The Pharma Innovation Journal 2022; 11(7): 3588-3589

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(7): 3588-3589

www.thepharmajournal.com
Received: 10-05-2022
Accepted: 19-06-2022

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Quantitative phenotypic evaluation of guava (*Psidium guajava* L.) hybrid population

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Abstract
An experiment was carried out at College of Horticulture, Dr. Y.S.R Horticultural University, Andhra Pradesh to estimate growth parameters for guava hybrid population. Estimation of growth parameters like plant height, stem circumference, leaf length and leaf width might be useful to know the potentiality of vegetative growth of particular hybrid. Wide range of variation was observed among hybrids of guava with respect to growth aspects.

Keywords: Guava, leaf length, leaf width, plant height and stem circumference

Introduction
Poor man's fruit (Guava) grown in tropical and subtropical regions of the world. Guava belongs to family Myrtaceae (Govaerts *et al*., 2008) [5]. Area under guava cultivation in India, is 292 thousand hectares with production of 4361 thousand metric tonnes (Anon., 2019) [3]. Major growing states are Maharashtra, Bihar, Uttar Pradesh, Gujarat, Madhya Pradesh, Odisha, Andhra Pradesh and Punjab. In Andhra Pradesh, guava is grown over an area of 9.53 thousand hectares with its annual production of 229.78 thousand metric tonnes (Anon, 2018) [2]. Edible guava fruits are rich in vitamin-A, Thiamin, vitamin B2 (Riboflavin) and ascorbic acid content. Guava juice might be helpful to improve average level of erythrocytes and hematocrit levels in post-partum women (Nurhasanah *et al*. 2021) [11]. Guava leaf extracts can potentially used as an ingredient in the development of functional foods and pharmaceuticals due to its phytochemical profile (Kumar *et al*. 2021) [8]. Guava fruit is cross pollinated, continuous variability is available in guava seedling in different growing regions (Srivastava, 2005) [15]. High heterozygosity, frequent cross pollination resulted in present day variation among seedling populations from which promising genotypes have been selected (Dinesh and Vasugi, 2010) [4]. Several hybrid progeny evaluation was reported by Santos *et al*. (2017) [12], Nagar *et al*. (2018) [10], Sohi *et al*. (2019) [14], Almeida *et al*. (2019) [1] and Jain (2021) [7]. Mark and Mukunda (2007) [9] studied on open pollinated progeny of guava cv. Apple colour. Characterization of progenies determines the expression of heritable characters such as morphological, agronomical, biochemical features to molecular markers aspects. Hence, characterization of progeny either full sib or half sib progeny was essential to acquire information on different traits.

Materials and Methods
An experiment was conducted on three year old hybrids of guava at College of Horticulture, Dr. Y.S.R. Horticultural University, Anantharajupeta, Andhra Pradesh. The crosses were attempted by Fruit science department (2017-2018) and full and half sib progenies of guava were planted at spacing of 2 x 2 m in fruit science block during August, 2019. Hybrids include H1 (ARP selection x Lalit), H2 (Lalit x ARP selection), H3 (Allahabad Safeda x ARP selection), H4 (Lalit x Allahabad Safeda), H5 (Allahabad Safeda x Lalit), H6 (Nagpur Seedless x Allahabad Safeda), and OP (Open pollinated progeny of Allahabad Safeda). Height of individual hybrid plant was measured with the help of a standard wooden scale from the base of the plant, near the soil surface to the highest point of the crown and expressed in metre (m). Stem circumference was measured with the help of measuring tape and expressed in centimeter (cm). Length and width of the index leaf (middle or third leaf of current season

growth) was measured with the help of measuring scale and expressed in centimeters. Length/width ratio was calculated by dividing the value of leaf length with that of leaf width. Descriptive statistical analysis was done using PAST 3 (Palaeontological Statistics; Hammer *et al.* 2001) [6] software version.

Results and Discussion

Among hybrid population, maximum variation was observed with respect to plant height, stem circumference, leaf length, leaf width and leaf length to leaf width ratio. Table. 1. pertaining to phenotypic characters indicates wide range of growth attributes observed among hybrid population with respect to stem circumference (19.20-47.0 cm), plant height (1.56 -5.52 m), leaf length (12.45-16.78 cm), leaf width (5.12-7.65 cm) and leaf length to width ratio (2.03-2.65). Larger leaf area might be helpful to synthesis of photosynthates and their accumulation, which might be responsible for better growth (Shiva, 2014). 31.57, 3.83, 15.12, 6.71 and 2.26 were the mean values for stem circumference (cm), plant height (m), leaf length (cm), leaf width (cm) and leaf length to width ratio.

Table 1: Descriptive statistics for growth characters in guava (*Psidium guajava* L.) hybrid population

	Minimum	Maximum	Mean	Standard Deviation	Coefficient of variation
Stem circumference (cm)	19.20	47	31.57	5.69	18.01
Plant height (m)	1.56	5.52	3.83	0.61	15.83
Leaf length (cm)	12.45	16.78	15.12	0.70	4.65
Leaf width (cm)	5.12	7.65	6.71	0.38	5.60
Length to width ratio of leaf	2.03	2.65	2.26	0.12	5.34

Similar variation in morphological aspects in guava was reported by Nagar *et al.* (2018) [10], Almeida *et al.* (2019) [1] and Jain (2021) [7]. This variability in guava hybrids is mainly due to its pedigree, i.e. the parents and the prevailing environmental and edaphic conditions.

Conclusion

Assessment of hybrid progeny during preliminary stage with respect to growth paraemeters like plant height, stem circumference, leaf length, leaf width and leaf length to leaf width ratio might be helpful to know the magnitude of hybrid population. Along with genetic nature of plant, soil and environmental conditions also plays an essential role for growth and development.

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