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PERFORAMCE OF GUAVA GENOTYPE TO QUALITATIVE AND YIELD ATTRIBUTES

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ABSTRACT

The present investigation was carried out on nine genotypes of guava,in randomized block design with three replications of each genotype. The results were obtained for the quality and biochemical characters. The most of the genotypes were observed whitish green and whitish yellow colour of fruit. Whereas, cuneate and oblong shaped fruit was noted in most of the genotypes.The most of the genotypes viz., GWS_5, GWS_6, GWS_7, GWS_8 and L-49 had white pulp colour with hard seed. Light pink colour of pulp with intermediate seed hardness was observed in genotypes GRS_1, GRS_2 and GRS_3, whereas, it was medium dark pink colour of pulp with soft seed in GRS_4 genotype.The genotype L-49 recorded the highest pulp weight (206.02g).The genotype GRS_4 had significantly, the lowest number seed and weight of seeds per fruit (194.33) and (1.91g). The genotype L-49 was recorded the highest fruit weight (214.03 g).The highest pulp content (96.55%), pulp: seed ratio (66.42), number of fruit per tree (406.44) and fruit yield (52.9 kg/tree and 21.15 Mt/ha) was observed in genotype GRS_4.

INTRODUCTION

The genus *Psidium* comprises about 150 species of small shrubs and trees (Hayes, 1970). About 20 species have edible fruits of which the most commonly cultivated is the common guava (*Psidiumguajava* L).belongs to family Myrtaceae is one of the most important fruit in India. It is native to tropical America which was introduced in India (Mitraand Bose, 2001) in the 17th century by Portuguese (Menzel, 1985). At present, it is the fifth most important fruit crops in India after mango, banana, citrus and apple with annual production of 2619 thousand MT from 233 thousand hector, 3.2 percent of total fruit production. Maharashtra is the leading producer of guava and it is grown on 39 thousand hector with average production of 304 thousand MT, followed by Madhya Pradesh, Uttar Pradesh and Bihar (Anonymous, 2013). Guava is one of the few tropical fruits that have some degree of tolerance to salinity, which varies from fairly tolerant to somewhat resistance to poorly to tolerant (Malo and Compbell, 1986). The guava clones vary greatly with respect to their fruit quality and yield potentials. It is most preferred for arid and semiarid fruit production in India. To expedite the crop improvement programme, it is necessary to trap the natural variability through surveys and the variability should be conserved ex situ and in situ to utilize for further hybridization programmes. Guava is rich source of vitamin C and it contains three to four times more vitamin C as compared to fresh orange juice, along with the minerals namely iron, calcium, and phosphorus. It is used for preparation of jam and jelly due to its high pectin content. Ripe fruits are also used for manufacturing of ice cream, *sherbet*, cheese, candy, puree and toffee. Leaves are source of dye and tannin and have medicinal value, being used for curing diarrhoea.However, guava is guaranteed source of ascorbic acid, pectin, sugars, etc. which play the role in processing. Hence, it is need to process guava on a large scale by using either red or white fleshed guava. The processed red fleshed guava might be novelty in guava industry. The extent of variability in guava for vegetative and fruit characteristics has been estimated by several workers (Deshmukh *et al.*, 2013, Rattanpal and Dhaliwal, 1999; Thimmappaiah *et al.*, 1985).

Data of the genetic diversity available would assist in the selection of parents in further hybridization programmes. Screening of these genotypes can help identifying a better source of resistance to various fruit and seeds characters. In this context, the study of genetic divergence is of vital importance for any plant breeding programme aimed at genetic improvement and productivity of that plant species. As discussed above so consideration of this point study was conducted for selection of superior red and white fleshed guava genotypes for qualitative and yield attributes.

MATERIALS AND METHODS

The experiment was conducted at Instructional-cum-Research Farm, Department of Horticulture, College of Agriculture, Latur during winter season of 2008-09, 2009-10 and 2010-11, on well-established four years old orchard of guava planted at 5.0 X 5.0 m. Total nine genotypes were identified for study viz., GRS_1, GRS_2, GRS_3, GRS_4, GWS_5, GWS_6, GWS_7, GWS_8 and L-49. Among them four genotypes were red fleshed (GRS) and four genotypes were white fleshed (GWS) and control. Ten

fruits were randomly harvested from each plant for recording qualitative and yield observations like, colour of fruit and colour of pulpwere observed visually from ten fully ripe but not over ripe fruits and genotypes grouped accordingly (Light yellow Dark yellow Whitish green and Whitish yellow) and (Light pink Medium dark pink and White) respectively as explained in guava descriptors Lakade *et al.* (2010). Shape of fruit was observed visually as to be round, oblate, unequal, obovate, Cuneate, oblong, ovate, or elliptical, as per the NBPGR guide book. Seed hardness was measured by keeping seed between teeth and differentiated as to be soft, intermediate and hard (Smita, 2005). The numerical data of the five qualitative and four yield characters were analysed statistically. The recommended package of agronomical practices and plant protection measures obligatory to raise a good crop were followed. The experiment was laid out in Randomized Block Design (RBD) with three replications as per the procedure outlined by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

Quality characters

Significant variation was observed among the genotypes for quality traits Genotypes of guava viz., GRS_1 and GRS_3 had light yellow coloured fruit. While, genotypes namely GWS_5, GWS_7, GWS_8 observed whitish green colour of fruit. GWS_6 and L-49 had whitish yellow coloured fruit, whereas, GRS_2 and GRS_4 had dark yellow coloured fruit.Thus, from the above findings it was noticed that prevailing agro-climate coupled with genetic makeup of individual cultivars persuade the responses to particular agro-climatic condition.

The variability in respect of colour of fruit could be attributes to the genetic makeup of individual tree. Singh and Singh (2000) recorded straw yellow coloured fruits in Chittidar, Red Fleshed, Allahabad Safeda and SurkhChitti, whereas, Apple Colour and Allahabad Safeda were reddish. Greenish yellow colour was observed in SevilalGudia and Behat Coconut. Similar work done by Reddy (2008).

The most of the genotypes viz., GRS_1, GRS_2, GRS_4 had noted cuneate shaped fruit, while, GWS_5, GWS_6 and GWS_8 had noted oblong shaped fruits and genotypes GWS_7, was found elliptical shaped fruit, whereas, GRS_3 and L-49 had Rounded shape. It might be due to genetically differences among the genotypes of guava. Many research workers, Singh and Singh (2000) found round shape of fruits in Allahabad Safeda, Allahabad Surkha and Behat Coconut. Fruits of Red Fleshed and Lucknow-49 were Roundish Ovate in shape, whereas, fruits of Nasik were oblong. Similar work done by Hernander-Delgado *et al.* (2007).

Genotypes viz., GWS_5, GWS_6, GWS_7, GWS_8 and L-49. had white pulp colour. Light pink colour of pulp was observed in genotypes GRS_1, GRS_2 and GRS_3, whereas, it was medium dark pink in GRS_4 genotype. The intensity of pink colour is depend on content of lycopene in fruit. Reddy (2008) studied cultivar Lalit and Sweta and found pink pulp colour in cultivar Lalit and white pulp colour in cultivar Sweta. White colour of flesh in Chittidar, Allahabad Safeda, Apple colour, Behat Coconut and Nasik. Creamy white colour of flesh was observed in L-49 and SurkhChitti, whereas, red flesh colour was found in Allahabad Surkha and SevilalGudia was observed by Singh and Singh (2000). Similar work done by Hernander-Delgado *et al.* (2007).

Soft seeds were present in GRS_4 genotype. Hard seeds were found in genotypes GWS_5, GWS_6, GWS_7, GWS_8 and L-49. While, the rest of the genotypes viz., GRS_1, GRS_2 and GRS_3 had intermediate seed hardness. Generally seed hardness might be due to varieral character. Similar observations have been reported by Singh and Singh (2000) found that the seeds of Chittidar, Apple Colour and Allahabad Surkha were soft in texture, whereas, seeds of L-49, Red Fleshed, Allahabad Safeda, SurkhChitti, Sevilal Gudia, Behat Coconut and Nasik were hard in texture. Smita (2005) found soft seeds in Rahuri and R-1. Hard seeds were found in Apple Colour and Matchless, while intermediate seed hardness in rest of the genotypes and hybrids.

Weight of pulp differed significantly for different genotypes of guava. The genotype L-49 recorded the highest pulp weight (206.02 g). However, it was at par with genotype GWS_6 (193.58 g). The lowest weight of pulp was recorded in genotype GRS_1 (95.61 g), followed by genotypes GWS_8 (124.99 g), GRS_2 (125.03 g). It is due to the more pulp area or bigger size of fruitand different genotypes had significant variations in their geneticmakeup. The analogous findings were also reported byKundu *et al.* (1995) and Smita (2005) in different agro-climatic conditions.

The highest pulp content (96.55%) was recorded in genotype GRS_4, which was at par with genotypes GWS_6 (96.43%), L-49 (96.28%), GWS_7 (95.82%). The lowest value (94.16%) was recorded for genotype GWS_8 and it was followed by genotype GRS_1 (94.50%). The higher content of pulp was due to the

Table 1: Performance of various guava genotypes for quality of fruit characters

Treatments	Genotypes	Pooled mean Colour of fruit	Shape of fruit	Colour of pulp	Seed hardness
T_1	GRS_1	Light yellow	Cuneate	Light pink	Intermediate
T_2	GRS_2	Dark yellow	Cuneate	Light pink	Intermediate
T_3	GRS_3	Light yellow	Round	Light pink	Intermediate
T_4	GRS_4	Dark yellow	Cuneate	Medium dark pink	Soft
T_5	GWS_5	Whitish green	oblong	White	Hard
T_6	GWS_6	Whitish yellow	oblong	White	Hard
T_7	GWS_7	Whitish green	Elliptical	White	Hard
T_8	GWS_8	Whitish green	oblong	White	Hard
T_9	L-49	Whitish yellow	Round	White	Hard

GRS- Guava red fleshed selection GWS - Guava white fleshed selection

Table 2: Performance of various guava genotypes for quality of fruit characters

Treatments	Genotypes	Pooled mean Weight of pulp (g)	Pulp content (%)	Weight of seed per fruit (g)	Number of seeds per fruit	Pulp: seed ratio
T_1	GRS_1	95.61	94.50	2.28	229.22	42.67
T_2	GRS_2	125.03	95.48	2.37	209.55	49.03
T_3	GRS_3	129.51	95.40	2.57	261.89	49.24
T_4	GRS_4	126.79	96.55	1.91	194.33	66.42
T_5	GWS_5	141.82	95.03	3.23	314.77	43.95
T_6	GWS_6	193.58	96.43	3.29	235.44	59.07
T_7	GWS_7	166.00	95.82	3.41	261.44	49.49
T_8	GWS_8	124.99	94.16	3.06	352.89	40.83
T_9	L-49	206.02	96.28	3.61	238.55	54.36
	S.Em. ±	5.13	0.60	0.10	20.71	2.61
	C.D. at 5%	14.22	1.67	0.28	57.32	7.23

GRS - Guava red fleshed selection, GWS - Guava white fleshed selection

Table 3: Performance of various guava genotypes for fruit yield characters

Treatments	Genotypes	Pooled mean Number of fruit per tree	Weight of fruit (g)	Yield (kg/tree)	Yield (Mt/ha)
T_1	GRS_1	180.00	101.11	18.17	7.26
T_2	GRS_2	238.88	121.93	29.04	11.61
T_3	GRS_3	185.55	134.74	25.13	10.05
T_4	GRS_4	406.44	131.45	52.90	21.15
T_5	GWS_5	167.55	149.41	20.09	8.03
T_6	GWS_6	234.77	201.11	47.21	18.88
T_7	GWS_7	156.77	173.46	27.28	10.91
T_8	GWS_8	130.33	132.90	17.27	6.90
T_9	L-49	222.89	214.03	47.74	19.09
	S.Em. ±	13.34	5.08	2.29	0.91
	C.D. at 5%	36.93	14.07	6.34	2.52

GRS - Guava red fleshed selection GWS - Guava white fleshed selection

more pulp area or bigger size of fruit. Thonte and Chakrawar (1982) observed the maximum pulp (87.18-87.25%) in ABD-4 and ABD-3 strains of guava.Tandon *et al.* (1983) studied physico-chemical characters of eight guava varieties at Lucknow and found the pulp content ranged from 96.2 to 98.3 per cent.

The highest weight of seeds per fruit was recorded for L-49 (3.61 g), it was followed by genotype GWS_7 (3.41 g). The genotype GRS_4 had significantly, the lowest weight of seeds per fruit (1.91 g), followed by genotype GRS_1 (2.28 g). The lowest weight of seeds per fruit might be due to the lower weight of fruit. Asrey *et al.* (2007) analyse guava cultivar Allahabad Safeda and found weight of seeds per fruit was (3.09 g). Similar work done by Singh and Singh (2000) and Smita (2005).

Less number of seeds per fruit is a desirable character in guava. Significant difference was found among the genotypes for this trait. Significantly the highest number of seeds were observed in genotype GWS_8 (352.89), followed by genotype GWS_5 (314.77), while the lowest number was recorded in genotype GRS_4 (194.33), followed by GRS_2 (209.55). It is due to the more pulp area of fruitand different genotypes had significant variations in their genetic makeup. Similar study was conducted by Marak and Mukunda (2007) studied 272 open pollinated seedling progenies of Apple Colour out of which the fruits of A.C. Sel. 6/10 have less number of seeds (142). Shukla *et al.* (2012) recorded the range of number of seed from 125to 450per fruit.

Significant variation was observed among the genotypes for pulp: seed ratio. Significantly the highest pulp: seed ratio was observed in genotype GRS_4 (66.42), followed by genotypes GWS_6 (59.07), L-49 (54.36) and GWS_7 (49.49).This was because of lower weight of seed as compared with higher weight of fruit. While the lowest pulp: seed ratio was observed in genotype GWS_8 (40.83), followed by genotype GRS_1 (42.67). This resulted from comparatively smaller weight of fruit with more weight of seeds per fruit. Similar variation in pulp: seed ratio was noted by Singh and Singh (2000) evaluated ten cultivars of guava for quality characters and found the highest pulp: seed ratio (148.03) in Behat Coconut, whereas, the lowest pulp: seed ratio (28.41) in Allahabad Surkha. Smita (2005) found the highest pulp: seed ratio in genotype Exotica-2 during both the year (first year: 52.09 and second year: 51.48). While, the lowest pulp: seed ratio was observed in genotype Apple Colour during first (16.15) and second (15.51) year.

Yield characters

Significant differences were observed among the genotypes for number of fruits per tree. The highest value was recorded for genotype GRS_4 (406.44), followed by genotype GRS_2 (238.88), genotype GWS_6 (234.77). While the lowest number of fruits per tree was recorded for genotype GWS_8 (130.33), followed by genotype GWS_7 (156.77). This type of variation may be due to phenotypic and genotypic interactions among the different genotypes under test condition. The variation in number of fruits per tree to cultivar in guava was also reported

by various workers viz., Padilla-Ramirez *et al.* (2007), Athani*et al.* (2007), Patel *et al.* (2011) and Deshmukh *et al.* (2013).

The genotype L-49 was recorded the highest fruit weight (214.03 g). However, it was at par with genotype GWS_6 (201.11 g).The lowest weight of fruit was observed in genotype GRS_1 (101.11 g) and it was followed by genotype GRS_2 (121.93 g).It is due to phenotypic and genotypic interactions among the different genotypes under test condition. Similar observation was recorded, Deshmukh *et al.* (2013). Babu *et al.* (2007) studied performance of eight years old guava selections and found maximum weight of fruit in cultivar Selection-11 (144.20 g) followed by L-49 (140.50 g).Similar work done byPatidar*et al.* (2012).

The highest fruit yield per tree was observed in genotype GRS_4 (52.9 kg). However, it was at par with genotype L-49 (47.74 kg) and GWS_6 (47.21 kg). The lowest fruit yield per tree was found in genotype GWS_8 (17.27 kg) and it was followed by genotype GRS_1 (18.17 kg). The higher yield was due to more number of fruits per plant. Deshmukh *et al.* (2013) recorded the fruit yield was recorded significantly highest RCGH 1 (39.05 kg/plant). Athani *et al.* (2007) revealed that cultivar SR-2 recorded higher fruit yield (42 kg/tree). Babu *et al.* (2007) reported the highest yield was recorded in Allahabad Safeda (20.40 kg/tree) followed by Sardar guava (19.50 kg/tree) and Selection-1 (18.80 kg/tree). Similar work done by Marak and Mukunda (2007) and Hernandez-Delgalo (2007).

Yield per hectare had significant differences among the genotypes of guava. The highest yield was observed in genotype GRS_4 (21.15 Mt/ha), which was at par with genotype L-49 (19.09 Mt/ha) and GWS_6 (18.88 Mt/ha). The lowest yield was noted in genotype GWS_8 (6.90 Mt/ha) and it was followed by genotype GRS_1 (7.26 Mt/ha).This type of variation may be due to phenotypic and genotypic interactions among the different genotypes under test condition. The variation in number of fruits per tree and fruit yield due to cultivar in guava was also reported by various workers viz., Pandey *et al.* (2007) and Patel *et al.* (2011) and Deshmukh *et al.* (2013) in different agro-climatic conditions.

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