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Correlation Studies in Yield and Yield Attributes of Mango (*Mangifera indica* L.) Cv. Banganpalli

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ABSTRACT

Correlation studies in mango with different physical parameters were carried out during 2015-16 at Fruit research station, Sangareddy, Telangana. The data on correlation coefficient of yield and its component characters reveals that yield per tree was significantly and positively correlated with percent flowering (0.760) and number of fruits per tree (0.988**), where as negatively correlated with vegetative buds percent (-0.793*) and with number of days taken for panicle initiation (-0.749*). Among the other physical parameters percent flowering was negatively correlated with vegetative buds percent (-0.861**) and days taken for panicle initiation (-0.865**) and positively correlated with number of fruits per tree (0.756*). Among the quality parameters the data showing that yield is positively correlate with total sugars (0.824*) and TSS : acidity ratio (0.853*) where as negatively correlate with ascorbic acid (-0.939**).*

Key words: *Correlation, Yield, quality, percent flowering, panicle initiation and Banganpalli.*

INTRODUCTION

Mango (*Mangifera indica*) is the king of fruit, and is grown in Andhra Pradesh, Telangana, Uttar Pradesh, Bihar, Karnataka, Maharashtra, West Bengal, and Gujarat. The fruits of mango are valued because of its excellent flavor, delicious taste, and nutritive value. In Telangana, mango occupies an area of 2.10 lakh ha, with a production of 1,894.9 M.T with a productivity of 9.0 T. ha^{-1} [6]. In Telangana the commercial cultivar is Banganpalli and it occupies 70% of mango area. The major growing districts of Banganpalli in Telangana are Medak, Adilabad, Karimnagar, Khammam and Ranga Reddy. Fruit yield depends on number of fruits per tree. The number of fruits harvested per tree depends on other physical parameters like percent flowering and early flower initiation. Therefore flowering and fruit set parameters contributes fruit yield and quality improvement aspects. Hence correlation studies with different plant bio regulator factor contributing to the yield and quality were carried out during 2015-16 at Fruit research station, Sangareddy, Telangana.

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MATERIALS AND METHODS

The present investigation on "Effect of plant bio regulators and chemicals on flowering yield and quality of mango cv. Banganpalli" was carried out on 15 years old trees of Banganpalli cultivar at fruit research station sangareddy during 2015-16. The experiment was conducted on fifteen years old, well grown, uniform statured trees of mango cv. Banganpali. Trees were spaced with 8 m and planted in square system. The statistical design adopted was Randomised block design with 16 treatments which were replicated thrice. The treatments consisted of T_1 (Paclobutrazol @ 3ml.m-1 canopy diameter application as soil drench), T_2 (NAA @ 80 ppm), T_3 (SA @ 100 ppm), T_4 (Spermidine @ 0.01 mM),T_5 (Borax @ 1.5gr.l^{-1}), T_6 (CPPU @ 10ppm),T_7 (Paclobutrazol @ 3ml.m^{-1} canopy diameter application + Spermidine @ 0.01 mM), T_8 (Paclobutrazol @ 3ml.m-1 canopy diameter application + Borax @ 1.5gr.l^{-1}), T_9 (Paclobutrazol @ 3ml.m^{-1} canopy diameter application + CPPU @ 10ppm),T_{10} (NAA @ 80 ppm + Spermidine @ 0.01 mM), T_{11} (NAA @ 80 ppm + Borax @ 1.5gr.l^{-1}), T_{12} (NAA @ 80 ppm + CPPU @ 10ppm), T_{13} (SA @ 100 ppm + Spermidine @ 0.01 mM), T_{14}(SA @ 100 ppm + Borax @ 1.5gr.l^{-1}), T_{15} (SA @ 100 ppm + CPPU @ 10ppm),T_{16} (Control). Treatmental trees were selected by random numbers and the experiment design was laid out in randomised block design[7]. All cultural practices like fertilizers, spraying of pesticides, fungicides and irrigation were uniformly practiced in experimental trees.

TSS was determined with the help of hand refractometer (0-32^0 Brix), Titrable acidity was determined by titrating the fruit sample against 0.1N NaOH using phenolphthalein as an indicator, Ascorbic acid was estimated by Indophenol method[8], Total sugars were estimated by Lane and Eynon method[8] and reducing sugars content was estimated by Nelsons Somogyi method[5]. The data on physical and chemical parameters were recorded and subjected to statistical analysis to draw valid inerferance.

RESULTS AND DISCUSSION

The data on correlation coefficients of yield, quality and its component characters reveal that fruit yield kg per tree was significantly and positively correlated with percent flowering (0.760*) and number of fruits per tree (0.988) , where as negatively correlated with vegetative buds percent (-0.793*) and days taken for panicle initiation (-0.749*) (Table 1). These findings are close agreement with the findings of Majumder *et al*.,[4] in mango and Abhilash *et al*.,[1] in guava. Positive correlation observed between yield and percent flowering, higher percent flowering may cause for better fruit set and more number of fruits per tree which may leads to higher yield per tree.

Table 1: Correlation matrix for yield attributes for mango cv. Banganpalli as influenced by flower enhancing plant bio regulators and fruit set improving chemicals

	Vegetative buds (%)	Flowering (%)	Days taken for panicle initiation	Panicle length (cm)	Panicle breadth (cm)	Fruit set per panicle	Number of fruits per tree	Fruit weight (gm)	Yield (kg/tree)
Vegetative buds (%)	1								
Flowering (%)	-0.861**	1							
Days taken for panicle initiation	0.662^{NS}	-0.865**	1						
Panicle length (cm)	0.093^{NS}	0.024^{NS}	-0.139^{NS}	1					
Panicle breadth (cm)	-0.286^{NS}	0.136^{NS}	0.079^{NS}	0.687^{NS}	1				
Fruit set per panicle	0.472^{NS}	-0.268^{NS}	0.227^{NS}	-0.204^{NS}	-0.483^{NS}	1			
Number of fruits per tree	-0.833*	0.756*	-0.693^{NS}	-0.161^{NS}	-0.076^{NS}	-0.321^{NS}	1		
Fruit weight (gm)	0.021^{NS}	0.139^{NS}	-0.494^{NS}	0.625^{NS}	0.044^{NS}	0.209^{NS}	0.126^{NS}	1	
Yield (kg/tree)	-0.793*	0.760*	-0.749*	-0.117^{NS}	-0.127^{NS}	-0.224^{NS}	0.988**	0.255^{NS}	1

* Significant at 5% level 'r' value at 5% - 0.706, **Significant at 1% level 'r' value at 1% - 0.834, NS – Non Significant

Further positive correlation observed between number of fruits per tree and percent flowering (0.756*), whereas number of fruits per tree was negatively correlated with vegetative buds percent (-0.833*). Similar positive correlation between number of flowers per tree and number of fruits per tree was earlier reported by Kaiser and Hulmani[3] in guava. Percent flowering was significantly and negatively correlated with vegetative buds percent (-0.861**) and days taken for panicle initiation (-0.865**) (Table 1). Similar negative correlation between vegetative parameters and number of flowers per tree was earlier reported in guava by Kaiser and Hulmani[3]. Highly significant and positive correlation was revealed between number of fruits per tree and yield, which indicated strong association of two characters. Thus, if number of fruits per tree increases fruit yield also increases.

The data on correlation coefficient of quality parameters of fruits with yield (Table 2) reveal that yield per tree was significantly and positively correlated with total sugars (0.824*) and TSS:acid ratio (0.853*) where as negatively correlated with ascorbic acid (-0.939**). These findings are in close agreement with the findings of Kaiser and Hulmani[3] in guava and Abilash *et al.*,[1] in guava. Among the other chemical characters ascorbic acid significantly and positively correlated with TSS (0.764*) and negatively correlated with total sugars (-0.924**). Acidity was significantly and negatively correlated with TSS (-0.785*) and with ascorbic acid (-0.765*). TSS:acid ratio significantly and positively correlated with TSS (0.817*) and negatively correlated with ascorbic acid (-0.825*) and with acidity (-0.772*). These findings are in close agreement with the findings of chakrawar and jathure[2] in lime, Saha[9] in lemon.

Table 2: Correlation matrix for quality parameters of mango cv. Banganpalli as influenced by flower enhancing plant bio regulators and fruit set improving chemicals:

	TSS (^{0} Brix)	Total Sugars	Reducing Sugars	Ascorbic Acid	Acidity (%)	TSS/ Acid Ratio	Yield (kg/tree)
TSS (^{0} Brix)	1						
Total Sugars	-0.734^{NS}	1					
Reducing Sugars	-0.544^{NS}	0.553^{NS}	1				
Ascorbic Acid	0.764*	-0.924**	-0.638^{NS}	1			
Acidity (%)	-0.785*	0.741^{NS}	0.415^{NS}	-0.765*	1		
TSS/ Acid Ratio	0.817*	0.668^{NS}	0.719^{NS}	-0.825*	-0.772*	1	
Yield (kg/tree)	-0.640^{NS}	0.824*	0.642^{NS}	-0.939**	0.750^{NS}	0.853*	1

* Significant at 5% level 'r' value at 5% - 0.762, **Significant at 1% level 'r' value at 1% - 0.921, NS – Non Significant

The association of fruit yield was highly and negatively correlated with ascorbic acid (-0.939**). It is quite natural that as the yield increases, the quality decreases. The relationship holds good for many other crops. The negative correlation of ascorbic acid content with yield indicated that as one tries to improve the yield to some extent, the ascorbic acid content reduces to that extent. This is because of weak linkage between the genes controlling the yield and ascorbic acid content. The negative correlation between total soluble solids and yield indicated that as the number of fruits per plant increases there was depletion in the supply of metabolites which resulted in decreased total soluble solid content in fruit. Hence, if the quality fruits were to be produced the fruit number per plant needs to be regulated.

CONCLUSION

Among plant physico-chemical parameters dependant variable (Yield) was significantly and positively correlated with percent flowering, number of fruits per tree, total sugars and TSS: acidity ratio. Whereas yield significantly and negatively correlated with vegetative buds percent, number of days taken for panicle initiation and ascorbic acid content.

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