJMG-2, RJMG-3, RJMG-4, RJMG-5, RJMG-6, RJMG-7, RJMG-8 and RJMG-9 were selected for the experiment. The experiment was laid out in completely randomized block design with 15 treatments each of which replicated 3 times. The data were taken from selected plants with respect to growth and yield attributes. Eighteen fruits were randomly harvested from each replication. Growth and yield study was made in terms of tree height (m), trunk girth (cm), canopy spread (m), number of fruits per tree, yield (kg/tree), fruit length (cm), fruit width (cm). Fruit weight (gm), pulp weight (gm), seed weight (gm), number of seed per fruit. The experimental data of all the parameters was subjected to statistical analysis for proper interpretation. The statistical analysis of the data in respect of the yield and quality components of fruit and plant was done according to the statistical procedure. Data recorded on various characters were subjected to statistical analysis of variance technique as given by Gomez (1985) [8].

### Results and discussion

Data showed (Table 1) that genotypes differed significantly with respect to their growth and yield attributes. Plant growth was recorded in terms of plant height, trunk girth, canopy spread. The maximum tree height (4.43 m) was recorded in RJMG-9 followed by genotype BSPG-8 (4.40 m) and BSPG-3 (4.30 m) whereas, the minimum tree height (3.50 m) was recorded in RJMG-6. The maximum trunk girth (55.44 cm) was recorded in BSPG-8 followed by BSPG-3 (55.32 cm) and RJMG-9 (53.66 cm) whereas, the minimum trunk girth (39.25 cm) was recorded in RJMG-6. The maximum plant spread in North-South direction was observed in genotype RJMG-3 (7.78 m) followed by BSPG-3 (7.43 m) and BSPG-8 (7.33 m) whereas, minimum plant spread in North-South direction was

observed in BSPG-9 (5.11 m). The maximum plant spread in East-West direction was observed in genotype RJMG-4 (7.84 m) followed by RJMG-7 (7.55 m) and RJMG-1 (7.37 m) whereas, minimum plant spread in East-West direction was observed in BSPG-6 (5.10 m). The maximum number of fruits per plant was observed in the genotype RJMG-4 (121) followed by BSPG-3 (106) and RJMG-3 (102) whereas, minimum number of fruits per plant was found in the genotype BSPG-6 (55). The highest fruit yield per plant was observed in the genotype RJMG-1 (21.32 kg) followed by BSPG-2 (20.81 kg) and BSPG-1 (18.92 kg) whereas, lowest yield per plant found in the genotype BSPG-6 (8.16 kg). Physical characteristics of the fruits (Table 2) revealed that The maximum fruit length was observed in genotype BSPG-1 (7.84 cm) which was found to be *at par* with RJMG-1 (7.72 cm), BSPG-8 (7.36 cm), RJMG-8 (7.31 cm) and RJMG-9 (7.29 cm) whereas, minimum fruit length was observed in BSPG-3. THE maximum fruit width was reported in genotype BSPG-1 (7.66 cm) which was found to be *at par* with RJMG-1 (7.53 cm), BSPG-2 (7.49 cm), BSPG-8 (7.22 cm), RJMG-9 (7.19 cm), RJMG-3 (7.17 cm), RJMG-8 (7.17 cm), RJMG-5 (7.15 cm), BSPG-6 (7.13 cm) RJMG-6 (7.12 cm) and RJMG-7 (7.11 cm) whereas, minimum fruit width was observed in genotype RJMG-4. These findings are in agreement with the work of Patel *et al.* (2007) [14] and Pandey *et al.* (2016) [12] in guava. The maximum fruit weight was noticed under genotype RJMG-1 (229.17 g), which was found to be *at par* with BSPG-2 (216.81 g) and BSPG-1 (212.67 g) whereas, the minimum fruit weight was observed in genotype BSPG-3 (130 g). The maximum pulp weight was noticed under genotype RJMG-1 (205.55 g) which was *at par* with BSPG-2 (191.59 g) and BSPG-1 (188.04 g) whereas, the minimum pulp weight was observed in genotype BSPG-3 (112.33 g). The minimum seed weight was observed in genotype RJMG-3 (2.32 g) followed by BSPG-9 (2.53 g) and RJMG-8 (2.64 g) whereas, the maximum seed weight was observed under genotype RJMG-7 (3.70 g). These results are in agreement with Gohil *et al.* (2006) [7] and Meena *et al.* (2013) in guava. The maximum number of seeds per fruit was observed in the genotype RJMG-7 (346.67) which was found to be *at par* with BSPG-7 (333.67), RJMG-9 (327.67) and BSPG-5 (321.67) whereas, minimum number of seeds was found in the genotype RJMG-3 (177).

**Table 1:** Growth and yield parameters of *in-situ* guava genotypes.

Genotypes	Tree height (m)	Trunk Girth (cm)	Canopy spread N-S (m)	Canopy spread E-W (m)	Number of fruits per Tree	Fruit yield Per plant (kg)
BSPG-1	3.66	42.15	6.10	6.55	89	18.92
BSPG-2	3.80	44.25	7.32	5.98	96	20.81
BSPG-3	4.30	55.32	7.43	5.80	106	13.78
BSPG-4	3.90	45.45	5.66	6.10	71	13.95
BSPG-5	3.70	42.10	6.03	5.47	66	10.07
BSPG-6	3.60	40.33	5.45	5.10	55	8.16
BSPG-7	4.10	51.26	5.76	6.20	62	11.05
BSPG-8	4.40	55.44	7.33	5.66	98	18.01
BSPG-9	4.00	47.15	5.11	5.30	58	9.70
RJMG-1	3.95	45.55	5.93	7.37	93	21.32
RJMG-2	3.55	40.13	6.55	5.36	86	13.33
RJMG-3	4.05	48.20	7.78	5.38	102	17.77
RJMG-4	3.85	45.10	5.90	7.84	121	15.94
RJMG-5	3.94	47.00	5.14	5.77	61	10.94
RJMG-6	3.50	39.25	6.77	5.49	91	14.80
RJMG-7	4.15	53.22	6.23	7.55	95	17.87
RJMG-8	3.76	44.13	6.38	5.44	82	12.24
RJMG-9	4.43	53.66	5.43	6.12	74	13.40
Range	3.50-4.40	39.25-55.44	5.11-7.78	5.10-7.84	55-141	8.16-21.32
Mean	3.92	46.64	6.23	6.02	83.66	14.55

**Table 2:** Physical parameters of *in-situ* guava genotypes.

Genotypes	Fruit length (cm)	Fruit width (cm)	Fruit weight (g)	Pulp weight (g)	Seed weight (g)	Number of seeds per fruit
BSPG-1	7.84	7.66	212.67	188.04	3.26	253.67
BSPG-2	7.25	7.49	216.81	191.59	3.14	273.00
BSPG-3	6.23	6.42	130.00	112.33	3.17	277.67
BSPG-4	7.19	6.66	196.41	176.24	2.89	242.33
BSPG-5	7.04	6.88	152.59	134.33	3.54	321.67
BSPG-6	7.00	7.13	148.30	132.75	3.32	286.67
BSPG-7	7.23	7.08	178.14	161.22	3.40	333.67
BSPG-8	7.36	7.22	183.80	162.00	2.67	233.00
BSPG-9	6.97	6.59	167.31	148.30	2.53	214.33
RJMG-1	7.72	7.53	229.17	205.55	3.00	254.67
RJMG-2	7.17	6.86	155.11	134.25	2.80	268.67
RJMG-3	7.26	7.17	174.25	151.18	2.32	177.00
RJMG-4	6.54	6.41	131.80	113.00	2.95	246.00
RJMG-5	7.07	7.15	179.37	160.51	3.09	270.67
RJMG-6	6.99	7.12	162.66	140.76	2.90	256.00
RJMG-7	7.23	7.11	188.21	167.33	3.70	346.67
RJMG-8	7.31	7.17	149.32	132.66	2.64	210.67
RJMG-9	7.29	7.19	181.17	164.21	3.34	327.67
S.E.m±	0.19	0.19	8.03	8.33	0.12	11.06
C.D. at 5%	0.57	0.55	23.20	24.02	0.36	31.94

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