

# VARIABILITY IN GROWTH PARAMETERS OF RED FLESHED AND WHITE FLESHED GUAVA GENOTYPES

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## ABSTRACT

The present investigation was carried out with object to study morpho-phenological characters of guava genotypes. The three year pooled data indicates that significant variation was found for this trait among the genotypes of guava. The highest height of plant (4.21 m), highest tree volume (55.32 m<sup>3</sup>) and highest leaf area (81.98 cm<sup>2</sup>) was recorded in genotype GRS<sub>4</sub> whereas, lowest height of plant (2.60 m), tree volume (24.93 m<sup>3</sup>) was observed for genotype GWS<sub>8</sub> and lowest leaf area (52.16 cm<sup>2</sup>) was recorded in genotype GRS<sub>1</sub>. The spreading to erect tree habit with medium to dense canopy was observed for all guava genotypes. Whereas, pale to dark green coloured leaves was recorded in most of genotypes. Leaf apex was obtuse in most of genotypes viz., GRS<sub>4</sub>, GWS<sub>5</sub>, GWS<sub>6</sub>, GWS<sub>7</sub>, GWS<sub>8</sub> and L-49 and acute was in GRS<sub>1</sub>, GRS<sub>2</sub> and GRS<sub>3</sub>. Whereas, Base of leaf was found round in all genotypes. Solitary type with white colour of flower was found in all genotypes viz., GRS<sub>1</sub>, GRS<sub>2</sub>, GRS<sub>3</sub>, GRS<sub>4</sub>, GWS<sub>5</sub>, GWS<sub>6</sub>, GWS<sub>7</sub>, GWS<sub>8</sub> and L-49.

## INTRODUCTION

The Myrtaceae or Myrtle family comprises at least 140 genera and some 3800 to 5600 species. Many important trees and shrubs belong to Myrtaceae. There are four genera of interest which produce edible fruits. 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 (*Psidium guajava* L.) belongs to family Myrtaceae. It is native to tropical America which was introduced in India (Mitra and Bose, 2001), with annual production of 2619 thousand MT from 233 thousand hector, 3.2 per cent 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 fruit is known for its 'vitamin-C', minerals like calcium, iron and phosphorous with pleasant aroma and flavour (Dhaliwal and Dhillon, 2003). The processed red fleshed guava might be novelty in guava industry. The extent of variability in guava for vegetative characteristics has been estimated by (Rattanpal & Dhaliwal, 1999; Thimmappaiah et al., 1985), and its better adoptability eulogized it as 'the apple of tropics'. A suitable agro-climatic condition coupled with variability of guava germplasm of India provided opportunity for the commercial cultivation of guava (Chandra and Govind, 1992). But yield and quality of local types grown by the farmers in region is poor and not able to with stand to competition. Introduction of promising guava cultivars in region is an option

for increasing the production and productivity. But performance varied significantly with cultivars, location, agro-climate and soil type etc. The variation with regard to growth and bearing habits, yield, colour and quality among different guava cultivars were also reported by Chadha et al. (1981) and Ojha et al. (1985) in different parts of the country. 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. For primary screening, the morphological characterization is effective and to trace true genetic variation.

In the view of above, various guava genotypes were undertaken for study, its diversity and variability for selection of a new genotype will be utilized which may result in overcoming the problems as discussed above. Therefore, the objective of the present work was to study the morpho-phenological characters of guava genotypes.

## MATERIALS AND METHODS

The experiment was conducted at Instructional-cum-Research Farm, Department of Horticulture, College of Agriculture, Latur, VNMKV, Parbhani (M.S.). 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<sub>1</sub>, GRS<sub>2</sub>, GRS<sub>3</sub>, GRS<sub>4</sub>, GWS<sub>5</sub>, GWS<sub>6</sub>, GWS<sub>7</sub>, GWS<sub>8</sub> and L-49. Among them four genotypes

were red fleshed selection (GRS) and four genotypes were white fleshed selection (GWS) and (L-49) as a control. Phenological observations in these genotypes were determined in the spring of each season. Tree habit was observed visually as per the NBPCR guide book. The base and apex of leaf was observed visually and it was classified as (round, acute and obtuse) standardized by Dutta (1996). Whereas, colour of mature leaf and colour of flower was observed visually and it was classified as (pale green, green and dark green) and (White). Flowering habit was visually recorded after flowering. It was classified as (solitary and cluster). Growth observations viz, height of plant (m) was recorded from ground level to the tip of the highest shoot during the flowering stage by using graduated measuring pole on the surface of the soil along the tree and observed the scale from a uniform distance. Tree volume ( $m^3$ ) was calculated separately just after fruit set, as per the formula given by Roose *et al.* (1989). Tree volume ( $m^3$ ) =  $(4/6) \times D \times \text{Height} \times (\text{Radius}^2)$  and leaf area ( $cm^2$ ) was measured with the help of leaf area meter of (200  $cm^2$ ) accordingly average leaf area was calculated. Obtained data analyzed 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 (1967).

## RESULTS AND DISCUSSION

### Growth characters

The three year pooled data (Table 1) indicates significant variation was found for this trait among the genotypes of guava. The highest height of plant (4.21 m) was recorded in genotype GRS<sub>4</sub>, followed by genotype GWS<sub>6</sub> (3.78 m) and GRS<sub>2</sub> (3.65 m). While, genotype GWS<sub>8</sub> recorded the lowest height of plant (2.60 m), followed by genotype GWS<sub>5</sub> (2.71 m). The presence of strong apical dominance in genotypes GRS<sub>4</sub>, GWS<sub>6</sub> and GRS<sub>2</sub> may be attributed to maximum plant height. Similar views were expressed by several workers Deshmukh *et al.* (2013), Athani *et al.* (2007) and Singh (2003). The highest value for tree volume was observed for genotype GWS<sub>6</sub> (52.32  $m^3$ ), followed by genotype GRS<sub>4</sub> (50.46  $m^3$ ). While, genotype GWS<sub>8</sub> recorded the lowest value (24.93  $m^3$ ) followed by genotype GWS<sub>5</sub> (27.12  $m^3$ ). Similar work done by Dhaliwal and Dhillon, (2003) and Reddy *et al.* (1999) found maximum tree volume

(135.7  $cm^3$ ) in L-49 as compared to other guava cultivars. Thus, from the above findings it was noticed that prevailing agro-climate coupled with genetic makeup of individual genotypes persuade the responses to particular agroclimatic condition. The maximum leaf area (81.98  $cm^2$ ) was recorded in genotype GWS<sub>6</sub>, followed by genotype GWS<sub>5</sub> (74.00  $cm^2$ ). The lowest leaf area (52.16  $cm^2$ ) was recorded in genotype GRS<sub>1</sub>, followed by genotype GRS<sub>3</sub> (60.28  $cm^2$ ). Similar observations have been reported by Smita (2005) recorded a range of 50.57  $cm^2$  per leaf (Local Selection-3) to 91.47  $cm^2$  per leaf (Seedless) during the first year and 51.90  $cm^2$  per leaf (Local Selection-3) to 93.75  $cm^2$  per leaf (Seedless) during the second year for leaf area.

### Phenological characters

Significant variation was found for phenological trait among the genotypes of guava. It is evident from the results (Table 2), the genotypes GRS<sub>4</sub> and L-49 had spreading tree habit and very dense canopy. GRS<sub>1</sub>, GRS<sub>2</sub> and GRS<sub>3</sub> had erect and medium dense canopy. Whereas, GWS<sub>5</sub>, GWS<sub>6</sub>, GWS<sub>7</sub>, and GWS<sub>8</sub> had spreading tree habit and medium dense typed canopy. Teatolia *et al.* (1969) observed spreading growth habit of tree in Behat Coconut and Supreme Mild Fleshed, whereas, Mirzapur Seedling and Smooth Green showed upright and spreading growth habit. Nasik had slightly spreading growth habit. Sharma *et al.* (2010) also recorded similar growth habit. The genotypes like GRS<sub>1</sub>, GRS<sub>2</sub> and GRS<sub>4</sub> had dark green coloured foliage. While GRS<sub>3</sub>, GWS<sub>6</sub> and L-49 had green coloured leaves, whereas, GWS<sub>5</sub>, GWS<sub>7</sub> and GWS<sub>8</sub> had pale green colour of leaves. Similar work done by Sharma *et al.* (2010) and Teatolia *et al.* (1969). Base of leaf was found round in all genotypes viz., GRS<sub>1</sub>, GRS<sub>2</sub>, GRS<sub>3</sub>, GRS<sub>4</sub>, GWS<sub>5</sub>, GWS<sub>6</sub>, GWS<sub>7</sub>, GWS<sub>8</sub>, GWS<sub>9</sub>, and L-49. Similar observations have been reported Teatolia *et al.* (1969) observed acute base of leaf in varieties like Barauiipur, Hafsi and Supreme Mild Fleshed, whereas, Mirzapur Seedling, Nasik and Smooth Green found obtuse base and Behat Coconut showed round base of leaf. Teatolia *et al.* (1966) and Teatolia *et al.* (1962). Leaf apex was obtuse in genotypes viz., GRS<sub>4</sub>, GWS<sub>5</sub>, GWS<sub>6</sub>, GWS<sub>7</sub>, GWS<sub>8</sub> and L-49 whereas, it was acute in GRS<sub>1</sub>, GRS<sub>2</sub> and GRS<sub>3</sub>. Teatolia *et al.* (1969) observed acute leaf apex in Beruipur, Hafsi, Supreme Mild Fleshed and Nasik, whereas, it was obtuse in Mirzapur Seedling and Smooth Green. Leaf apex of Behat Coconut was round. Type of flower was found solitary in all genotypes viz., GRS<sub>1</sub>, GRS<sub>2</sub>, GRS<sub>3</sub>, GRS<sub>4</sub>, GWS<sub>5</sub>, GWS<sub>6</sub>, GWS<sub>7</sub>, GWS<sub>8</sub>, GWS<sub>9</sub> and L-49. Similar

**Table 1: Performance of various guava genotypes in respect of growth characters (pooled mean 2008-09, 2009-10 and 2010-11)**

Treatments	Genotypes	Height of plant (m)	Tree volume( $m^3$ )	Leaf area ( $cm^2$ )
T <sub>1</sub>	GRS <sub>1</sub>	3.37	32.51	52.16
T <sub>2</sub>	GRS <sub>2</sub>	3.65	40.37	61.08
T <sub>3</sub>	GRS <sub>3</sub>	3.44	34.34	60.28
T <sub>4</sub>	GRS <sub>4</sub>	4.21	50.46	63.87
T <sub>5</sub>	GWS <sub>5</sub>	2.71	27.12	74.00
T <sub>6</sub>	GWS <sub>6</sub>	3.78	55.32	81.98
T <sub>7</sub>	GWS <sub>7</sub>	3.10	32.08	73.18
T <sub>8</sub>	GWS <sub>8</sub>	2.60	24.93	70.43
T <sub>9</sub>	L-49	3.58	48.46	71.03
	S.Em. +	0.13	2.37	1.58
	C.D. at 5%	0.36	6.57	4.39

GRS- Guava Red fleshed Selection GWS- Guava White fleshed Selection

**Table 2: Performance of various guava genotypes in respect phenological characters (pooled mean 2008-09, 2009-10 and 2010-11)**

Treatments	Genotypes	Tree habit	Mature leaf colour	Base of leaf	Leaf apex	Type of flower	Colour of flower
T <sub>1</sub>	GRS <sub>1</sub>	Erect and medium dense	Dark green	Round	Acute	Solitary	White
T <sub>2</sub>	GRS <sub>2</sub>	Erect and medium dense	Dark green	Round	Acute	Solitary	White
T <sub>3</sub>	GRS <sub>3</sub>	Erect and medium dense	Green	Round	Acute	Solitary	White
T <sub>4</sub>	GRS <sub>4</sub>	Spreading and very dense	Dark green	Round	Obtuse	Solitary	White
T <sub>5</sub>	GWS <sub>5</sub>	Spreading and medium dense	Pale green	Round	Obtuse	Solitary	White
T <sub>6</sub>	GWS <sub>6</sub>	Spreading and medium dense	Green	Round	Obtuse	Solitary	White
T <sub>7</sub>	GWS <sub>7</sub>	Spreading and medium dense	Pale Green	Round	Obtuse	Solitary	White
T <sub>8</sub>	GWS <sub>8</sub>	Spreading and medium dense	Pale green	Round	Obtuse	Solitary	White
T <sub>9</sub>	L-49	Spreading and very dense	Green	Round	Obtuse	Solitary	White

GRS- Guava Red fleshed Selection GWS- Guava White fleshed Selection

views were expressed by several workers. Sharma *et al.* (2010) observed the inflorescence depicted that all the genotypes of guava produced solitary, as well as cymose. Menzel (1985) and Sehgal and Singh (1965). Colour of flower was found white in all genotypes viz., GRS<sub>1</sub>, GRS<sub>2</sub>, GRS<sub>3</sub>, GRS<sub>4</sub>, GWS<sub>5</sub>, GWS<sub>6</sub>, GWS<sub>7</sub>, GWS<sub>8</sub>, GWS<sub>9</sub> and L-49. Similar views were expressed by Sharma *et al.* (2009) and Sandhu *et al.* (1987) Thus, from the above findings it was noticed that the variation between the genotypes for different phenological characters may be attributed to the differences in the genetic makeup of these genotypes.

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Cont. .... P. 910