

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 m³) and highest leaf area (81.98 cm²) was recorded in genotype GRS₄ whereas, lowest height of plant (2.60 m), tree volume (24.93 m³) was observed for genotype GWS₈ and lowest leaf area (52.16 cm²) was recorded in genotype GRS₁. 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., GRS₄, GWS₅, GWS₆, GWS₇, GWS₈ and L-49 and acute was in GRS₁, GRS₂ and GRS₃. Whereas, Base of leaf was found round in all genotypes. Solitary type with white colour of flower was found in all genotypes viz., GRS₁, GRS₂, GRS₃, GRS₄, GWS₅, GWS₆, GWS₇, GWS₈ 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., GRS₁, GRS₂, GRS₃, GRS₄, GWS₅, GWS₆, GWS₇, GWS₈ 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 (m³) was calculated separately just after fruit set, as per the formula given by Roose *et al.* (1989). Tree volume (m³) = (4/6) x π x Height x (Radius²) and leaf area (cm²) was measured with the help of leaf area meter of (200 cm²) 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 GRS₄, followed by genotype GWS₆ (3.78 m) and GRS₂ (3.65 m). While, genotype GWS₈ recorded the lowest height of plant (2.60 m), followed by genotype GWS₅ (2.71 m). The presence of strong apical dominance in genotypes GRS₄, GWS₆ and GRS₂ 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 GWS₆ (52.32 m³), followed by genotype GRS₄ (50.46 m³). While, genotype GWS₈ recorded the lowest value (24.93 m³) followed by genotype GWS₅ (27.12 m³). Similar work done by Dhaliwal and Dhillon, (2003) and Reddy *et al.* (1999) found maximum tree volume

(135.7 cm³) 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 cm²) was recorded in genotype GWS₆, followed by genotype GWS₅ (74.00 cm²). The lowest leaf area (52.16 cm²) was recorded in genotype GRS₁, followed by genotype GRS₃ (60.28 cm²). Similar observations have been reported by Smita (2005) recorded a range of 50.57 cm² per leaf (Local Selection-3) to 91.47 cm² per leaf (Seedless) during the first year and 51.90 cm² per leaf (Local Selection-3) to 93.75 cm² 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 GRS₄ and L-49 had spreading tree habit and very dense canopy. GRS₁, GRS₂ and GRS₃ had erect and medium dense canopy. Whereas, GWS₅, GWS₆, GWS₇, and GWS₈ 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 GRS₁, GRS₂ and GRS₄ had dark green coloured foliage. While GRS₃, GWS₆ and L-49 had green coloured leaves, whereas, GWS₅, GWS₇ and GWS₈ 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., GRS₁, GRS₂, GRS₃, GRS₄, GWS₅, GWS₆, GWS₇, GWS₈, GWS₉, 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., GRS₄, GWS₅, GWS₆, GWS₇, GWS₈ and L-49 whereas, it was acute in GRS₁, GRS₂ and GRS₃. 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., GRS₁, GRS₂, GRS₃, GRS₄, GWS₅, GWS₆, GWS₇, GWS₈, GWS₉ 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 ₁	GRS ₁	3.37	32.51	52.16
T ₂	GRS ₂	3.65	40.37	61.08
T ₃	GRS ₃	3.44	34.34	60.28
T ₄	GRS ₄	4.21	50.46	63.87
T ₅	GWS ₅	2.71	27.12	74.00
T ₆	GWS ₆	3.78	55.32	81.98
T ₇	GWS ₇	3.10	32.08	73.18
T ₈	GWS ₈	2.60	24.93	70.43
T ₉	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 ₁	GRS ₁	Erect and medium dense	Dark green	Round	Acute	Solitary	White
T ₂	GRS ₂	Erect and medium dense	Dark green	Round	Acute	Solitary	White
T ₃	GRS ₃	Erect and medium dense	Green	Round	Acute	Solitary	White
T ₄	GRS ₄	Spreading and very dense	Dark green	Round	Obtuse	Solitary	White
T ₅	GWS ₅	Spreading and medium dense	Pale green	Round	Obtuse	Solitary	White
T ₆	GWS ₆	Spreading and medium dense	Green	Round	Obtuse	Solitary	White
T ₇	GWS ₇	Spreading and medium dense	Pale Green	Round	Obtuse	Solitary	White
T ₈	GWS ₈	Spreading and medium dense	Pale green	Round	Obtuse	Solitary	White
T ₉	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., GRS₁, GRS₂, GRS₃, GRS₄, GWS₅, GWS₆, GWS₇, GWS₈, GWS₉ 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.

REFERENCES

- Anonymous 2013.** Data base. Area and production of horticulture, fruit crops at <http://www.nhb.gov.in/nhm.com>
- Athani, S. I., Patil, P. B., Swamy, G. S. K., Sabarad, A. I. and Gorabal, K. R. 2007.** Studies on growth parameters and fruit characters in guava cultivars *Acta Horti.* **735**: 271-275.
- Chadha, K. L., Singh, H. P. and Tondon, B. K. 1981.** A varietal trial of guava. In: *Proc. Nat. Symp. Trop. and Subtrop. Fruit crop.* 17.
- Chandra, R. and Govind, S. 1992.** Guava - A promising crop for N.E.H. Region. *Farmer and Parliament.* **27(11)**: 25-26.
- Deshmukh, N. A., Llyngdoh, P., Jha, A. K., Patel, R. K. and Deka, Bidyut, C. 2013.** Comparative study on newly developed guava hybrids with commercial cultivars under mid-hills of ne India. *The Bioscan.* **8(4)**: 1467-1470.
- Dhaliwal, G. S. and Dhillon, S. K. 2003.** Effect of tree size on physico-chemical characteristics of fruits of guava Cv. Sardar. *Indian J. Hort.* **60(4)**: 312-317.
- Dutta, A. C. 1996.** Botany for degree students. *Oxford University Press.* pp. 25-46.
- Hays, W. B. 1970.** Fruit growing in India, kitabistan, Allahabad, 297.
- Menzel, C. M. 1985.** Guava: An exotic fruit with potential in Queensland. *Queensland Agri. J.* **111(2)**: 93-98.
- Mitra, S. K. and Bose, T. K. 2001.** Guava fruit tropical and subtropical. Ed. T. K. Bose, S.K. Mitra and D. Sanyal. *Naya praksh pub. Caccutta, India.* pp. 610-619.
- Ojha, A. P., Tiwari, J. P. and Mishra, K. K. 1985.** Studies on yield and quality of some guava cultivars. *Indian J. Hill Farming.* **4(1)**: 15-18.
- Panase, V. G. and Sukhatme, P. V. 1967.** Statistical methods for Agricultural Workers, Indian Council of Agricultural Research, New Delhi.
- Rattanpal, H. S. and Dah iwal, G. S. 1999.** Variability pattern in guava (*Psidium guajava* L.) seedling for tree volume and trunk girth. *J. Hort.* **1(1)**: 32.
- Reddy, N. N., Gangopadhyay, K. K., Rai, M. and Kumar, R. 1999.** Evaluation of Guava cultivars under rainfed sub-humid region of Chhotanagpur plateau. *Indian J. Hort.* **56(2)**: 135-140.
- Roose, M. L., Cole, D. A., Atkin, D. and Kuper, R. S. 1989.** Yield and tree size of four citrus cultivars on 21 rootstocks in California. *J. Amer. Soc. Hort. Sci.* **114**: 678-684.
- Sandhu, A. S., Bains, S. S. and Singh, S. N. 1987.** Study on floral biology in guava (*Psidium guajava* L.) under Ludhiana condition I. flower bud development, time and duration of flowering and floral morphology. *Punjab Hort. J.* **27(3&4)**: 203-207.
- Sehgal, O. P. and Singh, R. 1965.** Studies on blossom biology of guava (*Psidium guajava* L.) Flowering season, flowering habit, floral bud development, anthesis and dehiscence. *Indian J. Hort.* **22(1-2)**: 25-32.
- Sharma, A., Sehrawat, S. K., Singhrot, R. S. and Tele, A. 2010.** Morphology and chemical characterization of *Psidium* species. *Not. Bot. Hort. Agrobot. Cluj.* **38(1)**: 28-32.
- Sharma, G., Sharma, O. C. and Thakur, B. S. 2009.** Systematics of Fruit Crops. *New India Publishing Agency.* pp. 181-183.
- Singh, I. P. 2003.** Performance of different guava (*Psidium guajava* L.) cultivars under Tripura climatic conditions. *Prog. Hort.* **35(1)**: 55-58.
- Smita, N. 2005.** Evaluation of genotypes and hybrids of guava. Ph.D. thesis, *Anand Agriculture, University, Anand, Gujrat state.*
- Teaotia, S. S., Pandey, I. C., Awasthi, R. K. and Dube, P. S. 1969.** Further studies of guava varieties (*Psidium guajava* L.). *The Punjab Hort. J.* **9(1-2)**: 41-47.
- Teaotia, S. S., Pandey, I. C., Agnihotri, B. N. and Kapur, K. L. 1962.** Study of some guava varieties (*Psidium guajava* L.) of Uttar Pradesh. *Indian Agriculturist.* **6**: 47-53.
- Teaotia, S. S., Pandey, I. C., Dubey, D. S. and Awasthi, R. K. 1966.** Description of Red-fleshed varieties of guava (*Psidium* spp.). *The Punjab Hoti. J.* **8**: 127-133.
- Thimmappaiah, Yadav, I. S. and Suman, C. L. 1985.** Genetic variability and association analysis in guava. *Ind. J. Agric. Sci.* **55(11)**: 679-682.

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