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Multivariate analysis in guava (*Psidium guajava* L.) hybrid population

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Abstract

An experiment was conducted at College of Horticulture, Anantharajupeta, to know variation of guava hybrid population. First two principal components with Eigen values more than one contributed to 71.05% of cumulative variance among guava hybrid population. Estimation of growth parameters like plant height, stem circumference, leaf length and leaf width might be helpful to know the potentiality of vegetative growth of hybrids.

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

Introduction

Guava is grown in tropical and subtropical climatic conditions of the world. Guava belongs to family Myrtaceae (Govaerts et al., 2008)^[5]. In India, the area under guava is 292 thousand hectares with a production of 4361 thousand metric tonnes (Anon., 2019)^[2]. 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 an annual production of 229.78 thousand metric tonnes (Anon, 2018)^[1]. There are about 160 cultivars in India, among which Allahabad Safeda, Lucknow-49, Red Fleshed, Banarasi, Arka Kiran, Lalit, Chittidar, Hafsi, Dharwar etc. varieties are mainly cultivated. Water soaked guava fruit is used for the treatment of diabetes (Mitra et al, 2012)^[10]. Guava is usually eaten raw and its use in jams, jellies, juices, preserves and sauces shows its economic importance. Guava has a high concentration of pectin (0.1-1.8%), which may play a significant role in cholesterol reduction and help in decreasing cardiovascular disease (Singh, 2005)^[12]. 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 guava germplasm evaluations was reported by Sharma (2019)^[11], Bui et al., (2021)^[3], Sohi et al. (2019)^[13] and Jain (2021)^[7]. Further, Mark and Mukunda (2007)^[9] studied on open pollinated progeny of guava cv. Apple colour. It is claimed that 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

Materials and Methods

information on different traits.

An experiment was worked out 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) and OP (Open pollinated progeny of Allahabad Safeda). With help of standard wooden scale, height of individual plant height was measured from base of the plant near surface to the highest point of the crown 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.

Principal component analysis was done by using PAST 3 (Palaeontological Statistics; Hammer *et al.* 2001)^[6] software version.

Results and Discussion

Principal component analysis (PCA) was performed to provide an easy visualization of the complete data set in reduced dimensions (Jolliffe and Cadima 2016)^[8]. The angle size between two or more traits in the biplot is directly proportional to correlation between these characters, that is, the closer the traits are to each other, the higher the correlation.

 Table 1: Principal component analysis (PCA) for five morphological traits of guava hybrid population

	PC 1	PC 2
Eigenvalue	2.14	1.41
% variance	42.77	28.27
Cumulative %	42.77	71.05
Factor loading		
Stem circumference (cm)	0.67	0.11
Plant height (m)	0.71	0.24
Leaf length (cm)	0.49	0.73
leaf width (cm)	0.85	-0.22
Length to width ratio of leaf	-0.47	0.88

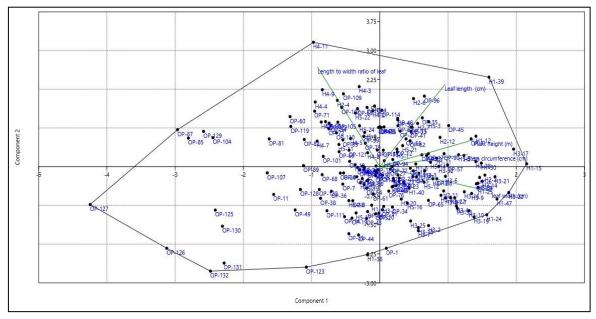


Fig 1: Segregation of the guava hybrid population according to qualitative traits determined by principal component analysis

The results presented in table 1 revealed that the first two principal components possessed Eigen value greater than 1.0, with per cent contribution towards total variance as 42.77 per cent, 28.27 per cent. The first Principal Component, which is the most important component, explained 42.77 percent of total variation. Eigen vector of the first principal component (PC1) had loading values for leaf width (0.85), plant height (0.71), stem circumference (0.67), leaf length (0.49) and Length to width ratio of leaf (-0.47). PC2 explained 28.27 percent variation, it represented mainly length to width ratio of leaf (0.88), leaf length (0.73), plant height (0.24), stem circumference (0.11) and leaf width (-0.22). The biplot was plotted between PC1 and PC2 to compare guava hybrid population on the basis of vegetative characters (Fig. 1). Guava hybrids H1-15, H1-22, H1-39, H1-24, OP-1, H1-38, H4-11, OP-123, OP-132, OP-87, OP-126 and OP-127 were distinct ones with respect to growth characters. Leaf length and leaf width had a great contribution to the principal component analysis in guava germplasm (Sharma, 2019 and Bui *et al.*, 2021)^[11, 3].

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.

Reference

- 1. Anonymous. National Horticulture Data Base. National Horticulture Board. Ministry of Agriculture, Government of India, 2018.
- 2. Anonymous. National Horticulture Data Base. National Horticulture Board. Ministry of Agriculture, Government of India, 2019.
- Bui DQ, Tran TD, Le HTM, Nguyen TT, Tran YTO. Phenotypic Diversity Assessment of Guava (*Psidium* guajava L.) Collection in Vietnam. Indian Journal of Agricultural Research. 2021;55(5):511-518.
- Dinesh MR, Vasugi C. Phenotypic and genotypic variations in fruit characteristics of guava (*Psidium* guajava L.) Indian Journal of Agriculture Science. 2010;80(11):62-63.
- 5. Govaerts R, Sobral M, Ashton P, Barrie F, Holst BK, Landrum LL, *et al.* World checklist of Myrtacea. The Board of Trustees of the Royal Botanic Gardens, Kew. 2008. http://www.kew.org/wcsp
- 6. Hammer O, Harper DAT, Ryan PD. PAST: paleontological statistics software package for education and data analysis. Palaeontol Electr. 2001;4:1-9.
- 7. Jain S. Morphological characterization of F_1 guava hybrids. M.Sc. Thesis. Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India, 2019.
- 8. Jolliffe IT, Cadima J. Principal component analysis: A review and recent developments. Philosophical Transactions of the Royal Society A: Mathematical,

Physical and Engineering Sciences. 2016;374(2065):20150202.

- Marak JK, Mukunda GK. Studies on the performance of open pollinated seedling progenies of guava cv. 'Apple Colour'. Proc. Ist IS on Guava Eds. G. Singh *et al.* Acta Horticulture. 2007;735:79-84.
- 10. Mitra SK, Irenaeus TKS, Gurung MR, Pathak PK. Taxonomy and importance of Myrtaceae. Acta Horticulture. 2012;959:23-34.
- Sharma I. Diversity Assessment of Seedling Guava (*Psidium guajava* L.) in Jammu Sub-tropics. M.Sc. Thesis. Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu. Chatha, Jammu, 2019.
- Singh G. Strategies for improved production in guava. In: Kishun R, Mishra AK, Singh G, Chandra R (Eds.) Proc 1st Int Guava Synp, CISH, Lucknow, India, 2005, 26-39.
- 13. Sohi HS, Gill MIS, Singh D, Arora NK. Characterization of F1 hybrids of guava (*Psidium Guajava* L.) on the basis of phenotypic and biochemical parameters. Chemical Science Review and Letters. 2019;8(32):335-339.