PATH CO-EFFICIENT ANALYSIS FOR SOME QUANTITATIVE CHARACTERS IN BRINJAL (Solanum melongena Linn.).

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The present study was made on nineteen strains of Brinjal to assess the genetic variability, degree of association and, path-co-efficient analysis for some quantitatively inherited yield components High genotypic co-efficient of variation and heritability values were recorded for number of fruits/plant, length/girth ratio of the fruit and weight of the fruit. Yield was positively correlated with number of fruits/plant, height of the plant and number of branches both at phenotypic and genotypic level and with length/girth radio of the fruit only at genotypic level. Path analysis using genotypic correlation showed that number of fruits, number of branches and length/girth ratio had positive direct effect on yield. But as number of branches had both low GCV as well as low heritability values, the other two characters were considered to be an important yield components in regard to selection of superior genotypes.

In a plant breeding programme it is essential to know the relative importance of morphological characters that have both direct and indirect effect on yield. Path co-efficient analysis developed by Wright (1921) provides and effective means of partitioning the total correlation into direct and indirect effects. The present investigation was, therefore, undertaken in a number of germplasm collection in brinjal strains to note the genetic variability among different plant characters by means of various genetic parameters and their-relationship by correlation and path co-efficient analysis The ultimate goal was to determine the relative importance of some of the plant characters with respect to yield and select better genotype to exploit in future breeding programme.

MATERIAL AND METHODS

Nineteen pure line varieties of brinjal were sown at Calcutta University Agricultural Farm, Ram Krishna, Mission, Narendrapur during Kharif season 1974 with three replications. In each replication a plot was represented by a row of ten plants, 540 cm. long and 60 cm. apart.

Five plants were randomly selected for each variety in each replication and observations were recorded on the following eight characters, viz., i) Days to heading, ii) Height of the plant, iii) Number of branches, iv) Days to plucking v) Number of fruits/plant, vi) Weight to the fruit, vii) Length/

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girth ratio of the fruit and viii) Total yield.

The estimate of genetic variance and various genetic parameters were calculated according to the formula employed by several authors,

Genotypic and phenotypic correlations were computed and genotypic correlations were subjected to path co-efficient analysis according to the method of Dewey and Lu (1958).

RESULTS AND DISCUSSION

Mean values, genetic co-efficient of variation and heritability estimate for yield and its component characters are presented in Table-1. The genotypes in the present investigation exhibited significant differences in respect of all the plant characters under study. High genetic co-efficient of variation were recorded for number of fruits/plant (55.9), Length/girth ratio of fruit (33.3), average weight of the fruit (24.58) and yield (26.7), while the other characters exhibited comparatively lower values. Heritability estimates ranged from 36.07 for number of branches/plant to 91.5 for length/girth ratio and yield showed comparatively lower value of heritability. The other characters were found to have high heritability values. The high GCV value in some of the plant cha-

racters indicated that there were large genetic differences in respect of these characters among the genotypes under study. A low heritability value for plant yield has been reported by several workers viz., Johnson et al. (1955) in Soybean, Chandraratna (1964) and Mazumder et al. (1971) in rice. A low value of this genetic parameter suggests that the character in question is subjected to high degree of non-heritable variation.

The phenotypic and genotypic correlation between yield and its components are presented in Table-2. It is evident that plant yield had positive correlation with number of fruits plant, height of the plant and number of branches/plant at both genotypic and phenotypic levels and with the length/girth ratio only at genotypic level. Thus it appears that increase in any one of the abovementioned plant characters increases the yield.

The yield component exhibited varying trend of association among themselves. Number of fruits showed positive correlation with height of the plant, number of branches and length/girth ratio of the fruit while it had negative association with other attributes.

Height of the plant had also positive correlation with length/girth ratio of the fruit and number of fruits plant while this character, was negatively correlated with days to plucking and and days to flowering both at phenotypic and genotypic level and number

of branches and weight of the fruit only at genotypic level.

Weight of the fruit was positively correlated with number of branches, days to plucking and length/girth ratio of the fruit, both at phenotypic and genotypic levels and with height only at phenotypic level while this character showed negative association with other yield components. Length/girth ratio of the fruit had negative correlation with days to plucking.

Path co-efficient analysis was computed with genotypic correlation co-efficients (Table-3.) The result showed that number of fruits/plant had positive and maximum association with plant yield. Number of branches and length/girth ratio of the fruit ranked second and third respectively. Association of other characters with yield was negative. Hence, the path co-efficient gave some what different picture than did simple correlation. The total correlation between yield and plant height was positive but their direct association was negative. This apparent conflict between two analyses was also recorded by several workers viz., Dewey and Lu (1959) in crested wheat grass, Ramanujam and Rai (1963) in *Brassica campestris* the positive total effect of plant height on yield was mainly due to high indirect effect via days to flowering, days to plucking and number of fruits/plant. Again the high positive direct association of length/girth ratio of the fruit on yield was somewhat reduced in total effect due to high indirect affect of plant height.

Thus, it appears that number of fruits/plant, number of branches/plant and length/girth ratio of the fruit are three important yield components which have high positive direct effect on yield. Again, among these three attributes number of branches/plant had low GCV value accompanied by low heritability estimate Hence, the other two attributes viz., number of fruits/plant and length/girth ratio of the fruit would be expected to play a significant role in selection of superior genotypes.

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Table 1. Phenotypic and genotypic correlation for different characters.

Yield attributes	Correlation	Hight of the plant	Number of branches	Days to plucking	No. of fruits/plant	Weight of the fruit	Length/girth ratio of fruit	Total yield
Days to flowering	Phenotypic	.459*	—.203	.056	—.041	—.117	—.051	—.165
	Genotypic	—.57**	—.015	.072	—.130	—.128	—.038	.821
Weight of the plant	Phenotypic		.140	—.412	.409	.120	.297	.421
	Genotypic		—.086	—.767	.462*	—.195	.296	.488*
Number of branches	Phenotypic			.148	.126	.167	—.290	.209
	Genotypic			.239	.182	.047	—.550*	.398
Days to plucking	Phenotypic				—.092	.017	.870**	—.521*
	Genetypic				—.193	.105	.381	—.129
Number of fruit/plant	Phenotypic					—.357	.012	.657**
	Genotypic					—.585**	.031	.604**
Weight of the fruit	Phenotypic						.021	—.023
	Genotypic						.012	—.160
Length/girth ratio of the fruit	Phenotypic							—.035
	Genotypic							.273

** Significant at 1% level   * Significant at 5% level

Table—2 Path Co-efficient values

Yield attributes	Days of flowering	Height of the plant	Number of branches	Days to plucking	Number of fruits/plant	Weight of the fruits	Length/girth ratio of the fruit	Genotypic co-relation with yield
Days to flowering	—2.2000*	1.6316	—.0124	—.1333	—.1194	.0401	—.0288	—.82
Height of the plant	1.2736	—2.8179*	—.0770	1.4076	.4238	—.0608	.2221	.49
Number of branches	.0341	.2714	.8001*	—.4394	.1667	—.0145	—.4208	.39
Days to plucking	—.1559	2.1630	.1917	—1.8338*	—.1775	—.0327	—.2860	—.13
Number of fruits/plant	.2869	—1.3038	.1456	.3554	.9160*	.1826	.0232	.60
Weight of the fruit	.2831	.5498	.0376	—.1925	.5367	—.3117*	.0232	—.14
Length/girth ratio of the fruit	.0845	—.8344	.4468	.6990	.0284	.0038	.7502	.27

* Indicates the direct effect of a particular attributes