Plant Archives Vol. 24, No. 2, 2024 pp. 999-1002 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org

DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2024.v24.no.2.140

CORRELATION STUDIES IN OKRA (*ABELMOSCHUS ESCULENTUS* L. MOENCH)

Chetana[1], M.P. Wankhade[2]*, Kesoju Ravali[3], S. Murtujasab[1], J. Meenakshi[1], M. Manjunath[1] and Radhika[3]

[1]Department of Genetics and Plant Breeding, U.A.S., G.K.V.K., Bangalore - 560 065, Karnataka, India.

[2]Seed Technology Research Unit, V.N.M.K.V., Parbhani - 431 402, Maharashtra, India.

[3]Department of Agricultural Botany, College of agriculture, V.N.M.K.V., Parbhani - 431 402, Maharashtra, India.

*Corresponding author E-mail : meenawankhade81@gmail.com

(Date of Receiving- 22-05-2024; Date of Acceptance-11-08-2024)

ABSTRACT

The present investigation was carried out during *kharif* 2020 at Experimental Farm, Department of Agricultural Botany, VNMKV, Parbhani. The experimental material consists of forty-two genotypes (including two checks) of which forty genotypes were the derivatives of segregating generations *i.e.*, F_2 and Back crosses of Parbhani Kranti × VROR-159, Parbhani Kranti × Kashi Pragati, Kashi Satadhari × BO-2, Kashi Satadhari × VROR-159. These genotypes were evaluated for twelve traits in RBD design with two replications and data was recorded. Fruit yield per plant have exhibited positive and significant association with traits *viz.*, plant height (cm), number of nodes on main stem, number of fruits per plant, 100 seed weight and number of seeds per fruit. Hence for improving the fruit yield in okra, the traits, which are exhibiting positive association with fruit yield and yield contributing characters are selected, which indicates the importance of these traits in improvement of fruit yield in okra.

Key words : Okra, Genotypes, Correlation, Segregating, Yield.

Introduction

Okra [*Abelmoschus esculentus* (L.) Moench] is an annual herbaceous important vegetable crop that is grown for its young immature green fruit and fresh leaves in the tropical and subtropical parts of the world. Okra is generally self-pollinated and belongs to family Malvaceae with 2n=130 chromosomes and amphidiploids in nature. It is being an often-cross pollinated crop, out crossing occurs to an extent of 4 to 19 percent with a maximum of 42.2 per cent by insect assisted pollination (Kumar *et al.*, 2006), which render a considerable amount of variability. Out of 34 species of Abelmoschus only the species Abelmoschus esculentus is known to be cultivated in extensively as commercial vegetable. Okra is a prestigious and prize value vegetable crop, which has captured a significant position among vegetables in India. It is usually consumed for its green tender fruits as a vegetable in a variety of ways. The tender fruits are used as vegetable, eaten boiled or in culinary preparations as sliced and fried pieces. Its average nutritive value is higher than tomato, egg plant and most of the cucurbits. It is also used in thickening of soups and gravies because of its high mucilage content. It is a short duration crop propagated through seeds, cherished for its tender and scrumptious green fruits used in curries, soups or in canned, dehydrated or frozen forms for off-season consumption (Neeraja *et al.*, 2004). Okra is more remunerative than the leafy vegetables, while crop has not adapted in India as leafy vegetable as in for East countries. Its ripe seeds are roasted, ground and used as a substitute for coffee in Turkey. The fruits are a green capsule containing numerous white seeds when immature and the flowers and upright plants give okra an ornamental value. The okra fruit can be classified based on the shape, angular or circular.

Okra contributes about 60 percent to the total fresh vegetable export, excluding potato, garlic and onion. In India, Okra is cultivated in an area of 0.51 million hectare with 6.18 million tonnes of produce with an average productivity of 12.04 tonnes per hectare (Anonymous,

2019) and in Maharashtra it occupies an area of 13.98 thousand hectare with an annual production of 139.40 thousand tonnes and productivity of 9.97 tonnes per hectare (Ananymous, 2018). The states, which are majorly involved in okra production are west Bengal, Gujarat, Orissa, Bihar and Andhra Pradesh.

The component traits, which are exhibiting positive correlation with yield can be used in the indirect selection for improvement of yield. Fruit yield per plant is a polygenically controlled complex trait resulting from the multiplicative interaction with components of yield. Yield is a dependent variable which depends on the cumulative effect of yield contributing traits. These traits play a major role in modifying the system of fruit yield as a whole, both in magnitude as well as direction. Fruit yield per plant is a complex quantitative character and is more influenced by the environment; hence direct selection for fruit yield is not effective. The change in one character brings about a series of changes in other characters, as they are interrelated to each other. Therefore, it is important to study the correlation between yield and its contributing traits in any selection programme.

Materials and Methods

The present investigation was conducted at Experimental Farm, Department of Agricultural Botany, College of Agriculture, VNMKV, Parbhani, during *kharif* 2020. The experimental material consists 42 genotypes as indicated in Table 1 (including two checks), which are the derivatives of segregating generations *i.e.*, F_2 and Back crosses of *viz.*, Parbhani Kranti × VROR-159, Parbhani Kranti × Kashi Pragati, Kashi Satadhari × BO-2, Kashi Satadhari × VROR-159. The study was carried out in Randomized Block Design with two replications and having a spacing of 60 cm × 30 cm in row to row: plant to plant, respectively. The seeds were sown by

Table 1 : List of genotypes of okra utilized for genetic variability analysis.

S. no.	Name of genotypes	Pedigree	S. no.	Name of genotypes	Pedigree
1	PBNLF 1	Parbhani Kranti × VROR-159 (F_3)	22	PBNLF 22	Kashi Satadhari × BO-2 (F_3)
2	PBNLF 2	Parbhani Kranti × VROR-159 (F_3)	23	PBNLF 23	Kashi Satadhari × BO-2 (F_3)
3	PBNLF 3	Parbhani Kranti × VROR-159 (F_3)	24	PBNLF 24	Kashi Satadhari × BO-2 (F_3)
4	PBNLF 4	Kashi Satadhari × VROR-159 (F_2)	25	PBNLF 25	Kashi Satadhari × BO-2 (F_3)
5	PBNLF 5	Parbhani Kranti × Kashi Pragati (F_2)	26	PBNLF 26	Kashi Satadhari × BO-2 (F_3)
6	PBNLF 6	Parbhani Kranti × Kashi Pragati (F_2)	27	PBNLF 27	Parbhani Kranti × Kashi Pragati(F_3)
7	PBNLF 7	(Kashi Satadhari × VROR-159) × Kashi Satadhari(BC_1F_2)	28	PBNLF 28	Kashi Satadhari × BO-2 (F_3)
8	PBNLF 8	(Kashi Satadhari × VROR-159) × Kashi Satadhari(BC_1F_2)	29	PBNLF 29	Kashi Satadhari × BO-2 (F_3)
9	PBNLF 9	Kashi Satadhari × BO-2 (F_3)	30	PBNLF 30	(Kashi Satadhari × BO-2) × (BO-2 (BC_1F_3)
10	PBNLF10	Kashi Satadhari × BO-2 (F_3)	31	PBNLF 31	Kashi Satadhari × VROR-159 (F_3)
11	PBNLF 11	(Parbhani Kranti × Kashi Pragati) × ParbhaniKranti (BC_1F_2)	32	PBNLF 32	Kashi Satadhari × VROR-159 (F_3)
12	PBNLF 12	(Parbhani Kranti × Kashi Pragati) × ParbhaniKranti (BC_1F_2)	33	PBNLF 33	Kashi Satadhari × VROR-159 (F_3)
13	PBNLF 13	(Parbhani Kranti × Kashi Pragati) × ParbhaniKranti (BC_1F_2)	34	PBNLF 34	Kashi Satadhari × VROR-159 (F_3)
14	PBNLF 14	(Parbhani Kranti × Kashi Pragati) × Parbhani Kranti (BC_1F_2)	35	PBNLF 35	Kashi Satadhari × VROR-159 (F_3)
15	PBNLF 15	(Parbhani Kranti × Kashi Pragati) × Parbhani Kranti (BC_1F_2)	36	PBNLF 36	Kashi Satadhari × VROR-159 (F_3)
16	PBNLF 16	Parbhani Kranti × Kashi Pragati (BC_1F_2)	37	PBNLF 37	Kashi Satadhari × VROR-159 (F_3)
17	PBNLF 17	Kashi Satadhari × BO-2 (BC_1F_1)	38	PBNLF 38	Kashi Satadhari × VROR-159 (F_3)
18	PBNLF 18	(Parbhani Kranti × Kashi Pragati) × Kashi Pragati(BC_1F_1)	39	PBNLF 39	Kashi Satadhari × VROR-159 (F_3)
19	PBNLF 19	Parbhani Kranti × VROR-159 (F_2)	40	PBNLF 40	Kashi Satadhari × VROR-159 (F_3)
20	PBNLF 20	Kashi Satadhari × BO-2 (F_3)	41	PBNLF 41	Check
21	PBNLF 21	Kashi Satadhari × BO-2 (F_3)	42	PBNLF 42	Check

dibbling 2-3 seeds on a plot of size 1.20 × 3 m^2, the basal dose of 100:50:50 Kg/ha was given to crop. The agronomic and plant protection measures were given as per requirement. These genotypes were evaluated and observations were recorded on twelve characters *viz*., Days to 50% flowering, Plant height (cm), Internodal length (cm), Number of nodes on main stem, Number of branches per plant, Fruit length (cm), Fruit diameter (cm), Number of ridges per fruit, Number of fruits per plant, 100 seed weight (g), Number of seeds per fruit and Fruit yield per plant (g). For statistical analysis mean values of five randomly selected plants were taken in each replication. The data were subjected to statistical analysis as per description of Panse and Sukhatme (1985). Genotypic and phenotypic correlation coefficients are worked from their respective variances and co-variances, these studies used to find the extent of association between different traits. The formulae suggested by Johnson *et al*. (1955) is used for calculating correlation coefficient. According to the Fisher and Yates (1983) table, significance of correlation coefficient was determined at 5 and 1 per cent level of significance and comparison of 'r' values was done at (n-2) degrees of freedom.

Results and Discussion

In present investigation, fruit yield per plant has recorded the significant and positive association with plant height (0.226, 0.219), number of nodes on main stem (0.382, 0.377), number of fruits per plant (0.948, 0.914), 100 seed weight (0.446, 0.443) and number of seeds per fruit (0.465, 0.359) at both genotypic and phenotypic level respectively (Tables 2 and 3). These results are in conformity with earlier works of Raval *et al*. (2019), Das *et al*. (2012), Singh *et al*. (2017), Mishra *et al*. (2015), Rambabu *et al*. (2019). These parameters are showing strong significant positive association with fruit yield per plant, rational improvement in yield is possible through simultaneous improvement and selection for these component characters under hybridization programmes in okra.

The traits *viz*., fruit diameter (-0.279, -0.278) and number of ridges per fruit (-0.535, -0.334) has exhibited significant and negative association with fruit yield per plant, both at phenotypic and genotypic level, similar results were obtained by Singh *et al*. (2017), Guddadmath *et al*. (2011). Fruit yield per plant has exhibited the non-significant and positive association with days to 50 per cent flowering (0.103, 0.074) and internodal length (0.023, 0.021) at both genotypic and phenotypic level, respectively. Whereas, number of branches per plant (-0.017, -0.016) and fruit length (-0.116, -0.112) has shown non-significant and negative

Table 2: Estimation of Genotypic correlation coefficient in okra.

Characters	Days to 50 % flowering	Plant height (cm)	Internodal length (cm)	Number of nodes on main stem	Number of branches per plant	Fruit length (cm)	Fruit diameter (cm)	Number of ridges per fruit	Number of fruits per plant	100 seed weight (g)	Number of seeds per fruit	Fruit yield per plant (g)
Days to 50% flowering	**1.000**	-0.033	0.070	-0.197	-0.216	0.012	-0.070	0.444**	-0.052	0.001	0.101	0.103
Plant height (cm)		**1.000**	0.466**	0.343**	0.252*	0.010	-0.362**	-0.392**	0.178	0.268*	0.473**	0.226*
Internodal length (cm)			**1.000**	0.071	0.640**	-0.319**	-0.107	-0.007	-0.049	0.256*	0.266*	0.023
Number of nodes on mainstem				**1.000**	0.130	-0.172	0.013	-0.835**	0.379**	0.298**	0.084	0.382**
Number of branches per plant					**1.000**	-0.051	0.262*	0.068	-0.173	0.058	-0.268*	-0.017
Fruit length (cm)						**1.000**	0.182	0.433**	-0.199	-0.242*	-0.084	-0.116
Fruit diameter (cm)							**1.000**	-0.072	-0.356**	0.100	-0.316**	-0.279*
Number of ridges per fruit								**1.000**	-0.595**	-0.600**	-0.492**	-0.535**
Number of fruits per plant									**1.000**	0.399**	0.423**	0.948**
100 seed weight (g)										**1.000**	0.775**	0.446**
Number of seeds per fruit											**1.000**	0.465**
Fruit yield per plant (g)												**1.000**

* and ** indicate significance of values at 5 % and 1 %, respectively.

Table 3 : Estimation of Phenotypic correlation coefficient in okra.

Characters	Days to 50 % flowering	Plant height (cm)	Internodal length (cm)	Number of nodes on main stem	Number of branches per plant	Fruit length (cm)	Fruit diameter (cm)	Number of ridges per fruit	Number of fruits per plant	100 seed weight (g)	Number of seeds per fruit	Fruit yield per plant (g)
Days to 50% flowering	**1.000**	-0.051	0.063	-0.182	-0.175	0.014	-0.057	0.073	-0.070	-0.0004	0.062	0.074
Plant height (cm)		**1.000**	0.427**	0.335**	0.250*	0.010	-0.348**	-0.248*	0.176	0.257*	0.393**	0.219*
Internodal length (cm)			**1.000**	0.072	0.575**	-0.303**	-0.102	-0.023	-0.042	0.247*	0.169	0.021
Number of nodes on main stem				**1.000**	0.134	-0.167	0.013	-0.494**	0.356**	0.293**	0.073	0.377**
Number of branches per plant					**1.000**	-0.044	0.252*	0.100	-0.167	0.057	-0.126	-0.016
Fruit length (cm)						**1.000**	0.178	0.290**	-0.191	-0.236*	-0.050	-0.112
Fruit diameter (cm)							**1.000**	-0.044	-0.340**	0.099	-0.242*	-0.278*
Number of ridges per fruit								**1.000**	-0.396**	-0.378**	-0.190	0.334**
Number of fruits per plant									**1.000**	0.383**	0.309**	0.914**
100 seed weight (g)										**1.000**	0.590**	0.443**
Number of seeds per fruit											**1.000**	0.359**
Fruit yield per plant (g)												**1.000**

* and ** indicate significance of values at 5 % and 1 %, respectively.

association with fruit yield per plant at both genotypic and phenotypic level, respectively.

Conclusion

The present investigation indicated that, there is much scope for breeder in improvement of yield through selection of genotypes based on the traits *viz*., plant height (cm), number of nodes on main stem, number of fruits per plant, 100 seed weight and number of seeds per fruit, as these traits have exhibited highly significant and positive association with fruit yield per plant (g).

References

Anonymous (2018). *Horticultural Area Production Info System 2018.* Ministry of Agriculture and Farmers Welfare, Department of Agriculture, Cooperation and Farmers Welfare, Horticulture Statistics Division, pp-10.

Anonymous (2019-20). 3rd Advanced estimate, Horticulture Statistics Division Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India, pp-234.

Das, S., Chattopadhyay A., Chattopadhyay S.B., Dutta S. and Hazra P. (2012). Genetic parameters and path analysis of yield and its components in okra at different sowing dates in the Gangetic plains of eastern India. *Afr. J. Biotechnol.*, **11(95)**, 16132-16141.

Fisher, R.A. and Yates F. (1983). *Statistical tables of biological, agricultural and medical research*. Langmah group Ltd. England. Pp. 63.

Guddadamath, S., Mohankumar H.D. and Salimath P.M. (2011). Genetic analysis of association studies in segregating population of okra. *Karnataka J. Agricult. Sci.*, **24(4)**.

Johnson, H.W., Robinson H.F. and Comstock R.E. (1955). Genotypic and Phenotypic correlation in soybean and their implications Selection. *Agron. J.*, **47**, 477-485.

Kumar, P.S., Sriram P. and Karuppiah P. (2006). Studies on combining ability in okra [*Abelmoschus esculentus* (L.) Moench]. *Indian J. Horticult.*, **63(2)**, 182-184.

Mishra, A., Mishra H.N.A., Senapati N.B. and Tripathy P. (2015). Genetic variability, correlation and path analysis studies in okra (*Abelmoschus esculentus* (L.) Monech). *Elect. J. Plant Breed.*, **6(3)**, 866-869.

Neeraja, G., Vijaya M., Chiranjeevi C.H. and Gautham B. (2004). Screening of okra hybrids against pest and diseases. *Indian J. Plant Prot.*, **32(1)**, 129-131.

Panse, V.G. and Sukhatme P.V. (1985). *Statistical methods for agricultural workers*. ICAR, New Delhi, India.

Rambabu, B., Waskar D.P. and Khandare V.S. (2019). Correlation and path coefficient analysis of fruit yield and yield attributes in okra (*Abelmoschus esculentus*). *Int. J. Curr. Microbiol. Appl. Sci.*, **8(4)**, 764-774.

Raval, V., Patel A.I., Vashi J.M. and Chaudhari B.N. (2019). Correlation and Path Analysis Studies in Okra (*Abelmoschus esculentus* (L.) Moench). *Acta Scientific Agricult.*, **3(2)**, 65-70.

Singh, N., Singh D.K., Pandey P., Panchbhaiya A. and Rawat M. (2017). Correlation and path coefficient studies in okra (*Abelmoschus esculentus* (L.) Moench). *Int. J. Curr. Microbiol. Appl. Sci.*, **6(7)**, 1096-1101.