P: ISSN No. 0976-8602 RNI No.UPENG/2012/4262 VOL.-8, ISSUE-2 (Part-1) April 2019

E: ISSN No. 2349-9443 Asian Resonance

Study on Variability, Correlation and Path Coefficient Analysis in Different Genotypes of Cucumber

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Abstract

At the research farm of SSSUTMS, Sehore, an experiment was conducted to study the variability, correlation and path coefficient analysis using twenty genotypes of *Cucurmis sativus*. It was found that the phenotypic coefficient of variation which measures the total variation greater than the genotypic coefficient of variation in majority of characters in the present investigation. The closer magnitude of GCV and PCV indicated that genotype had played greater role rather than environment. Wide variability was found for the plant parameters such as Nodal position of first male and female flowering, Days to first picking and yield contributing characters namely Fruit length, Fruit diameter and yield per plant. The highest GCV was recorded in yield per plant (42.76) followed by Fruit length (27.58). Among the twenty cucumber germplasm, SB-3 gave the highest yield per plant (3.67kg). The correlation co-efficient revealed that, yield per plant had highly positive and significant association with fruit length and fruit diameter. Path analysis showed that the fruit diameter and fruit length directly contributed towards the yield per plant in the SB-20 cucumber.

Keywords: Variability, Correlation, Path Analysis, Yield Performance And Cucumber.

Introduction

Cucumber (*Cucumis sativus* L.) belongs to the *Cucurbitaceae* family. It has been cultivated for at least 3000 years**.** It is believed to have originated in India; southern Asia. The fruits are used for preparation of cosmetic items like soap and cream and in many other ways. The crop is of Asian origin and the progenitor may be closely related to its wild relative *Cucumis sativus* var. *hardwickii*, first found in the Himalayan mountains (foothills of Nepal) and used by native peoples of Northern India as a laxative. It is an ideal summer vegetable crop chiefly grown for its edible tender fruits, preferred as a salad ingredient, pickles, and as a cooked vegetable (Shah *et al.,* 2016). It may further be mentioned that cucumber juice is commonly used for treating diseases of teeth and gums. Its juice is still useful for rheumatic conditions and healthy growing hair. India being the primary centre of origin, it has accumulated a ample range of variability providing good extent for improvement in yield and other character of cucumber through selection. Genetic variability in crop breeding lines is important for successful plant breeding. Determining variability in yield and yield components of different cucumber genotypes will enable a breeder to know to what extent the environment affects yield. Direct selection only for higher yield could be misleading because many factors interact to determine crop yield. Separate yield components are less influenced by the environment than yield itself; hence, selection for such yield components can be useful to acquire genotypes with better yield abilities. Any crop improvement programme primarily depends on the amount of genetic variability available and the extent to which the economic traits are heritable. The coefficient of variation of phenotypic and genotypic is helpful in detecting the amount of variation present in the available strains. The knowledge of genetic advance helps the plant breeder in predicting the behaviour of the succeeding generation and making desirable selections for the improvements, (Singh *et al.,*2014).

Grain yield, being a complex trait, depends upon component variables and their interaction. Degree and direction of relationship between two or more variables lead to estimation of correlation. Correlation studies provide better understanding of yield component which helps the

plant breeder during selection (Johnson *et al*., 1955). Path coefficient analysis measures the direct and indirect contribution of independent variables on dependent variables and thus helps breeder in determining the yield component and understanding cause of association between two variables (Dewey and Lu, 1959). The information obtains by path coefficient analysis helps in indirect selection for genetic improvement of yield because direct selection is not effective for low heritable trait like yield. Thus, the estimation of heritability and genetic advance is essential for a breeder which helps in understanding the magnitude, nature and interaction of genotype and environmental variation of the trait.

Therefore, keeping in view, the importance of the crop the present investigation entitled "Study on genetic variability, correlation and path coefficient analysis in diverse genotypes of cucumber (*Cucumis sativus* L.)" was under taken with the following objectives:

1. To study the extent of variability for fruit yield and its component traits.
2. To determine genotypic and phenotypic correlation coefficient between yield and its contributing characters.
3. To identify the characters having direct and indirect effect on fruit yield per plant with the help of path analysis.

Aim of Study

In the present investigation we study the different growth and yield parameters to assess the variability, correlation and path coefficient analysis in twenty different genotypes of Cucumber. Our purpose of the study is to find out the best genotypes among the twenty different genotypes in the terms of growth and yield.

Material and Methods

The present investigation entitled "Study on genetic variability, correlation and path coefficient analysis in diverse genotypes of cucumber (*Cucumis sativus* L.)" was carried out at the Research Farm of University Teaching Department of Sri Satya Sai University of Technology and Medical Sciences, Sehore, (M.P.) during the summer season of 2016. Twenty genotypes were evaluated in RCBD design in three replications. Plant characters such as Nodal position of first male and female flowering, days to first picking, fruit length, fruit diameter and yield per plant will be recorded in each entry/ replication. Ten plants from each entry will be selected at random for recording observation. Collected data on yield and yield contributing characters under study will be statistically analyzed to find out the significance of difference among the treatment means. The means for all the treatments will be calculated. The analysis of variance for most of the characters under consideration shall be performed by F variance test. The significance of the difference between treatments means will be evaluated by least significance difference (LSD) test for the interpretation of the results (Gomez and Gomez, 1984). According to the Dewey and Lu (1959), path coefficient analysis will be done by using the simple correlation values. In path analysis, correlation coefficient is divided into direct and indirect effect of independent variable on the dependent variable.

Results and Discussion

Variability, correlation and Path analysis in respect of different plant characters, yield contributing characters of different cucumber genotypes are discussed below:

Nodal position of first male and female flowering

Estimation of genotypic and phenotypic variances was fairly high for nodal position of first male and female flowering. Genotypic co-efficient of variation was found lower than the corresponding phenotypic one, which indicated the larger influence of environment.(Ullah et al., 2012) found low value in cucumber (0.28 and 0.57), which indicating high environment influence on this trait.

Days to first picking

The analysis of variance indicated the existence of sufficient genetic variability among the 20 genotypes for all the plant characters. Days to first picking as observed in this experiment varied significantly among the genotypes. The earliest days to picking in the field was found in SB-5 (50.68 days) which was statistically similar with the genotypes SB-4. Long days required for first picking was found in genotype SB-20 (69.68 days), which was statistically similar with the genotypes SB-9 and SB-14. This findings was supported by Dhiman and Prakash. 2005.

Fruit length

The highest range of variation was recorded in fruit length among the accessions and ranged from 6.74 to 36.38 cm with the mean value of 18.54. The plant of genotype SB-2 (11.39 cm) showed the minimum fruit length which was statistically similar with SB-10 (Table3). The genotype SB-20 showed the maximum fruit length (26.71 cm) followed by SB-17 and SB-8 but all were statistically same. Differences between genotypic (26.10) and phenotypic (29.19) variances as well as genotypic (27.58%) and phenotypic (29.16%) co-efficient of variation were high indicating considerable environmental effect upon the expression of this trait. Fruit length had significant and positive correlation with fruit diameter(r=0.155) and negative correlation with No. of fruit/ plant (r=-0.016). These results were in close resemblance with Khulakpam *et al.,* 2015.

Fruit diameter

Fruit diameter varied significantly among the different genotypes and ranged from 4.03 to 5.85 cm where mean value was 4.90. The genotypes SB-19 (5.57 cm) had the maximum fruit diameter followed by SB-8. On the other hand SB-5 (4.04) was carried the minimum fruit which was statistically similar with genotypes SB-10 and SB-17. Low range of genotypic (0.08) and phenotypic (0.26) variances as well as genotypic (5.54%) and phenotypic (10.17%) co-efficient of variation (Table 2) was obtained from the above result for this character, which indicated the maximum amount of variability within the genotypes for average fruit weight and offered better scope of selection. This finding was supported by Naseeruddin *et al.,* 2011.

Yield per plant

The cultivars showed a significant difference in producing yield per plant and ranged from 1.17kg to 2.67kg (Table 2). From the above result, the data indicated that SB-3 (2.67kg) had the highest yield per plant followed by SB-10 (2.50kg), SB-1 (2.45kg) and SB-17 (2.42kg) which were statistically similar with each other. The genotype number SB-2 (1.17kg) had the lowest yield per plant followed by SB-4 (1.19kg) and SB-12 (1.34kg) which were statistically similar to each other but significantly different from the other genotypes. Subramanian and Subbaraman, 2010 also supports our results in their findings. By the present investigation we can suggest that Fruit length and Fruit diameter are the main components of yield should be given priority in the selection programme and as well as variety development.

References

Dhiman and Prakash, C. 2005. Correlation and path coefficient analysis in cucumber. Haryana J. Horti. Sci., 34(1-2): 111-112.

Dewey, D.R. and Lu, K.H. (1959). A correlation and path coefficients analysis of crested wheat grass seed production. Agronomy J., 51: 515-518.

Gomez, K. A. and A. A. Gomez. (1984). Statistical procedure for Agricultural Research. Jhon Wiley and Sons. Inc. New York. pp. 6-206.

Johnson, H.W., Robinson, H.F. and Comstock, R.E. 1955. Estimates of genetics and environmental variability in soybean. Agron. J., 47(7): 314-318.

Khulakpam, N.S., Singh, V. and Rana, D.K. 2015. Medicinal importance of cucurbitaceous Crops. Int. Res. J. Bio. Sci., 4(6): 1-3.

Naseeruddin, K., Pant, S.C., Tomar, Y. K. and Rana, D.K. 2011. Genetic variability and selection parameters for different genotypes of radish (Raphanus sativus L.) under valley condition of Uttarakhand. Pro. Horti., 43(2): 256-258.

Shah, K.N., Rana, D.K. and Singh, V. 2016. Evaluation of different cucumber strain for various horticultural traits under valley condition of Garhwal Himalaya. J. Plant Dev. Sci., 8(12): 599-603.

Singh, V., Naseeruddin, K. and Rana, D.K. 2014. Genetic variability of tomato genotypes for yield and other horticultural traits. J. Hill Agri., 5(2): 186-189.

Subramanian, A., and N. Subbaraman. 2010. Hierarchical cluster analysis of genetic diversity in maize germplasm. Electronic Journal of Plant Breeding 1(4):431-436.

Ullah, M.Z., M.J. Hassan, A.Z.M.K.A. Chowdhury, A.I. Saki, and A.H.M.A. Rahman. 2012. Genetic variability and correlation in exotic cucumber (Cucumis sativus L.) varieties. Bangladesh Journal of Plant Breeding and Genetics 25(1):17-23.

Table 1

Plant characteristics in respect of Nodal position of first male and female flowering, Days to first picking, Fruit length, Fruit Diameter and Yield per plant.

Genotypes	NPFMF	NPFFF	DFP	FL	FD	Y/P
SB-1	4.45	5.79	64.01	17.32	4.98	2.45
SB-2	4.57	5.01	60.68	11.39	5.22	1.17
SB-3	4.68	5.79	59.34	14.55	4.86	2.67
SB-4	3.79	6.23	52.01	16.02	4.98	1.19
SB-5	4.45	6.12	50.68	16.70	4.04	1.65
SB-6	4.45	6.34	58.68	19.05	4.92	2.00
SB-7	4.79	6.45	60.01	15.03	5.19	2.70
SB-8	3.12	6.01	58.68	19.10	5.32	2.30
SB-9	3.45	5.57	64.68	12.59	4.20	1.98
SB-10	4.34	6.12	58.34	11.54	4.77	2.50
SB-11	4.12	7.34	60.34	14.72	5.14	1.90
SB-12	3.90	5.68	64.34	16.61	4.68	1.34
SB-13	3.34	5.12	58.34	15.97	4.70	2.32
SB-14	4.12	5.90	64.68	15.98	4.90	1.98
SB-15	4.12	5.23	62.01	19.01	4.68	2.40
SB-16	4.23	5.45	64.34	15.57	4.73	2.08
SB-17	3.68	4.34	57.68	25.81	4.83	2.42
SB-18	3.23	7.45	60.01	19.70	5.21	2.26
SB-19	4.23	5.57	57.68	17.34	5.57	2.12
SB-20	3.45	5.79	69.68	26.71	4.79	2.36

Table-2

Estimates of Parameters of Characters, Yield Contributing Characters of Cucumber

Characters	NPFMF	NPFFF	DFP	FL	FD	Y/P
GV	0.28	0.57	6.76	26.10	0.08	0.26
PV	0.35	0.71	26.05	29.19	0.26	0.27
GCV	13.29	12.63	4.35	27.58	5.54	42.76
PCV	14.87	14.15	8.52	29.16	10.17	43.70
Range	2.67-4.79	4.22-8.48	50.68-69.68	6.74-36.38	4.03-5.85	0.53-2.70
Mean± SE	3.94±0.16	5.91±0.23	59.93±2.4	18.54±1.2	4.90±0.25	1.18±0.07
CV(%)	6.69	6.40	7.34	9.49	8.53	8.98

Table-3

Correlation coefficient among yield and yield contributing characters of Cucumber

Characters	FL	FD	Y/P
DFP	0.049	0.084	-0.146
FL		0.155	0.203
FD			0.408**

Table-4

Path Analysis showing direct and indirect effects on yield components of Cucumber

Characters	DFP	FL	FD	Y/P
DFP	-0.01506	0.00084	0.00098	-0.146
FL	-0.00073	0.0174	0.00185	0.408
FD	-0.00126	0.00267	0.01999	0.408