CORRELATION STUDIES BETWEEN FLORAL BIOLOGY AND FRUIT QUALITY IN DIFFERENT GENOTYPES OF APPLE COLOUR GUAVA (*PSIDIUM GUAJAVA* L.)

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ABSTRACT

Study of floral biology and developmental changes in fruits of Apple Colour guava (*Psidium guajava* L.)was carried out at Department of Horticulture, University of Agricultural Sciences, GKVK, Bengaluru during the year 2010-11on ten year old plants with the objective to study the correlation between the floral biology and fruit quality. Correlation studies of different characters in Apple Colour guava have revealed that the duration of flowering is positively and significantly correlated with total sugars (0.58*) and reducing sugars (0.73*) whereas, it is associated negatively significant with Titratable acidity (-0.83**) and pH (-0.83**) number of flowers per shoot was positively and significantly correlated with fruit retention (0.59*) and negatively significant associated with pH(-0.83**) fruit set is highly significant and positively correlated with fruit retention (0.98**) whereas negatively associated with pH (0.66*). The positive or negative correlation of different flowering and fruit quality parameters helps to understand the relationship between different apple colour guava genotypes.

INTRODUCTION

Guava (*Psidiumguajava* L.) is one of the most important fruit cropof Tropical and Sub –Tropical region of India. It was originated in Tropical America. In India, Uttar Pradesh leads in production, while Allahabad region of U. P. produces best quality of guava in India as well as in the world.it is rich source of ascorbic acid and pectin. Study of floral biology is very important to study in guava it helps researchers to identify elite hybrid/genotypes which are having good fruit set and also helps to adjust the cultural operations in relation to flowering and fruiting where as, quality characters in fruits has a key role in determining the harvest indices of the fruit & estimation of its potential shelf - life. It also helps in qualitative analysis of the fruits. Maintenance of superior genotypes for further crop improvement program is essential Therefore, evaluation of floral biology and its physico- chemical characters provide ample opportunity to the researchers to understand different guava genotypes (Janal et al., 2015). Therefore, for a variety/hybrid/genotype it is most important to know its performance, on its flowering behaviour and its relation along with quality parameters, hence in this line the research has been conducted with objective of the study the relationship between floral biology and fruit quality.

MATERIALS AND METHODS

The studies were carried out during 2010 -11on the selected ten years old seedling progenies of guava cv. Apple Colour

were planted at a spacing of 6.0 m x 6.0 m at Horticulture Research Farm, GKVK, Bengaluru during the year 2000. Among

them,the nine seedlings progenies*viz.*, R_3P_3-22, R_3P_5-24, R_4P_3-32, R_6P_1-49, R_6P_2-50, R_8P_5-72, R_9P_1-78, R_9P_2-79 and $R_{11}P_4$-100were found to perform well under this Eastern dry zone. These nine seedling selections were selected and study has been conducted.

The number of days that the time of first flowers opened on a plant up to the last day when the anthesis of flowers occurred was recorded as the duration of flowering and the number of flowers produced per shoot was counted and the average was computed. The 25 flowers which were completely opened were tagged and the percentage of fruit set and fruit retention was recorded and expressed in percentage (Jessica, 2001).

The fruit juice was extracted by crushing the fruit pulp from the two halves of each fruit, respectively, stained through muslin cloth and Total Soluble Solids (TSS) was determined using standard 'Erma' hand refractometer (0-32⁰B) and TSS was expressed as degree Brix (^0B) after making necessary temperature corrections to the recorded readings.

Titratable acidity was estimated by taking the composite sample of 10 g of fruit pulp blended with distilled water and the volume was made up to 100 ml and filtered. An Aliquot of 10 ml was taken and titrated against 0.1N NaOH solution using phenolphthalein indicator and it was expressed as per cent citric acid (Ranganna, 1977).

The juice was extracted from the fruit and the pH was measured by using combined glass electrode pH meter.Ten gram of the representative fruit sample was blended with 0.40 per cent oxalic acid and the volume was made up to 100 ml using distilled water and 5mL of aliquot was taken from this

filtrate and titrated against 2, 6- dichlorophenol indophenols dye which is self indicator of the end point (Anon, 1975).

A known quantity of filtrate was hydrolyzed by mixing with 5 ml of hydrochloric acid (1:1) and kept for overnight. Then, it was neutralized with sodium hydroxide using phenolphthalein indicator and diluted suitably. Aliquot was taken and total sugars were estimated by Shaffer Somogi method (Ranganna, 1977).

Ten gram of fruit pulp was boiled with 50 ml of water, cooled, clarified by adding two ml of lead acetate (45%) and allow to stand for 10 minutes, excess of lead was precipitated by using potassium oxalate solution (22%) filtered and suitable dilution was made. 5 ml of filtrate was taken and reducing sugars was estimated by following Shaffer Somogi method (Ranganna, 1977).

Non reducing sugars were computed by using formula

Non reducing sugars (%) = Total sugars (%) – Reducing sugars (%)

Correlation coefficient between floral biology and fruit quality characters

To determine the degree of association between the traits studied, phenotypic correlation was computed by using formula given by (Webber and Moorthy, 1952.

RESULTS AND DISCUSSION

The idea of correlations was presented by Galton (1889) and was later elaborated by Hazel (1943).A result of the correlation analysis for floral biology and fruit quality characters.
A result of the correlation analysis for floral biology and fruit quality (Table 1). It was observed that duration of the flowering was significant and negative correlation existed between titratable acidity (-0.83**) and pH (-0.83**) by which it shows there is no contribution of duration of the flowering on the acidity and pH of the fruit. Whereas, it was significant and positively correlated with the total sugars (0.58*) and reducing sugars (0.73*) of the fruit by which duration of flowering influences the sugar content of the fruit hence, duration of flowering influences the sugar content of the fruit . There is no previous correlation studies found on this line.
Number of flowers per shoot was found to have positively and significantly associated with fruit retention (0.59*). Therefore, the number of flowers per shoot has direct influence

on the fruit retention. However, it was negatively correlated with titratable acidity (-0.70*) and pH (-0.66*) of the fruit. Hence, number of flowers per shoot has no influence on the pH of the fruit related correlation studies found Number of fruits per new shoot was significant and positively correlated with number of flowers at second leaf pair, number of flowers at third leaf pair and number of flowers per new shoot Number of fruits per new shoot was significant and positively correlated with number of flowers at second leaf pair, number of flowers at third leaf pair and number of flowers per new shoot (Lakpathi *et al.,* 2013).

The fruit set expressed highly significant and positive correlation with fruit retention (0.98**). Fruit set has direct influence on the fruit retention. There was a negative and significant correlation between fruit set with pH (-0.63*) and

also with non reducing sugars (-0.63*).Fruit set has no influence on the fruit pH (-0.63*) and non-reducing sugars (-0.67*). Further, fruit retention was significant and negatively correlated with pH. Fruit retention has no influence on the pH of the fruit similar results were found by Borthakur and Bhattacharyya (1999) studied that there was a positive relationship between fruit set and fruit retention and also with fruit yield and it has negative correlation with pH and sugar content of the fruit.

The titratable acidity was found negative and significant correlation with the pH (-0.93**) Increase in acidity of the fruit result in decrease pH of the fruit. A significant and negative correlation was observed between pH of the fruit and total sugars (-0.58*), which indicates that the pH of the fruit has no contribution in increasing total sugars. Total sugars expressed positive and significant correlation with reducing sugars (0.66*). Hence, increase in total sugar increases the reducing sugars of the fruit. Singh and Singh (2000) also observed positive significant association of reducing sugars with TSS, acidity and total sugars of the fruit. The similar study was found in line with this study shows that the size of flower had a positive correlation with diameter of fruit, weight of fruit, days required to fruit positive correlation with number of seeds per fruit, TSS, Total Sugar and reducing and non reducing sugar, size of flower has positive and significant correlation with no. of seeds per fruit. Length of fruit revealed positive and significant correlation with total sugar content and reducing sugar. Diameter of fruit at maturity, number of seeds per plant and Total Soluble Solids. (Man Bihari and Surya

Table 1: Correlation studies between floral biology and fruit quality in different genotypes of Apple Colour guava.

	1	2	3	4	5	6	7	8	9	10	11
1	1										
2	0.26	1									
3	0.44	0.56	1								
4	0.41	0.59*	0.98**	1							
5	0.05	0.14	-0.19	-0.17	1						
6	-0.83**	-0.70	-0.55	-0.50	-0.08	1					
7	-0.83**	-0.67*	-0.66*	-0.63*	-0.07	-0.93**	1				
8	0.13	0.19	0.12	0.26	0.48	0.06	-0.02	1			
9	0.58*	0.14	0.01	-0.08	0.30	-0.55	-0.58*	-0.35	1		
10	0.73*	-0.13	0.28	0.24	-0.11	-0.47	-0.63	-0.26	0.66*	1	
11	0.06	0.07	-0.63*	-0.67	0.40	-0.16	0.01	-0.11	0.55	-0.11	1

* Significant @ 5%; ** Significant @ 1%; 1. Duration of the flowering; 3. Fruit set (%);4. Fruit retention (%);5. TSS (%);6. Titratable acidity (%);7. pH; 2. Average number of flowers/shoot;8. Ascorbic acid (mg/100g); 9. Total sugars (%);10. Reducing sugars (%); 11. Non reducing sugar (%)

Narayan, 2009).

(Jana1 *et al., 2015*) also studied on correlation Study of Yield, Flowering Duration and Fruit Physico-chemical Characters of Guava (*Psidiumguajava* L.) revealed that In guava significant correlations were observed between duration of flowering with their respective seasons and their yield and total yield. Duration of flowering was positively correlated with yield of respective seasons. Fruit weight was positively and significantly correlated with fruit size (r=0.860**) and fruit volume (r=0.981**). T.S.S. was positively and significantly correlated with reducing sugar (r=0.586**) and total sugar (r=0.683**). Acidity also positively and significantly correlated with reducing sugar (r=0.497**) and total sugar (r=0.417*). Reducing sugar was positively and significantly correlated with total sugar (r=0.888**). Yield was significantly and positively correlated with fruit size, weight and fruit volume (r=0.327*).Hence by all these studies it concludes that there is significantly and positive or negative association along with flowering and quality of different progenies in apple colour guava genotypes

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