Plant Archives Vol. 25, No. 1, 2025 pp. 314-318 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

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

DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2025.v25.no.1.047

STUDIES ON CORRELATION AND PATH COEFFICIENT ANALYSIS IN OKRA (*ABELMOSCHUS ESCULENTUS* L. MOENCH)

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(Date of Receiving-03-12-2024; Date of Acceptance-03-02-2025)

ABSTRACT

The present investigation was conducted at the Vegetable Research Farm, Department of Horticulture, Institute of Agriculture and Natural Sciences (IANS), Deen Dayal Upadhyaya Gorakhpur University, Gorakhpur (U.P.) during post-kharif season 2023.Correlation and path coefficient analysis studies in okra has been done in 16 genotypes laid out in Randomized Block Design (RBD) with three replications. In phenotypic correlation studies, Fruit yield per plant showed significant and positive correlation with No. of fruits per plants (0.69), Hundred seed weight (0.39), Fruit girth (0.12), Fruit length (0.09), Plant height (0.07) and Days to first fruit harvest (0.02) while in case of genotypic correlation studies fruit yield per plant showed significant and positive correlation with No. of fruits per plants (0.91) followed by Hundred seed weight (0.51), Fruit girth (0.04) and Days to first fruit harvest (0.01). Path analysis studies showed that characters such as Fruit girth (2.27), Days to first flowering (1.95), Plant height (1.38), Petiole length (1.17), Stem girth (0.60), No. of leaves per plant (0.23), No. of nodes per plants (0.09) and no. of ridges per fruit (0.08) recorded positive direct effect on fruit yield per plant.

Key words : Correlation, Path analysis, Okra.

Introduction

Among vegetables, okra is a major crop grown across the country and has great importance. It is constantly an interesting crop for a breeder to grow with high consumer demand. In various English-speaking nations, okra [*Abelmoschus esculentus* (L.) Moench] is known as lady's finger, bhindi in India, okra bean, quingumbo, gombo, and kopi arab in South-East Asia.

It has somatic chromosome number 2n =130 and is an amphidiploid of *A. tuberculatus* (L.) with 2n = 72 belongs to the family Malvaceae, also known as the Mallow family and to the *Abelmoschus* genus. Okra is believed to have originated near Ethiopia, where it was frequently cultivated by the Egyptians during the 12th century and thereafter spread throughout the middle east and north Africa (Elkhalifa *et al.*, 2021). India ranks first in world for okra production. The other okra growing countries are Turkey, Iran, Western Africa, Pakistan, Brazil and Bangladesh etc. In India major okra-growing states are Karnataka, West Bengal, Uttar Pradesh, Assam, Bihar, Orrisa, and Maharashtra. Okra is produced globally with an estimation of 9.96 mt. while India being the leading country with 6.18 mt. (FAOSTAT, 2020).

Okra is suitable for both *kharif* and summer seasons. It is a warm season vegetable crop and requires a long warm growing season. The flower drops able 42^{0}C temperature and the seed fail to germinate below 18^{0}C. The optimum temperature is 21^0 to 30^{0}C, with a minimum temperature of 18^{0}C for commercial cultivation of okra. The best vegetative growth and fruiting is observed at an average temperature of 25^{0}C with high relative humidity (65-85%). It can be grown in all kinds of soils, but sandy loam and fertile loamy soil is considered good for its cultivation. Okra is usually self-pollinated, however insect cross pollination recorded to be as high as 19%, making it a frequently cross-pollinated vegetable crop. It is mainly

Table 1 : Genotypic correlation coefficient estimates for 16 characters in okra

	DFF	DF	PH	NFFA	IL	NPP	DFFH	FPP	FL	FG	RPF	LPP	PL	SG	HSW	FYPP
DFF	**1****	0.92 **	0.40	0.52 *	0.36	0.54*	0.78**	-0.39	-0.67 **	0.40	-0.01	-0.12	0.22	0.14	-0.02	-0.25
DF		**1****	0.52 *	0.54 *	0.43	0.66 **	0.80 **	-0.29	-0.90**	0.54 *	-0.05	-0.06	0.15	0.20	0.13	-0.21
PH			**1****	0.25	0.65 **	0.55 *	0.19	-0.00	-0.59 *	0.11	-0.53 *	-0.54 *	-0.22	0.39	-0.29	-0.34
NFFA				**1****	-0.05	0.35	0.38	-0.12	-0.40	0.62 **	-0.07	-0.47	0.14	-0.03	0.03	-0.24
IL					**1****	0.32	-0.12	-0.49	-0.38	-0.06	-0.65 **	0.20	0.13	0.35	-0.35	-0.40
NPP						**1****	0.38	-0.35	-0.97**	0.07	-0.21	0.43	0.15	0.73 **	0.06	-0.45
DFFH							**1****	0.02	-0.71**	0.46	0.20	-0.38	0.04	0.01	0.16	0.01
FPP								**1****	-0.03	-0.02	-0.28	-0.71 **	-0.37	-0.40	0.41	0.91 **
FL									**1****	-0.32	-0.36	-0.36	-0.21	-0.62 *	-0.45	-0.04
FG										**1****	-0.42	-0.25	-0.34	-0.33	0.34	0.04
RPF											**1****	0.24	0.92 **	0.02	0.36	-0.10
LPP												**1****	0.53 *	1.09 **	0.66**	-0.34
PL													**1****	0.11	-0.04	-0.22
SG														**1****	-0.01	-0.54 *
HSW															**1****	0.51*
FYPP																**1****

*, ** Significant at 5% and 1% level respectively.

Table 2 : Phenotypic correlation coefficient estimates for 16 characters in okra.

	DFF	DF	PH	NFFA	IL	NPP	DFFH	FPP	FL	FG	RPF	LPP	PL	SG	HSW	FYPP
DFF	**1****	0.90 **	0.31 *	0.45**	0.34*	0.42 **	0.71 **	-0.37**	-0.51**	0.31 *	-0.03	-0.07	0.17	0.11	-0.02	-0.20
DF		**1****	0.34*	0.46**	0.38 **	0.53 **	0.72**	-0.27	-0.64 **	0.44 **	-0.06	-0.05	0.13	0.17	0.13	-0.20
PH			**1****	0.23	0.53**	0.41**	0.11	-0.00	-0.27	0.07	-0.20	-0.19	-0.04	0.26	-0.17	0.07
NFFA				**1****	0.01	0.33 *	0.30*	-0.09	-0.27	0.33*	-0.05	-0.11	0.19	-0.02	0.03	-0.14
IL					**1****	0.28*	-0.08	-0.40 **	-0.20	0.01	-0.20	0.07	0.16	0.32 *	-0.27	-0.23
NPP						**1****	0.28 *	-0.20	-0.50 **	0.07	-0.13	0.16	0.16	0.60**	0.05	-0.25
DFFH							**1****	0.01	-0.40**	0.37**	0.07	-0.09	0.01	0.01	0.11	0.02
FPP								**1****	0.03	0.01	-0.08	-0.29 *	-0.31 *	-0.35 *	0.38 **	0.69**
FL									**1****	-0.06	0.13	-0.06	-0.12	-0.33 *	-0.30 *	0.09
FG										**1****	0.03	-0.20	-0.27	-0.21	0.27	0.12
RPF											**1****	0.25	0.34 *	0.01	0.11	-0.02
LPP												**1****	0.17	0.39 **	0.19	-0.26
PL													**1****	0.14	-0.00	-0.13
SG														**1****	-0.00	-0.41**
HSW															**1****	0.39 **
FYPP																**1****

*, ** Significant at 5% and 1% level respectively.

propagated by seeds and has a duration of 90-100 days. So, for the identification of superior genotypes and enhancement of any trait, correlation and path coefficient analysis is necessary before improving any crop, including okra. Study of correlation analysis gives an insight into the genetic variability present in population. Correlation coefficient measures the manual relationship between various plant characters and determines the component character on which selection can be based for improvement of fruit yield. Path coefficient analysis differentiate the correlation coefficient into direct and indirect effects of a set of independent variables on the basis of dependent variable thereby aids in the selection of elite genotype.

Materials and Methods

The present investigation entitled "Studies on Correlation and Path Coefficient Analysis in Okra [*Abelmoschus esculentus* (L.) Moench]", was conducted at the Vegetable Research Farm, Department of Horticulture, Institute of Agriculture and Natural Sciences (IANS), Deen Dayal Upadhyaya Gorakhpur University, Gorakhpur (U.P.) during post-kharif season 2023. The experimental materials for this study consisted of 16 genotypes of okra [*Abelmoschus esculentus* (L.) Moench], which were received and collected from different sources and grown in Randomized Block Design (RBD) with three replications. Genotypic and phenotypic coefficients of correlation between two characters were determined by using the variance and covariance components as suggested by Al-Jibouri *et al.* (1958). Path coefficient analysis was carried out according to the procedure described by Dewey and Lu (1959).

Results and Discussion

The genotypic and phenotypic correlation coefficient were carried out for 16 characters and are represented in Tables 1 and 2. Present study showed that number of fruits per plant (rg= 0.91, rp= 0.69) followed by hundred seed weight (rg=0.51, rp= 0.39), fruit girth (rg= 0.04, rp= 0.12) and days to first fruit harvest (rg=0.01, rp=0.02) had significant positive correlation with fruit yield per plant at both genotypic as well as phenotypic level. Fruit length (0.09) showed significant positive correlation with fruit yield per plant only at phenotypic level. Whereas ridges per fruit (rg= -0.10, rp= -0.02) followed by days to 50% flowering (rg= -0.20, rp= -0.21), petiole length (rg= -0.22, rp= -0.13), node to first flower appearance (rg= -0.24, rp= -0.14), days to first flowering (rg= -0.25, rp= -0.20), plant height (rg= -0.34, rp= -0.07), numbers of leaves per plant (rg= -0.34, rp= -0.26), internodal length (rg= -0.40, rp= -0.23), number of nodes per plant (rg= -0.45, rp= -0.25) and stem girth (rg= -0.54, rp= -0.41) showed significant negative correlation with fruit yield per plant. Similar results were reported by Ghadage *et al.* (2024), Shinde *et al.* (2023), Munshi *et al.* (2023) and Abdul (2017). Fruit yield and yield attributing traits are interrelated among themselves. This impairs the true association existing between a component and fruit yield. Thus, path coefficient analysis breaks the correlation coefficient into the measures of direct and indirect effect and points out the precise causes of association.

Path coefficient analysis at genotypic and phenotypic

Table 3 : Genotypic path coefficient showing direct and indirect effect of different characters on fruit yield.

	DFF	DF	PH	NFFA	IL	NPP	DFFH	FPP	FL	FG	RPF	LPP	PL	SG	FYPP
DFF	**1.95**	-2.01	0.56	-0.68	-0.46	0.05	-0.66	0.01	0.20	0.91	0.00	-0.03	0.27	0.09	-0.21
DF	1.81	**-2.16**	0.73	-0.71	-0.54	0.06	-0.68	0.01	0.27	1.24	0.00	-0.02	0.18	0.12	-0.18
PH	0.79	-1.14	**1.38**	-0.34	-0.81	0.24	-0.17	0.00	0.17	0.26	-0.04	-1.14	-0.27	0.24	-0.29
NFFA	1.03	-1.19	0.36	**-1.30**	0.06	0.03	-0.32	0.00	0.12	1.41	-0.01	-0.11	0.17	-0.02	-0.20
IL	0.72	-0.93	0.90	0.07	**-1.25**	0.03	0.10	0.01	0.11	-0.14	-0.05	0.05	0.16	0.22	-0.34
NPP	1.05	-1.43	0.76	-0.47	-0.41	**0.09**	-0.32	0.01	0.29	0.16	-0.02	0.10	0.18	0.44	-0.38
DFFH	1.53	-1.74	0.27	-0.50	0.15	0.01	**-0.84**	0.00	0.21	1.05	0.02	-0.09	0.05	0.01	0.01
FPP	-0.76	0.63	0.00	0.16	0.61	-0.03	-0.02	**-0.02**	0.01	-0.06	-0.02	-0.17	-0.44	-0.24	0.77
FL	-1.32	1.96	-0.81	0.52	0.48	-0.09	0.60	0.00	**-0.30**	-0.73	-0.03	-0.09	-0.25	-0.37	-0.04
FG	0.78	-1.18	0.16	-0.81	0.08	0.01	-0.39	0.00	0.10	**2.27**	-0.03	-0.06	-0.41	-0.20	0.04
RPF	-0.03	0.12	-0.74	0.09	0.81	-0.02	-0.17	0.01	0.11	-0.97	**0.08**	0.06	1.09	0.02	-0.09
LPP	-0.25	0.15	-0.75	0.62	-0.25	0.04	0.32	0.01	0.11	-0.58	0.02	**0.23**	0.63	0.65	-0.29
PL	0.45	-0.33	-0.31	-0.18	-0.17	0.01	-0.04	0.01	0.06	-0.79	0.07	0.13	**1.17**	0.07	-0.19
SG	0.28	-0.44	0.55	0.04	-0.45	0.07	-0.01	0.01	0.18	-0.77	0.00	0.26	0.04	**0.60**	-0.46
FYPP	-0.49	0.46	-0.48	0.31	0.51	-0.04	-0.01	-0.02	0.01	0.11	-0.01	-0.08	-0.27	-0.33	**0.84**

Bold values show direct and normal values show indirect effect.

Table 4 : Phenotypic path coefficient showing direct and indirect effect of different characters on fruit yield.

	DFF	DF	PH	NFFA	IL	NPP	DFFH	FPP	FL	FG	RPF	LPP	PL	SG	FYPP
DFF	**-0.11**	0.69	-0.04	-0.03	-0.13	-0.06	-0.33	-0.12	0.09	0.09	0.00	-0.02	0.02	0.03	-0.07
DF	-0.10	**0.77**	-0.05	-0.03	-0.15	-0.08	-0.34	-0.09	0.11	0.13	0.00	-0.01	0.01	0.04	-0.07
PH	-0.03	0.26	**-0.15**	-0.01	-0.21	-0.06	-0.05	-0.00	0.04	0.02	0.00	-0.06	-0.00	0.07	0.02
NFFA	-0.05	0.35	-0.03	**-0.07**	-0.00	-0.05	-0.14	-0.03	0.05	0.10	0.00	-0.03	0.02	-0.00	-0.04
IL	-0.04	0.29	-0.08	-0.00	**-0.39**	-0.04	0.03	-0.14	0.03	0.00	0.00	0.02	0.02	0.08	-0.08
NPP	-0.05	0.41	-0.06	-0.02	-0.11	**-0.16**	-0.13	-0.06	0.09	0.02	0.00	0.05	0.02	0.16	-0.09
DFFH	-0.08	0.56	-0.01	-0.02	0.03	-0.04	**-0.47**	0.00	0.07	0.11	-0.00	-0.03	0.00	0.00	0.00
FPP	0.04	-0.21	0.00	0.00	0.16	0.03	-0.00	**0.34**	-0.00	0.00	0.00	-0.09	-0.04	-0.09	0.24
FL	0.06	-0.49	0.04	0.02	0.08	0.08	0.19	0.01	**-0.18**	-0.02	-0.00	-0.02	-0.01	-0.09	0.03
FG	-0.03	0.34	-0.01	-0.02	-0.00	-0.01	-0.17	0.00	0.01	**0.30**	-0.00	-0.06	-0.03	-0.05	0.04
RPF	0.00	-0.04	0.03	0.00	0.07	0.02	-0.03	-0.03	-0.02	0.01	**-0.02**	0.08	0.04	0.00	-0.00
LPP	0.00	-0.04	0.03	0.00	-0.02	-0.02	0.04	-0.10	0.01	-0.06	-0.00	**0.32**	0.02	0.10	-0.09
PL	-0.02	0.10	0.00	-0.01	-0.06	-0.02	-0.00	-0.10	0.02	-0.08	-0.00	0.05	**0.14**	0.03	-0.04
SG	-0.01	0.13	-0.04	0.00	-0.12	-0.09	-0.00	-0.12	0.06	-0.06	-0.00	0.12	0.02	**0.27**	-0.14
FYPP	0.02	-0.15	-0.01	0.01	0.09	0.04	-0.00	0.24	-0.01	0.03	0.00	-0.08	-0.01	-0.11	**0.35**

Bold values show direct and normal values show indirect effect.

level is represented in Tables 3 and 4. Genotypic path coefficient analysis studies showed that fruit girth (2.27) followed by days to first flowering (1.95), plant height (1.38), petiole length (1.17), stem girth (0.60), number of leaves per plant (0.23), number of nodes per plant (0.09) and ridges per fruit (0.08) showed positive direct effect on fruit yield per plant while days to 50% flowering (-2.16) followed by nodes to first flower appearance (1.30), internodal length (-1.25), days to first fruit harvest (-0.84), fruit length (-0.30) and number of fruits per plants (-0.02) showed negative direct effect on fruit yield per plant. Similarly, phenotypic path coefficient analysis studies showed that days to 50% flowering (0.77) followed by number of fruits per plant (0.34), number of leaves per plant (0.32), fruit girth (0.30), stem girth (0.27) and petiole length (0.14) showed positive direct effect on fruit yield per plant while ridges per fruit (-0.02) followed by node to first flower appearance (-0.07), days to first flowering (-0.11), plant height (-0.15), number of nodes per plant (-0.16), fruit length (-0.18), internodal length (-0.39) and days to first fruit harvest (-0.47) showed negative direct effect on fruit yield per plant. These results are in agreement with the earlier findings of Kumar *et al*. (2024), Nayak *et al*. (2023), Saryam *et al.* (2015), Sawant *et al*. (2014) and Prakash *et al*. (2011).

Conclusion

The nature and extent of correlation among various characters differs from each other. The study of correlation indicated that number of fruits per plant (rg= 0.91, rp= 0.69) followed by hundred seed weight (rg=0.51, rp= 0.39), fruit girth (rg= 0.04, rp= 0.12) and days to first fruit harvest (rg=0.01, rp=0.02) had significant positive correlation with fruit yield per plant at both genotypic as well as phenotypic level. Whereas fruit girth (2.27) followed by days to first flowering (1.95), plant height (1.38), petiole length (1.17), stem girth (0.60), number of leaves per plant (0.23), number of nodes per plant (0.09) and ridges per fruit (0.08) showed positive direct effect on fruit yield per plant at genotypic level while days to 50% flowering (0.77) followed by number of fruits per plant (0.34), number of leaves per plant (0.32), fruit girth (0.30), stem girth (0.27) and petiole length (0.14) showed positive direct effect on fruit yield per plant. These traits should be regarded as important selection criteria for fruit yield improvement programs because these characters also demonstrated a significant role as indirect effects on fruit yield per plant through the majority of the component traits.

Acknowledgement

I want to sincerely thank my esteemed advisor Dr. Saurabh Singh, Assistant Professor, Department of Horticulture, Institute of Agriculture and Natural Sciences, DDU Gorakhpur University, Gorakhpur for suggesting this interesting research topic for me. Throughout this inquiry and for the production of this research, his knowledgeable advice, intense attention, unwavering support and helpful criticism have been priceless.

References

Abdul, S. (2017). Genetic variability, heritability and correlation coefficient in okra (*Abelmoschus esculentus* (L.) Moench) in Allahabad agroclimatic conditions. *Plant Archives*, **17(2)**, 1597-1602.

Elkhalifa, A.E.O., Alshammari E., Adnan M., Alcantara J.C., Awadelkareem A.M., Eltoum N.E., Mehmood K., Panda B.P. and Ashraf S.A. (2021). Okra (*Abelmoschus esculentus* (L.) Moench) as a potential dietary medicine with nutraceutical importance for sustainable health applications. *Molecules*, **28(3)**, 696.

FAOSTAT (2021). Production data was reported by (FAO Statistics online database, Food and Agriculture Organization, Rome, (www.fao.org/faostat/en).

Ghadage, A.P., Pole S.P., Kute K.G., Gavhale K.N. and Panchabhaye P.P. (2024). Character association and path analysis studies in okra (*Abelmoschus esculentus* (L.) Moench). *Int. J. Adv. Biochem. Res.*, **8(2)**, 307-310.

Kumar, D., Singh J., Pathania R., Dogra B. and Chandel V. (2024). Revealing genetic diversity for the improvement of pod yield in okra (*Abelmoschus esculentus* (L.) Moench). *Elect. J. Plant Breed.*, **14(4)**, 1497-1504.

Munshi, R., Acharyya P., Chattopadhyay A., Mishra P., Sahoo B. and Chakraborty L. (2023). Diversity analysis in okra (*Abelmoschus esculentus* (L.) Moench) genotypes under saline situation. *Int. J. Biological Macromole.*, **15(6)**, 385-394.

Nayak, N.J., Tripathy P., Sahu G.S., Dash S.K., Lenka D. and Mishra S. (2023). Correlation and path analysis of okra (*Abelmoschus esculentus* (L.) Moench) germplasms for fruit yield and its components. *Int. J. Environ. Climate Change*, **12(12)**, 1963-1969.

Prakash, K., Pitchaimuthu M., Venugopalan R., Shivanand H. and Jainag K. (2011). Genetic diversity studies in okra (*Abelmoschus esculentus* (L.) Moench). *Int. J. Agricult. Sci.*, **7(2)**, 440-443.

Saryam, D.K., Mittra S.K., Mehta A.K., Sunil P. and Satish K. (2015). Correlation and path coefficient analysis of quantitative traits in okra (*Abelmoschus esculentus* (L.) Moench). *The Bioscan*, **10(2)**, 735-739.

Sawant, S.N., Nagre P.K., Gudadhe P.S. and Narkhede G.W. (2014). Correlation coefficient and path analysis studies in okra (*Abelmoschus esculentus* (L.) Moench). *Int. J. Tropical Agricult.*, **32(3/4)**, 341-347.

Shinde, S.L., Zate D.K., Gavade S.S., Zate A.K. and Shinde J.V. (2023). Correlation analysis for fruit yield and its related traits in okra (*Abelmoschus esculentus* (L.) Moench). *The Pharma Innov. J.*, **12(1)**, 215-220.