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EVALUATION OF GUAVA (*Psidium guajava* L.) GENOTYPES OF CHHATTISGARH BASED ON QUALITATIVE TRAITS

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ABSTRACT

A survey was conducted for the collection and evaluation of guava genotypes of Chhattisgarh plains during 2016-17. The ripe fruits of eighteen elite genotypes of guava were analyzed for their bio-chemical characters. The genotype BSPG-1 recorded highest TSS (12.21 °Brix), total sugar (8.91 %) and non-reducing sugar (2.64 %). The genotype RJMG-8 recorded the highest acidity (0.74 %) while, highest ascorbic acid was observed in RJMG-5 (271.45 mg 100 g^{-1} pulp). Maximum reducing sugar was recorded in RJMG-1 (6.85 %). Correlation studies of different characters in guava genotypes have revealed that TSS is positively and significantly correlated with total sugars (0.951) and reducing sugars (0.957). The variation in these characters generated useful information for selection of parents for further guava breeding programme. From the investigation, it is concluded that genotypes BSPG-1, RJMG-1 and BSPG-8 were superior to other genotypes in relation to different qualitative characters.

(Keywords: Guava, Chhattisgarh, genotype, TSS, sugars)

INTRODUCTION

Guava (*Psidium guajava* L.) popularly known as "Apple of Tropics" is a tropical fruit but also grows well under sub-tropical condition. The fruit is rich in vitamins C, A and B_1 and minerals like phosphorus and iron. It contains about 180-300 mg of vitamin C 100 g^{-1} of pulp. In India, guava occupies an area of 20.83 lakh ha with an annual production of 22.7 lakh MT (Anonymous, 2015). Chhattisgarh covered an area of 0.21 Lakh ha and annual production of 1.74 Lakh M.T. with the productivity of 8.56 M.T. ha^{-1} (Anonymous, 2015). Guava being a cross-pollinated crop has large variability in size of fruit as well as the colour of pulp. This natural variability available within the species is often exploited to identify superior genotypes.

Chhattisgarh plains have availability of lines of guava and exist in the form of land races, hence there exists a lot of scopes to identify best one amongst wild strains available in plenty. The variation with regard to yield, flesh colour and quality among different guava cultivars and genotypes were also reported by Mitra *et al.* (1983), Bal and Dhaliwal (2004) and Ghosh *et al.* (2013) in different parts of the country. Therefore, the present study was undertaken to study the chemical characteristics of various genotypes of guava and to find out the suitable genotype of guava for Chhattisgarh Plain's condition.

MATERIALS AND METHODS

The survey was conducted in two Districts viz., Bilaspur and Dhamtari during 2016-17 to identify superior guava genotypes in Chhattisgarh plains. Experiment location of Kodasar, Bilaspur district is situated between 22.09° North Latitudes and 82.15° East Longitudes and Chandrasur, Dhamtari District is situated in the central part of Chhattisgarh and lies 20.63° North Latitude and 82.05° East longitude. Different genotypes were chosen by collecting the information from local people. Only 8-10 years old genotypes were identified for this study. The data were statistically analyzed by the method of analysis of variance using Randomized Block Design. All the treatments (genotypes) were replicated three times and one tree served as a unit of treatment in each replication. Thirty fruits were randomly harvested from each genotype (tree) for recording observations. The fruit quality was studied in terms TSS (°B), acidity (%), ascorbic acid (mg $100g^{-1}$), total sugar (%), reducing sugar (%) and non-reducing sugar (%). 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 malic acid. The ascorbic acid content of fruit was determined with the help of the method given by Anonymous (2000) and total sugar was analyzed as per method is given by Lane and

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Eynon's method reported by Ranganna (1986). Data were expressed as the mean of all the scores. Statistical analyses were done using the software OPSTAT developed at CCS HAU, Hisar.

RESULTS AND DISCUSSION

Data from table 1 revealed that genotype BSPG-1(12.21 ºBrix) recorded the highest TSS, which was found to be *at par* with genotypes BSPG-8 (12.16 °Brix) and RJMG-1 (12.08 °Brix). The lowest TSS was recorded in genotype BSPG-5 (8.75 °Brix) followed by genotypes RJMG-9 (8.86 °Brix) and RJMG-6 (8.97 °Brix). This might be due the favourable temperature and humidity during the fruit growth period which might have influenced the retention of higher TSS in the ripe fruits. Increase in TSS might be due to the conversion of starch and their insoluble carbohydrate into a soluble form of sugar content as reported by Bal and Dhaliwal (2004) and Ghosh *et al*. (2013) in guava.

The maximum acidity (0.74%) was noted in genotype RJMG-8. Genotype RJMG-2 recorded the lowest acidity content (0.26 %) followed by RJMG-6 (0.29%) and BSPG-1 (0.32%) which was statistically lower than all other genotypes. The higher and lower values of acidity might be due to inheritance, which is quite helpful in finding the suitable elite types as per requirements. Some other climatic factors like temperature and humidity, sunshine hours at the time of fruit development also affect the chemical composition of the fruits. Variation in acidity among guava genotypes due to climatic factors was also recorded earlier by Patel *et al.* (2005) and Ghosh *et al*. (2013) in guava.

The genotype RJMG-5 was recorded maximum (271.45 mg 100 g^{-1} pulp) ascorbic acid, which was found to be *at par* with genotypes RJMG-2 (270.10 mg 100 g^{-1} pulp), RJMG-6 (263.45 mg 100 g^{-1} pulp) and BSPG-5 (254.24 mg 100 g^{-1} pulp). Whereas, the minimum ascorbic acid was found in genotype BSPG-4 (139.37 mg 100 g^{-1} pulp) followed by genotypes BSPG-3 (166.15 mg 100 g^{-1} pulp) and BSPG-7 (189.24 mg 100 g^{-1} pulp). The larger variation in ascorbic acid content may be attributed to a varietal character and due to favourability of seasonal conditions. Furthermore, it seems that temperature plays an important role which governs the enzymatic systems involved in biogenesis and catabolism of ascorbic acid. A similar trend was also reported by Gohil *et al.* (2006) and Ghosh *et al.* (2013), who found ascorbic acid content is influenced by the genetic makeup of trees.

The data on total sugar of different guava genotypes under study are presented in table 1. The genotype BSPG-1 recorded the highest total sugar (8.91%) which was found to be *at par* with genotypes RJMG-1 (8.90%) and BSPG-8 (8.86%). The genotype RJMG-1 recorded maximum reducing sugar (6.85%) which was found to be *at par* with genotype BSPG-8 (6.55%) The lowest total sugar and reducing sugar was recorded in genotype BSPG-5 *i.e*., 6.31% and 4.23% respectively. The genotype BSPG-1 recorded significantly highest non-reducing sugar (2.64%) followed by genotypes BSPG-8 (2.31%) and BSPG-6 (2.24%). Whereas, the lowest non-reducing sugar recorded in genotype RJMG-3 (1.61%) followed by genotypes RJMG-7 (1.62 %) and RJMG-8 (1.63%). The variation observed in total sugar might be due to inherent effect and also the influence of agro-climatic conditions. These results are in agreement with Pandey *et al.* (2007) and Mahour *et al*. (2011) in guava. Mahour *et al*. (2011) observed that maximum total sugars were found in Apple Colour whereas, the minimum total sugars were found in Chittidar. Pandey *et al.* (2007) reported higher content of total sugars in cv. Hisar Surkha (9.32%), while lower (6.67%) was found in Hisar Safeda. The reducing sugar of fruits from different genotypes varied due to the difference in genetic makeup of the genotypes. High reducing sugar in genotypes RJMG-1 and BSPG-8 might be attributed to the presence of more monosaccharide and disaccharides like glucose and fructose in fruits of these genotypes during maturity. The non-reducing sugar of fruits from different genotypes varied due to the difference in genetic makeup of the genotypes. These parameters may vary from place to place depending on climatic factors and management practices. Similar results were also reported by Mahour *et al.* (2011) and Meena *et al.* (2013) in guava. Mahour *et al.* (2011) found that maximum reducing sugars was found in genotype Abuwala whereas minimum reducing sugar was found in Dharwar. Meena *et al.* (2013) observed maximum reducing sugars in genotype FRSG-R2 (5.91%) whereas, lowest in genotype FRSG-R3 (4.34%) and the non-reducing was maximum in genotype Lalit (1.68%) however, minimum in genotype FRSG-R2 (1.17%).

Data on correlation studies among chemical characters of guava has been presented in table 2. A close perusal of the table revealed that TSS was positively and significantly correlated with total sugar (r=0.951**) and reducing sugar (r=0.957**). Total sugars were positively and significantly correlated with reducing sugars (r=0.945**). There was no correlation found between acidity, ascorbic acid and non-reducing sugars with other traits under study. The results are in agreement with the earlier worker Singh *et al.* (2015) in guava, who reported total sugar was found to have a significant positive correlation with reducing sugar, non-reducing sugar and acidity. Hence, it is concluded that there is significant and positive or negative association along with chemical traits of different genotypes in guava of Chhattisgarh region.

Table 1. Bio-chemical fruit parameters of *in- situ* guava genotypes

Genotypes	TSS (°Brix)	Titrable acidity(%)	Ascorbic acid (mg 100g^{-1} pulp)	Total sugar (%)	Reducing sugar(%)	Non-reducing sugar (%)
BSPG-1	12.21	0.32	201.07	8.91	6.26	2.64
BSPG-2	10.46	0.34	220.12	7.41	5.50	1.91
BSPG-3	10.87	0.65	166.15	7.51	5.61	1.91
BSPG-4	9.24	0.36	139.37	6.83	4.62	2.21
BSPG-5	8.75	0.71	254.24	6.31	4.23	2.08
BSPG-6	9.42	0.55	195.32	6.86	4.63	2.24
BSPG-7	9.86	0.52	189.24	6.92	4.70	2.22
BSPG-8	12.16	0.38	247.64	8.86	6.55	2.31
BSPG-9	9.55	0.33	206.54	6.90	4.74	2.16
RJMG-1	12.08	0.37	215.56	8.90	6.85	2.06
RJMG-2	9.93	0.26	270.10	6.94	4.87	2.08
RJMG-3	11.22	0.40	241.10	7.44	5.82	1.61
RJMG-4	10.63	0.63	191.15	7.92	5.86	2.07
RJMG-5	9.87	0.55	271.45	6.91	4.77	2.14
RJMG-6	8.97	0.29	263.45	6.42	4.46	1.96
RJMG-7	10.87	0.52	219.63	7.42	5.81	1.62
RJMG-8	10.55	0.74	245.14	7.23	5.60	1.63
RJMG-9	8.86	0.61	230.23	6.62	4.83	1.78
S E m ±	0.38	0.010	7.84	0.27	0.19	0.07
CD at 5 %	0.89	0.029	22.64	0.76	0.57	0.20

Table 2. Correlation matrix for bio-chemical fruit traits of guava genotypes

Traits	TSS	Acidity	Ascorbic acid	Total sugars	Reducing sugars	Non reducing sugars
TSS	1.000					
Acidity	-0.217^{NS}	1.000				
Ascorbic acid	-0.062^{NS}	-0.059^{NS}	1.000			
Total sugars	0.951**	-0.247^{NS}	-0.148^{NS}	1.000		
Reducing sugars	0.957**	-0.139^{NS}	-0.073^{NS}	0.945**	1.000	
Non-reducing sugars	0.138^{NS}	-0.352^{NS}	-0.246^{NS}	0.324^{NS}	-0.004^{NS}	1.000

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