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STUDY THE CORRELATION, PATH COEFFICIENT BETWEEN YIELD AND ITS ATTRIBUTING CHARACTERS IN BRINJAL (*SOLANUM MELONGENA* L.)

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Abstract

A field experiment entitled Study the correlation, path coefficient between yield and its attributing characters in brinjal (*Solanum melongena* L.)" was conducted at the experimental farm of Horticulture AKS University, Satna during *kharif* season 2015-16. Involving fifteen genotypes of brinjal with a view to assess the genetic parameters and degree of mutual association in respect of yield and yield contributing characters *viz.* plant height (cm), number of primary branches per plant, number of leaves per plant, days to first flowering, days to 50 % flowering, days to first fruit set, fruit length (cm), single fruit weight, number of fruits per plant, fruit yield per plot (kg). Significant variations were obtained among the genotypes for all the characters under investigation. The variety Arka Nidhi recorded the maximum plant height (cm) at 90 days after transplanting. Maximum number of primary branches per plant at 90 days after transplanting and days to 50% flowering were observed in Swarna mani. Maximum single fruit weight were observed in Utkal Tarini. Minimum days to first flowering, days to 50% flowering and days to first fruit set was observed in Kashi Taru. Further it was also noticed that maximum fruit yield per plot was recorded in Punjab barsati. However, lowest yield per plot was recorded in JB-6.The highest PCV and GCV were recorded for fruit yield per plot.

Key word: Brinjal (*Solanum melongena* L.), Correlation, Path Coefficient, Yield and Attributing Characters.

Introduction

Brinjal (*Solanum melongena* L.) is one of the most common and popular vegetable grown in India and other parts of the world. It belongs to family Solanaceae. The primary center of origin is India (Thompson and Kelly. 1957). It is a hardy crop and can be grown successfully on wide range of soil under variable environmental conditions. India is endowed with favourable environments for production of high quality and high value vegetable round the year. It can be grown in almost all parts of India except at higher altitudes. Brinjal is often cross pollinated crop due to its heteromorphy flower structure called heterostyle. Brinjal fruits are fairly good source of Ca, P, Fe and vitamins like A, B and C. The green leaves of brinjal are excellent source of vitamin 'C'. White brinjal is good for diabetic patients. It is reported to stimulate the intrapeptic metabolism of blood cholesterol. People in rural areas dry the fruits and use it in the lean period when vegetable are not available but the dry fruits are reported to contain goitrogenic principles. The regional preferences differ greatly with size, shape, color of fruits and prickles on the calyx. This has created the necessity to breed new brinjal varieties. Which may fulfill the area specific needs of the growers. Variability is a key factor which determine the amount of process expected from selection. Planning and execution of a breeding programme for the improvement of the various quantitative and qualitative attributes depends, to a great extent upon the magnitude of genetic variability in existing population. Correlation studies help in finding out the association between different characters helps to make the basis of selection more effective.The development of an effective plant breeding programme is depend upon the assessment of polygenic variation, selection of elite genotypes, choice of parents and breeding procedure. Crop improvement depends upon the magnitude of genetic variability and the extent to which desirable characters are heritable. Yield and yield components are quantitative characters and are poly genetically inherited which are greatly influenced by environment. The phenotype of characters

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is the resultant of interaction between genotypes and environment. Partitioning of observed variability into heritable and non-heritable components is essential to get a true indication of the genetic variation of the traits. Heritability and genetic advance help in determining the influence of environment in the expression of the characters and the extent to which the improvement is possible after selection (Robinson *et al*. 1955). Correlation coefficient measure the mutual relationship between various plant characters and determines the component characters on which selection can be used for genetic improvement in yield while the path analysis splits the correlation coefficient in to the measure of direct and indirect effect of a set of dependent variables on independent variables. Path coefficient analysis measures the direct influence of one variable upon another and permits the separation of correlation coefficient into components of direct and indirect effects. When more variables are included in the correlation studies, the indirect associations become complex. Under such situation, path coefficient analysis provides an effective means of finding out direct and indirect causes of association among causal variables. Correlation and path coefficient analysis give an insight into the genetic variability present in populations. Correlation coefficient analysis measure the mutual relationship between various plant characters and determines the component characters on which selection can be based for improvement in field. Path analysis splits the correlation coefficients into direct and indirect effects of a set of dependent variables on the independent variable thereby aids in selection of elite genotype. An improvement in yield and quality in often cross pollinated crop like brinjal is normally achieved by selecting the genotypes with desirable character combinations existing in nature or by hybridization. Information on the nature and extent of variability present in genetic stock, heritability, genetic advance and interrelationship among various characters is a prerequisite for framing any selection program.

Material and methods

The present research works entitled "Study the correlation, path coefficient between yield and its attributing characters in brinjal (*Solanum melongena* L.)" have been undertaken in the Department of Horticulture, AKS University, Satna (M.P.) during 2015-2016. Experiment have been conducted at the farm of AKS University, Satna M.P. (80°21' to 81°23' east longitude and 23°58' to 25°12' north latitude). The experimental plot was located about 2000 meters East of AKS University, Campus.

Experimental materials

The experimental material for the present investigation comprised of 15 genotypes of Brinjal (*solanum melongena* L.) have been used on the basis of their genetic advance and heritability. The name of genotypes and combination of their availability are referred as under : Pusa Kranti (T-1) Panjab Nagini (T-2) Utkal Tarini (T-3) Arka Shirish (T-4) Swarnamani (T-5) Punjab Barsati (T-6) Kashi Taru (T-7) Bhagyamati (T-8) Pusa Ankur (T-9) Utkal Madhur (T-10) Jawahar Brinjal-7 (T-11) Arka Nidhi (T-12) Jawahar brinjal-6 (T-13) Pusa Bindu (T-14) Utkal Keshri (T-15) etc. The experiment was laid out in Randomized Blok Design with three replications. Each replication consists of 15 genotypes. All the genotypes were randomized separately in each replication. The plan of layout is given in details are as below the crop Brinjal (*Solanum melongena* L.), Experimental design RBD, Number of replication 03, Number of treatments 15, Total number of plot - 45, Plot size 1.80 × 1.35 m^2, Row distance 60cm. Plant spacing 45cm.Total area under layout 40 × 27.25 m^2, Number of plant per plot 09, Date of nursery sowing 23 July 2015 and date of transplanting 20 August 2015 etc.

Observation to be record

Five plants were randomly selected in each replication for each treatment and were tagged. Further observations were recorded on these plants during the experimentation.

(A) Morphological characters

(I) Plant height (cm) :

Height of five randomly selected plants in each plot was measured in cm from ground levels up to the apical bud at an interval of 30, 60, and 90 days after transplanting. The mean height was computed by digitizing the summation with five.

(II) Number of branches per plant :

The number of branches of five plants in each plot was counted at different stages. The mean number of branches per plant from each plot at 30 days interval (*i.e.* 30, 60 & 90 DAT).

(III) Number of leaves per plant:

The number of leaves of five plants in each plot was counted at different stages. The mean number of leaves per plant from each plot at 30 days interval (i.e. 30, 60 & 90 DAT).

(B)Phonological characters

(I)Days to first flowering:

Number of days taken beginning from the

transplanting to the appearance of first flower on the five randomly selected plants in each plot was noted and average was calculated.

(II) Days to 50 percent flowering:

Number of days from the date of transplanting to the date when fifty per cent of plants were flowered in a plot was recorded.

(III) Days to first fruit set:

The number of days beginning from opening of long and medium styled flower up to the day when pea size fruits developed was counted in five randomly selected clusters of each plants and average was worked out.

(C)Yield attributing characters

(I)Number of fruits per plant:

Number of fruits was counted from five randomly selected plants from each plot at each harvest. Total number of fruits harvested is divided by fire to workout number of fruits per plant.

(II)Fruit length (cm):

The fruit length from joints of calyx to the apex was measured in centimeter for five randomly selected fruits from plot at peak fruiting stages.

(III) Weight of fruit (g):

The weight of the fruits per plot was recorded at each picking. Total weight of fruits per plant was obtained in kilograms.

(IV)Fruit yield per plot (kg):

Total yield of each of the five randomly selected plants at every picking was calculated as well as the total number of fruits was calculated for the same.

(D)Statistical analysis

The data obtained in respect of all the characters have been subjected to the following statistical analysis:

(I)Analysis of correlation coefficient

(II)Analysis of path coefficient

(I) Correlation coefficients

The simple correlation between different characters at genotypic (g) and phenotypic (p) levels were worked out between characters as suggested by Searle (1961).

Genotypic correlation coefficient

$$r_{XY}(g) = \frac{Cov_{XY}(g)}{\sqrt{Var_X(g)Var_Y(g)}}$$

Phenotypic correlation coefficient

$$r_{XY}(p) = \frac{Cov_{XY}(p)}{\sqrt{Var_X(p)Var_Y(p)}}$$

(II) Path coefficient analysis

The path diagram shows Y as either completely determined by certain other characters. In this study Y, the dependent variable average yield of brinjal (X_{10}) is of various characters like Plant height (X_1), Number of primary branches (X_2), Number of leaves per plant (X_3), Days to first flowering (X_4), Days to 50% flowering (X_5), Days to first fruit set (X_6), Fruit length (X_7) Single fruit weight (X_8), Number of fruits per plant (X_9), fruit yield per plot (X_{10}), is treated as a linear function of a number of others, X_1 to X_9 and the residual factors R we have

$$Y = b_0+b_{01}X_1+b_{02}X_2+b_{03}X_3+.....+b_{09}X_9+b_{0R}R$$

Results and Discussion

The results from the present investigation was carried out to study of "Study the correlation, path coefficient between yield and its attributing characters in brinjal (*Solanum melongena* L.)" are presented under the following heads:

1. Correlation coefficient analysis
2. Path coefficient analysis

1. Correlation coefficient analysis: Correlation coefficients were worked out at phenotypic and genotypic levels for all possible combination of fruit yield and its attributing characters Results indicated that genotypic correlation coefficient, in general, were of higher magnitude than the corresponding phenotypic coefficient in general were of higher magnitude than the corresponding phenotypic ones. The results of phenotypic correlation coefficients have been discussed only as the genotypic correlations was mostly influenced by the environmental condition, hence phenotypic correlation will give the correct idea about the association between two variables.

1.1 Plant height (cm): Plant height expressed significant and positive correlation with number of primary branches per plant DAT (0.42), fruit yield per plot (0.15). Significant and negative association of this character was recorded with days to first fruit set (-0.20).

1.2 Number of primary branches per pant: Correlation coefficient of number of primary branches per plant was observed significant and positive with number of leaves per plant 90 DAT (0.66). Significant and negative association of this character was recorded with days to first flowering (-0.44).

1.3 Number of leaves per plant: Number of leaves per plant expressed significant and positive correlation with number of fruits per plant (0.53). While, it was significant but negative with average days to first flowering (-0.35), days to first fruit set (-034), days to 50% flowering (-0.24).

1.4 Days to first flowering: Days to first flowering expressed significant and positive correlation with days to first fruit set (0.68), days to 50% flowering (0.66).

1.5 Days to 50 percent flowering: Association of days to 50 percent flowering was exhibited significant and positive with days to first fruit set (0.76). It was significant but negative with fruit length (-0.40).

1.6 Days to first fruit set: Days to first fruit set expressed significant but negative with number of fruits per plant(-0.46).

1.7 Fruit length (cm): Fruit length expressed a significant and positive association with number of fruits per plant (0.49).

1.8 Single fruit weight (g): Association of weight of fruit exhibited positive and significant with fruit yield per plot (0.41).

1.9 Number of fruits per plant: The correlation coefficient of number fruits per plant was found to be positive and significant with fruit yield per plot (0.62).

(2) Path coefficient analysis : To measure the direct as well as indirect association of one variable through another on the end product path coefficients were calculated at genotypic and phenotypic levels for all the yield attributing traits. The observed correlation coefficients of fruit yield with its contributing traits were partitioned into direct and indirect effects. In the present investigation, important characters *viz.,* fruit yield per plant have been used as dependable variables with other traits. In general the genotypic direct as well as indirect effects were slightly higher in magnitude as compared to corresponding phenotypic direct and indirect effects. The results obtained from genotypic direct and indirect effects are presented as under.

2.1 Direct effect: Path coefficient analysis of different characters contributing towards fruit yield per plot showed that single fruit weight (0.896) had highest positive direct effect followed by fruit length (0.685), days to 50% flowering (0.678), number of leaves per plant (0.107), plant height (0.101) and days to first flowering (0.051). Whereas, number of primary branches per plant (-0.313) had the highest negative direct effect on fruit yield per plot followed by days to first fruit set (-0.240) and number of fruits per plant (-0.015).

2.2 Indirect effect

2.2.1 Plant height (cm): Plant height at 90 DAT imparted highest positive indirect effect on fruit yield per plot via single fruit weight (0.193), followed by fruit length (0.103), days to first fruit set (0.033), number of leaves per plant 90DAT (0.101).

2.2.2 Number of primary branches per plant, Number of branches per plant was recorded to have highest positive indirect effect on fruit yield per plot through, fruit length (0.465), followed by single fruit weight (0.410), days to first fruit set (0.139). However, it was expressed high negative indirect effect via days to 50% flowering (-0.388).

2.2.3 Number of leaves per plant: Number of leaves per plant was recorded to have highest positive indirect effect on fruit yield per plot through, fruit length (0.485), followed by single fruit weight (0.456). However, it was expressed high negative indirect effect via number of primary branches per plant 90 DAT (-0.325), days to 50% flowering (-0.193), days to first flowering (-0.026) and number of fruits per plant (-0.012).

2.2.4 Days to first flowering: Days to first flowering revealed high values of positive indirect effect on fruit yield per plant through days to 50% flowering (0.478), followed by number of primary branches per plant 90 DAT (cm) at 120 DAT (0.331). days to first fruit set (-0.163).

2.2.5 Days to 50 percent flowering: Days to 50 percent flowering expressed a positive indirect effect on fruit yield per plot through, number of primary branches per plant at 90 DAT (0.179), followed by days to first flowering (0.036).

2.2.6 Days to first fruit set: Days to first fruit set expressed a positive indirect effect on fruit yield per plot through, days to 50% flowering (0.602) followed by number of primary branches per plant 90 DAT (0.181).

2.2.7 Fruit length (cm): Fruit length revealed high values of positive indirect effect on fruit yield per plot through single fruit weight (0.214),

followed by days to first fruit set (0.171).

2.2.8 Single fruit weight (g): Weight of fruit exhibited highest positive indirect effect on fruit yield per plot through, fruit length (0.163), followed by days to first fruit set (0.126).

2.2.9 Number of fruits per plant: Number of fruits per plant exhibited positive indirect effect *via.* fruit length (0.477), followed by single fruit weight (0.462). Highest negative indirect effect was observed through number of primary branches per plant 90 DAT (-0.200). The experimental material consisting of 15 diverse genotypes of brinjal were transplanted on 1.80 × 1.35 m^2 plot in a Randomized Block Design with three replications. The row and plant spacing as maintained at 60 cm and 45 cm respectively and each plot accommodated 9 plants. The observations were recorded replication wise by selecting 5 random plants. The variance components and coefficients of according to Burton (1952). The heritability in broad sense was calculated using formula by Hanson *et al.* (1956) and expected genetic advance was calculated by using the method suggested by Johnson *et al.* (1955). Correlation coefficients were estimated between yield and its components to know the inter-relationship among the characters. It provides information about the nature, extent and direction of selection pressure to be applied for practical consideration. The genotypic correlation coefficients were higher in magnitude that their corresponding phenotypic one, indicating there by strong inherent association between different traits studied. The phenotypic expression of correlation was lessened possibly due to multiple influences of environmental components. In view of their correspondence, selection on phenotypic basis would be effective. The highest positive and significant correlation coefficient of fruit yield per plot was with days to first fruit set, number of fruits per plant, fruit length, days to 50% flowering, number of leaves per plant, single fruit weight, number of primary branches per plant 90 DAT. Plant height expressed significant and positive correlation with number of primary branches per plant 90 DAT, number of leaves per plant 90 DAT, single fruit weight fruit length and fruit yield per plot. Significant and negative association of this character was recorded with days to 50% flowering, days to 1st flowering and days to first fruit set. Correlation coefficient of number of primary branches par plant was observed significant and positive with number of leaves per plant 90 DAT, number of fruits per plant, fruit length, fruit yield per plot and single fruit weight. Number of leaves per plant expressed significant and positive correlation with number of fruits per plant, fruit length, fruit yield per plot and single fruit weight. Days to first flowering expressed significant and positive correlation with days to first fruit set and days to 50% flowering. Association of days to 50 per cent flowering was exhibited significant and positive with days to first fruit set. Days to first fruit set expressed significant and negative correlation with number of fruits per plant, fruit length, single fruit weight and fruit yield per plot. Fruit length significant and positive association with number of fruits per plant, fruit yield per plot and single fruit weight. Correlation coefficient for single fruit weight was found to be positive and significant with fruit yield per plot and number of fruits per plant. The correlation coefficient for number fruits per plant was found to be positive and significant with fruit yield per plot. Path coefficient analysis revealed that single fruit weight, followed by fruit length, days to 50% flowering, number of leaves per plant, plant height and days to first flowering are the most important characters contributing towards fruit yield and hence purposeful and balanced selection based on these characters would be made rewarding for improvement of brinjal.

References

Burton, G.W. 1952. Quantitative inheritance in grasses proc. *Int. Grassesland Congress.,* **1**: 277-285.

Honson, W.D., H.F. Robinson and R.E. Comstock (1956). Biometric studies of yield in segregating. *Agron. J.,* **48**: 268-272.

Jhonson, H.W., H.F. Robinson and R.E. Cormstock (1955). Estimation of genetic and environmental variability in soyabeans. *Agron. J.,* **47**: 314-318.

Johnson, H.W., H.F. Robinson and R.F. Comstock (1955). Estimates of gentic. *Agron. J.,* **47(10)**: 314-318.

Searle, S.R. (1961). Phenotypic and Genotypic and Environmental correlations. *Biometrics.,* **17(3)**:474-480.

Thompsom, C.H. and C.W. Kelly (1957), Vegetable Crops, Mc. Growth Hill Book Co., UInc., New York,p. 501.