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Correlation Studies on the Yield and Yield Characters of Eggplant (Solanum melongena L.) in Anyigba, Kogi State Nigeria

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Abstract
Efforts are being made to increase its productivity by developing superior varieties. However, yield is a complex character, its direct improvement is difficult. Knowledge is respect of the nature and magnitude of associations of yield with various component characters is a pre-requisite to bring improvement in the desired direction. This research was conducted at Kogi State University Student Research and Demonstration Farm (Longitude 07°06[1] N; 43°E), Anyigba, Kogi State, to investigate the association of some yield characters with yield in eggplant (*Solanum melongena* L.). Two cultivars of eggplant *NC-2 (green)* and *NC-1 (off-white)* were laid out in a randomized complete block design (RCBD) with four replications. Yield component such as number of branches, fruit diameter, number of nodes, and number of fruits shows significant and positive association with yield. Correlation coefficient (r) for yield versus other growth and yield component: Plant height, number of branches, fruit diameter, number of nodes, and number of fruits were found to be 0.983, 0.962, 0.959, 0.906 and 0.891 respectively.
Keywords: Correlation coefficient (r), Character association, Plant height; PH, Number of branches; NB, Fruit Diameter; FD, Number of nodes; NN, Number of Fruits; NF, Yield; Y.

INTRODUCTION

Eggplant is an autogamous diploid with 12 chromosomes (2n=24). Despite eggplant's similarities to other Solanaceous crops, there is rather little molecular genetic information for species as compared to tomato, pepper and potato (Doganla *et al.,* 2002).

Eggplant has wide variability (Lal, 1991) in its morphological characters (colour, shape size) physiological attributes and biochemical features. Interspecific crosses between plant species are an ideal way for introducing desirable genetic traits in breeding programs. Yield being a complex character, is dependent upon a number of attributes.

Before initiating an effective selection programme, it is necessary to know the importance and association of various components with yield and among each other, hence the necessity of coefficient of correlation to describe the degree of association between independent and dependent variables. A simple measure of correlation of characters does not quantify the relative contribution of causal factors to the ultimate yield. Since the component traits themselves are inter-dependent, they often affect their direct relationship with yield and consequently restrict the reliability of selection indices based upon correlation coefficients (Thangamani and Jansirani, 2012). Genotypes carries specific characters, these characters which are associated with yield are bases upon which selection is based. The genes cannot cause a character to develop unless they have the proper environment and conversely, no amount of manipulation of the environment will cause a character to develop unless the necessary genes are present. However, it must be recognized that the variability observed in some characters was caused primarily by the differences in the genes carried by the genotypes and that the variability in other characters was due primarily to differences in the environment to which the genotypes have been exposed (Karak *et al.*, 2012). Hence this research work was carried out to investigate the association of some yield characters with yield of eggplant in the said location.

MATERIALS AND METHOD

The study was conducted at Kogi State University Student Research and Demonstration Farm (Longitude 07°06[1] N; 43°E), Anyigba, Kogi State during the early growing season of 2014. The soil in the study area belongs to a textural class of sandy-loam and low in total nitrogen relative to available phosphorus with a pH of 7.3 which is slightly alkaline. Two cultivars of eggplants NC-2 (green) and NC-1 (off-white) developed at the National Institute for Agricultural Research (NIHORT) was used. Twenty-two days old seedlings were transplanted on ridges adopting a spacing of 70 × 75cm with plant population of about 20plants per plot. Standard horticultural practices and plant protection measures recommended for hybrid eggplant were adopted uniformly. Observations were recorded for plant height and number of branches per plant at final harvest, number of fruits per plant, fruit yield, fruit diameter and number of nodes per plant at final harvest. The relationship between final fruit yield and some yield parameters was determined by simple linear correlation analysis as described by Snedecor and Cochran (1964).

RESULT AND DISCUSSION

The results in (table 1) shows that there was positive and highly significant correlation between yield and all other yield characters measured such as number of branches (0.962), number of nodes (0.959), fruit diameter (0.906), number of fruits (0.891) and plant height (0.983). Similar significant positive association with fruit yield was quoted by Singh and Khanna (1978) for number of fruits per plant; Prasath (1997) for number of branches per plant and fruits per plant. Thangamani and Jansirani (2012), obtained a significant but negative association between Fruit weight and number of fruits per plant and positive correlation with fruit girth indicating that the limited number of fruits per plant more efficiently obtain larger share of the metabolites and thereby increase the fruit girth. These results were also confirmed by the findings of Devi and Sankar (1990). Bhukya and Nagre (2013) had reported a positive correlation between yield per plant and No. of fruits per plant, fruit diameter out fruit length both at genotypic and phenotypic levels. It was apparent that high vegetative growth might have produced increased number of fertile flowers per plant resulting into increased fruits per plant. Jones and Kwadwo (2012) reported that height at flowering revealed significant and highly positive association with fruit length at both phenotypic and genotypic levels in *Solanum gilo*.

Positive and significant association between other yield components such as number of fruits and plant height, number of branches and number of nodes, fruit diameter, number of fruits and plant height, number of nodes and fruit diameter, number of fruits and plant height, fruit diameter and number of fruits, plant height and number of fruits respectively might be related to the close genetic heritability of the two cultivars under study as yield was found to be statistically at par when tested with analysis of variance at 0.05 level of significance (table 2). The non-significance of some of the characters measured such as number of fruits, fruit diameter, plant height and yield when subjected to analysis of variance (ANOVA), and the positive/significance correlation among these pairs of characters is an indication of close genetic heritability between the two varieties and thus may be included in selection programme.

CONCLUSION

Knowledge in respect of the nature and magnitude of associations of yield with various component characters is a pre-requisite to bring improvement in the desired direction. Hence these yield characters haven shown a positive and significant association with yield should be considered in selection programmes for improvement of eggplant varieties.

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Table 1. Estimate of phenotypic correlation coefficient (r) between different pairs of characters in eggplant.

	Yield (kg)	Number of branches	Number of nodes	Fruit diameter	Number of fruits	Plant height
Yield	1					
Number of branches	0.962**	1				
Number of nodes	0.959**	0.987**	1			
Fruit diameter	0.906**	0.979**	0.979**	1		
Number of fruits	0.891**	0.971**	0.973**	0.999**	1	
Plant height	0.983**	0.976**	0.989**	0.956**	0.946**	1

** ***Significant at 1% level of probability***
* ***Significant at 5% level of probability***

Table 2. Effect of varieties on the yield and yield characters of eggplant when subjected to Analysis of variance (ANOVA) test.

		Yield Characters				
Cultivars	Yield(kg/plot)	Number of branches	Number of nodes	Fruit diameter(cm)	Number of fruits	Plant height(cm)
NC-1	26.65	34.82[a]	111.18[b]	33.20	122.00	253.2
NC-2	27.25	26.54[b]	139.51[a]	36.40	122.00	281.43
Significance	ns	*	*	ns	ns	ns
L.S.D		0.94	3.19		2.14	
C.V (%)	32.66	24.39	20.25	5.80	13.95	14.80

Means followed by the same letter(s) within a sampling stage is not statistically significant at 5% level of probability using DMRT.