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Correlation Analysis of Avocado (*Persea americana* Mill.) Genotypes from Lower Pulney Hills of Tamil Nadu

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ABSTRACT: Avocado (*Persea americana* Mill.) commonly known as "Butter Fruit" is an evergreen subtropical fruit tree native to Central America and Mexico. Seventy diverse genotypes of Avocado were selected from the Lower Pulney Hills (Western Ghats) of Tamil Nadu for the current study during October 2019 to September 2021. The study was aimed to evaluate the yield contributing characters of lower Pulney hills of Tamil Nadu The yield correlated characters like Tree age, tree height, tree canopy, trunk circumference, fruit circumference, fruit length, fruit weight, pulp peel ratio and yield were estimated. The phenotypic correlation, as well as their direct and indirect impacts, were assessed in avocado using correlation coefficient analysis to determine the influence of the most parameters to yield. Tree height (0.510), tree canopy (0.410), trunk circumference (0.660), fruit weight (0.771), length of seed cavity (0.505), and fruit circumference (0.353) all had favourable direct effects on yield, however seed pulp ratio (-0.343) had a negative indirect effect. In conjunction with coefficient of correlation analysis, it was discovered that tree canopy, tree height, trunk circumference, fruit circumference, and fruit weight produced substantial positive correlation coefficients with yield as well as a high positive direct influence.

Keywords: Avocado, Fruits, yield, correlation, coefficient.

INTRODUCTION

Avocado is one of the world's most important fruit crops. It is recognized as the most nutritious of all fruits and has a considerable worldwide trade volume. Its nutritional content is comparable to ripe olives, which contain an average of 2.1 percent protein and 24-26 percent fat. Because the fruit has less than 1% sugar, it is recommended as a high energy diet for diabetics. It is commonly used in table purpose and cosmetics. Lower Pulney hills of Tamil Nadu enjoys subtropical climate which is ideal for the growth of avocado. Because of its low production cost and high returns to farmers of Kodaikanal region of Tamil Nadu are taking up avocado cultivation and no more avocado is a border crop of other farms**.** There exists a rich diversity of avocado grown as shade tree in coffee plantations in Lower Pulney Hills. In plant breeding, having a good understanding of the relationship between yield and its contributing characteristics is important. To build up a viable breeding programme for any crop, knowledge of the interrelationships between yield contributing characteristics is required. The path coefficient analysis and correlation provide a good description of the genetic link between various features (Bhatt, 1973). Correlation and path coefficient analyses are used to quantify the direct and indirect impact of one character on another (Dewey and Lu, 1959). Grafius, (1959) suggested that yield may not have a genetic basis, but that the multiplicative interaction of numerous genes results in the yield of several components. Understanding the link between yield and component characters, as well as among component characters, is therefore crucial for logical and focused crop development (Rao *et al.*, 2004). Path analysis is useful in indirect selection since it helps to identify yield contributing features. Correlation, in conjunction with path analysis, would provide a better understanding of the cause and effect relationship between character pairs. If knowledge of correlations was accompanied by an understanding of the magnitude of contribution (direct and indirect) of the each constituent character to the final make up of the fruit yield, the formulated criteria would be effective in selecting genotypes and using themselves in the crop improvement program. As a result, the current study was done to evaluate the genotypic and phenotypic correlations, as well as their direct and indirect impacts in avocado, using route coefficient analysis to determine the contribution of most relevant features to yield.

MATERIALS AND METHODS

These studies cover 10 locations in Tamil Nadu's

Lower Pulnuy Hills, including Pachalur, Sembirankulam, Poolathur, Thadiyankudisai, Thandigudi, Pannaikadu, Patlakadu, Perumkanal, Uthu, and Manjal parappu. Which are the parts of western ghats, lies between elevation of 800–1600 MSL at 10˚south latitude and 77˚ East longitude. The locations were chosen for their abundance of avocado trees as well as their closeness, which made traveling between them easier. Old avocado trees produced from seed are referred to as trees in this situation. From October 2019 to September 2021, field visits were conducted with the support of people who were familiar with avocado producing regions in a particular district. With the aid of IPGRI (1995) descriptors, seventy Avocado genotypes were chosen and assessed. Tree age, tree height, tree canopy, trunk circumference, fruit circumference, fruit length, fruit weight, fruit peel ratio, pulp peel ratio, number of fruits, and other yield contributing characteristics were all recorded.

Correlation estimation. According to Prasad and Rao (1989), the genotypic and phenotypic correlation coefficient was calculated.

RESULTS AND DISCUSSION

Correlation between numerous morphological parameters is essential to improving selection programme design and identifying the behavior of complex qualities such as yield. However, the correlation does not provide a clear picture of the relative relevance of each of the component qualities' direct and indirect effects on yield. As a result, the path coefficient is used to study the character association further. A lack of understanding of the interrelationships between diverse qualities, as well as unilaterally selection for agronomic characteristics, frequently result in backward or inadequate plant breeding (Bhatt, 1973). The connection between yield and its components may be influenced by genetic linkage, pleiotrophy, or developmental variables. Correlation and path analysis studies are significant resources for breeders, especially in fruit crops such as mango and citrus, where both quantity and quality are critical. Knowledge of the type and amount of variability and correlation in a population owing to genetic and non-genetic factors is one of the criteria in any hybridization programme for selecting parents with acceptable features. In this work, the relationship between yield and yield contributing features was investigated and addressed.

Correlation between yield and yield contributing characters. Correlation between yield and qualities that contribute to yield The most significant instrument in the selection process for crop development is knowledge of the relationships between distinct features (Desai *et al.*, 1994). Table 1 shows the results of the phenotypic correlation coefficients analysis. The phenotypic correlation values appeared to be higher in most cases than their genotypic correlation values.

Table 1: Phenotypic correlation co-efficient between yield contributing characters in Avocado.

	TA	TH	TC	TRC	LB	FL	FC	FW	PP	SW	SP	LSC	LS	SC	YLD
TA	1														
TH	**0.510****	1													
TC	**0.410****	0.235	1												
TRC	**0.461****	**0.660****	**0.429****	1											
LB	0.198	-0.001	0.020	0.156	1										
FL	0.133	0.153	-0.086	0.091	0.190	1									
FC	0.136	0.031	0.045	0.034	**0.243***	**0.353****	1								
FW	0.154	0.186	0.035	0.171	**0.271***	**0.771****	**0.491****	1							
PP	0.098	-0.040	0.007	-0.054	0.138	0.074	0.029	**0.309****	1						
SW	0.101	-0.010	-0.148	-0.022	**0.387****	**0.362****	**0.265***	**0.555****	0.067	1					
SP	-0.140	-0.104	-0.208	-0.189	0.063	**-0.305***	**-0.169**	**-0.291***	**-0.341****	**0.419****	1				
LSC	-0.066	0.035	-0.034	0.107	**0.347****	**0.505****	**0.271***	**0.485****	0.115	**0.371****	-0.094	1			
LS	-0.102	0.026	-0.051	0.023	0.197	**0.305***	0.149	**0.252***	0.068	0.221	-0.076	**0.521****	1		
SC	0.084	0.159	0.078	0.193	**0.239***	0.184	0.126	**0.197**	-0.030	**0.285***	0.129	**0.496****	**0.383****	1	
YLD	0.106	0.020	**0.329****	**0.295***	**0.241***	**0.249***	**0.334****	**0.401****	0.088	**0.288***	-0.137	0.201	0.083	0.064	1

** Significance at 0.01, *significance at 0.05

TA – Tree Age, TH – Tree Height, TC – Tree canopy, TRC – Trunk Circumference, LB – Leaf Blade Length, FL – Fruit Length, FC – Fruit Circumference, FW – Fruit Weight, PP – Pulp Peel Ratio, SW –Seed Weight, SP- Seed Pulp Ratio, LSC – Length of Seed Cavity, LS – Length of Seed, SC – Seed Circumference, YLD – Yield / Plants

Tree age (TA) was positively correlated with the tree height (0.510). Positive and highly significant phenotypic correlation was found tree height (TH) and trunk circumference (0.660). These results indicated that tree height and trunk circumference circumference (0.660). These results indicated that tree height and trunk circumference would be increased with tree age and tree height Majumder *et al.*, (2012).

Highly significant positive phenotypic correlation was observed fruit length and fruit weight (0.771) because, the fruit length was increased pulp content, seed and peel also directly influenced the fruit weight Positive and significant correlation was recorded for fruit weight and seed weight (0.555), fruit length and length of seed cavity (0.505), length of seed cavity and length of seed (0.521), length of seed cavity and seed circumference

(0.496). Yield was positively correlated with fruit weight (0.401), fruit circumference (0.334), tree canopy (0.329) had highly significant and positive correlation with fruit yield (Roy *et al*., 2021). The characters negatively correlated with fruit length and seed pulp (-0.305), pulp peel ratio and seed pulp (-0.341), is highly insignificant.

CONCLUSION

This study's phenotypic correlation analysis revealed that fruit weight, fruit length, tree age, tree canopy, tree height, and seed weight are all important factors in increasing yield. If knowledge of correlations was accompanied by an understanding of the magnitude of contribution (direct and indirect) of each component character to the final makeup of the fruit yield (Saran *et al.*, 2007). The constructed criteria would be effective in selecting genotypes and using themselves in the crop improvement programme.

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Conflict of Interest. None.

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