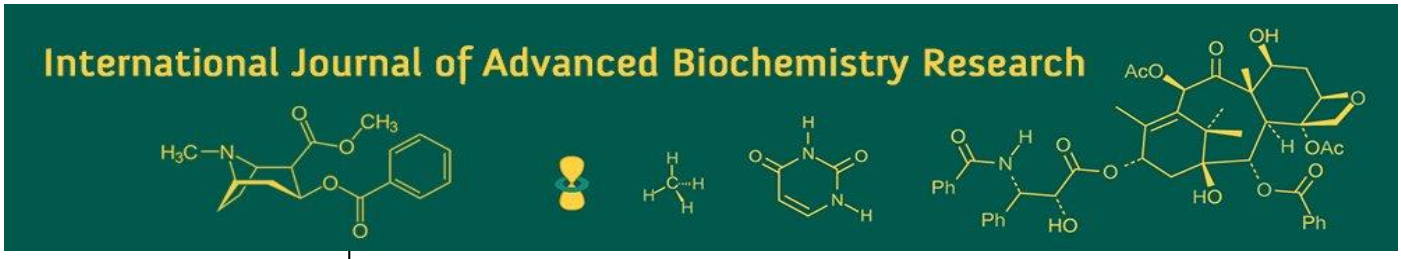

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Character association and path analysis studies in okra (*Abelmoschus esculentus* (L.) Moench)

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Abstract
The present investigation was undertaken to estimate the correlation and path analysis for fruit yield and yield contributing characters in okra (*Abelmoschus esculentus* (L.) Moench). Fourty genotypes were sown in a randomized block design with two replications during rainy season. The characters studied were, days to 50 percent flowering, plant height, internodal length, number of nodes per plant, number of branches per plant, fruit length, fruit diameter, number of fruits per plant, fruit weight, days to first picking, YVMV incidence and fruit yield per plant. Correlation studies indicated the characters *viz*., fruit length, fruit weight, number of fruits per plant, number of nodes per plant and days to first picking showed significant and positive correlation with fruit yield per plant. Hence, these traits could be considered as important for improving fruit yield in okra. The path analysis revealed that, all the characters except plant height, fruit diameter, YVMV incidence showed highest direct positive effect on fruit yield per plant. Hence, importance must given to these characters because they are directly proportional to fruit yield per plant.

Keywords: Correlation, path analysis, fruit yield, yield components and okra

Introduction
Okra (*Abelmoschus esculentus* (L.) Moench) is an annual, herbaceous plant and belongs to the family malvaceae, having a chromosome number 2n=130. Okra known in many English-speaking countries as lady's fingers, Bhindi in India, okra plant, Ochro, Okoro, Gombo, Quimgombo, kopi Arab, Kacangbendi and Bhindi in South East Asia. Okra is originated in Hindustani centre of origin, chiefly India.

Okra is also known as “Queen of vegetable”. It requires long warm growing season during its growing period and hence it can be grown as spring-summer as well as rainy season crop in India. It grows best within a temperature range of 24-270C. It can be grown in a wide range of soils with pH range of 6.0-6.8, but well drained fertile soils with adequate organic matter results to high yield. It is drought and heat tolerant crop. It is a nutritious vegetable containing 86.1 percent water, 2.2 percent protein, 0.2 percent fat, 9.7 percent carbohydrate, 1.0 percent fiber and 0.8 percent ash. Okra is also canned or dehydrated. Okra is rich in vitamins, calcium, potassium and other mineral matters. Tender fruits of okra are used as vegetable or in culinary preparation as sliced and fried pieces. It also used for thickening soups and gravies, because of its high mucilage content. Okra fruits are also sliced for sun drying or canning or pickled for off-season use. Okra leaves are used in inflammation and dysentery.

Correlation and path coefficient analysis are pre-requisites for improvement of any crop including okra for selection of superior genotypes and for improvement of any character. The correlation studies simply measure the associations between yield and other characters. Yield is a quantitative character and also contributed by many characters, therefore for designing effective breeding programme, adequate knowledge about the magnitude and degree of association between yield and its components traits is essential. Path coefficient analysis permits the separation of correlation coefficient into direct and indirect effects. Path coefficient analysis useful for choosing most useful characters to be used for yield improvement through selection. Using path analysis, the variables contributing most to an observed relationship can be identified and employed in formulating an effective selection strategy.

Materials and Methods

The experimental material consisted of the present investigation comprising fourty genotypes of okra were evaluated in a randomized block design two replication during rainy season. The characters studied were days to 50 percent flowering, plant height, internodal length, number of nodes per plant, number of branches per plant, fruit length, fruit diameter, number of fruits per plant, fruit weight, days to first picking, YVMV incidence and fruit yield per plant. Correlation coefficient were calculated for all quantitative character combinations at phenotypic, genotypic and environmental levels, method suggested by Panse and Sukhatme (1967) [5] and path coefficient were worked out as per the method given by Wright and elaborated by Dewey and Lu (1959) [3].

Results and Discussion

In order to find out the association between twelve characters in the given genotypes the genotypic and phenotypic correlation coefficients were worked out and are interpreted in Table 1 and 2. Yield is highly complex character and polygenic in nature which is influenced by environment. Hence, the study of inter association is essential to understand the relationship of simple traits with complex yield attributing traits. The study of genetic correlation gives an idea about the extent of which the characters are under the control of same set of genes. The pleiotropy assumes importance if the correlation is high, whereas, the independent inheritance of traits may be perceived if the correlation is found to be low.

The present evaluation revealed that the characters such as number of nodes per plant, fruit length, fruit weight, number of fruits per plant and days to first picking which showed strong positive correlation with fruit yield per plant. Hence, these traits could be considered as important for improving fruit yield per plant. Similar results were found by Sujata *et al*. (2019) [14], Shinde *et al*. (2023) [12], Ranganayaki *et al*. (2020) [13], Rynjah *et al*. (2020) [10]. The characters *viz*., days to 50 percent flowering, plant height, internodal length, number of branches per plant and fruit diameter showed positive and non-significant association with fruit yield per plant. These results are in conformity with those of Rathod *et al*. (2019) [8], Raval *et al*. (2018) [9]. Kumar *et al*. (2020) [4]. The characters YVMV incidence have negative non- significant association with fruit yield per plant. These results are in agreement with Chavan *et al*. (2019) [2], Sharma *et al*. (2022) [11], Shinde *et al*. (2023) [12]. Path coefficient analysis is important tool for selection of characters those have direct and positive effect on fruit yield per plant for improvement of fruit yield. This helps in giving the weightage to a particular character during the selection. The path analysis indicated that the characters except plant height, fruit diameter, YVMV incidence showed highest direct positive effect on fruit yield per plant. Thus, importance must be given to these characters because they are directly proportional to fruit yield per plant. The similar results also have been reported by Sujata *et al*. (2019) [14], Pawar *et al*. (2020) [6], Bagadiya *et al*. (2022) [1], Rajani *et al*. (2022) [7].

Table 1: Genotypic correlation coefficients between fruit yield and yield contributing traits in okra

Characters	Days to 50% flowering	Plant height (cm)	Internodal length (cm)	Number of nodes per plant	Number of branches per plant	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (gm)	Number of fruits per plant	Days to first picking	YVMV incidence	Fruit yield per plant
Days to 50% Flowering	1.000	0.060	0.055	-0.089	0.202	0.138	-0.074	0.120	-0.188	0.187	-0.116	0.050
Plant Height (cm)		1.000	0.046	0.249*	0.180	-0.180	-0.160	-0.064	0.108	0.164	0.124	0.005
Internodal length (cm			1.000	-0.205	-0.279*	0.188	0.150	0.067	0.103	-0.077	0.136	0.158
Number of nodes per plant				1.000	0.328*	0.128	-0.134	0.036	0.401**	0.085	-0.098	0.290*
Number of branches per plant					1.000	0.009	-0.020	0.157	0.013	0.214	0.134	0.163
Fruit length (cm)						1.000	0.356*	0.410**	0.097	-0.029	0.082	0.397**
Fruit diameter (cm)							1.000	0.377**	-0.142	0.080	0.015	0.197
Fruit weight (gm)								1.000	-0.005	0.239*	0.005	0.716**
Number of fruits per plant									1.000	-0.122	0.062	0.447**
Days to first picking										1.000	-0.028	0.230*
YVMV incidence											1.000	-0.021
Fruit yield per plant												1.000

*significance at 5 percent level and ** significance at 1 percent level

Table 2: Phenotypic correlation coefficients between fruit yield and yield contributing traits in okra

Characters	Days to 50% flowering	Plant height (cm)	Internodal length (cm)	Number of nodes per plant	Number of branches per plant	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (gm)	Number of fruits per plant	Days to first picking	YVMV incidence	Fruit yield per plant
Days to 50% Flowering	1.000	0.063	-0.068	-0.081	0.198	0.143	-0.066	0.119	-0.190	0.180	-0.120	0.059
Plant Height (cm)		1.000	0.051	0.247*	0.182	-0.182	-0.164	-0.064	0.109	0.168	0.125	0.001
Internodal length(cm)			1.000	-0.192	-0.290*	0.198	0.166	0.065	0.102	-0.096	0.132	0.177
Number of nodes per plant				1.000	0.337*	0.123	-0.146	0.038	0.405**	0.100	-0.095	0.281*
Number of branches per plant					1.000	0.013	-0.015	0.156	0.012	0.209	0.132	0.171
Fruit length (cm)						1.000	0.353*	0.412**	0.099	-0.023	0.084	0393**
Fruit diameter (cm)							1.000	0.381**	-0.141	0.092	0.018	.189
Fruit weight (gm)								1.000	-0.005	0.239*	0.004	0.723**
Number of fruits per plant									1.000	-0.125	0.062	0.452**
Days to first picking										1.000	-0.033	0.247*
YVMV incidence											1.000	-0.017
Fruit yield per plant												1.000

*significance at 5 percent level and ** significance at 1 percent level

Table 3: Direct and indirect effects (genotypic) of different characters on fruit yield in okra

Characters	Days to 50% flowering	Plant height (cm)	Internodal length (cm)	Number of nodes per plant	Number of branches per plant	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (gm)	Number of fruits per plant	Days to first picking	YVMV incidence	Fruit yield per plant
Days to 50% Flowering	0.018	0.001	-0.001	-0.002	0.004	0.003	-0.001	0.002	-0.003	0.003	-0.002	0.050
Plant Height (cm)	-0.003	-0.042	-0.002	-0.010	-0.008	0.008	0.007	0.003	-0.005	-0.007	-0.005	0.005
Internodal length(cm)	-0.006	0.005	0.114	-0.023	-0.032	0.021	0.017	0.008	0.012	-0.009	0.016	0.158
Number of nodes per plant	-0.008	0.023	-0.019	0.094	0.031	0.012	-0.013	0.003	0.038	0.008	-0.009	0.290*
Number of branches per plant	0.008	0.007	-0.011	0.013	0.041	0.000	-0.001	0.006	0.001	0.009	0.005	0.163
Fruit length (cm)	0.009	-0.012	0.012	0.008	0.001	0.064	0.023	0.026	0.006	-0.002	0.005	0.397**
Fruit diameter (cm)	0.002	0.005	-0.005	0.004	0.001	-0.011	-0.030	-0.011	0.004	-0.002	0.000	0.197
Fruit weight (gm)	0.078	-0.042	0.044	0.023	0.102	0.267	0.246	0.651	-0.003	0.156	0.003	0.716**
Number of fruits per plant	-0.079	0.045	0.043	0.167	0.005	0.041	-0.059	-0.002	0.417	-0.051	0.026	0.447**
Days to first picking	0.023	0.020	-0.010	0.011	0.026	-0.004	0.010	0.030	-0.015	0.123	-0.004	0.230*
YVMV incidence	0.007	-0.007	-0.008	0.006	-0.008	-0.005	-0.001	0.000	-0.004	0.002	-0.056	-0.021
Fruit yield per plant	0.050	0.005	0.158	0.290*	0.163	0.397**	0.197	0.716**	0.447**	0.230*	-0.021	1.000

Table 4: Direct and indirect effects (Phenotypic) of different characters on fruit yield in okra

Characters	Days to 50% flowering	Plant height (cm)	Internodal length (cm)	Number of nodes per plant	Number of branches per plant	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (gm)	Number of fruits per plant	Days to first picking	YVMV incidence	Fruit yield per plant
Days to 50% Flowering	0.025	0.002	-0.002	-0.002	0.005	0.004	-0.002	0.003	-0.005	0.005	-0.003	0.059
Plant Height (cm)	-0.004	-0.058	-0.003	-0.014	-0.011	0.011	0.010	0.004	-0.006	-0.010	-0.007	0.001
Internodal length(cm)	-0.010	0.007	0.146	-0.028	-0.042	0.029	0.024	0.010	0.015	-0.014	0.019	0.177
Number of nodes per plant	-0.006	0.017	-0.013	0.069	0.023	0.009	-0.010	0.003	0.028	0.007	-0.007	0.281*
Number of branches per plant	0.012	0.012	-0.018	0.021	0.063	0.001	-0.001	0.010	0.001	0.013	0.008	0.171
Fruit length (cm)	0.008	-0.010	0.011	0.007	0.001	0.054	0.019	0.022	0.005	-0.001	0.005	0.393**
Fruit diameter (cm)	0.004	0.009	-0.009	0.008	0.001	-0.019	-0.054	-0.021	0.008	-0.005	-0.001	0.189
Fruit weight (gm)	0.079	-0.042	0.043	0.025	0.103	0.272	0.251	0.660	-0.004	0.158	0.003	0.723**
Number of fruits per plant	-0.082	0.047	0.044	0.175	0.005	0.043	-0.061	-0.002	0.432	-0.054	0.027	0.452**
Days to first picking	0.026	0.025	-0.014	0.015	0.031	-0.003	0.014	0.035	-0.018	0.147	-0.005	0.247*
YVMV incidence	0.007	-0.007	-0.008	0.005	-0.007	-0.005	-0.001	0.000	-0.004	0.002	-0.056	-0.017
Fruit yield per plant	0.059	0.001	0.177	0.281*	0.171	0.393**	0.189	0.723**	0.452**	0.247*	-0.017	1.000

Conclusion

Correlation studies indicated the characters *viz*., fruit length, fruit weight, number of fruits per plant, number of nodes per plant and days to first picking showed significant and positive correlation with fruit yield per plant. Hence, these traits could be considered as important for improving fruit yield in okra. The path analysis revealed that, all the characters except plant height, fruit diameter, YVMV incidence showed highest direct positive effect on fruit yield per plant.

References

1. Bagadiya PG, Intwala CG, Patel P, Usadad JS. Assessment of the correlation and path analysis with association of growth and yield characteristics in okra (*Abelmoschus esculentus* (L.) Moench). The Pharma Innovation Journal. 2022;11(4):769-774
2. Chavan J, Seenivasan N, Saidaiah P, Sivaraj N. Estimation of correlation coefficient and path coefficient analysis for yield and yield components in Okra [*Abelmoschus esculentus* (L.) Moench]. International Journal of Chemical Studies. 2019;7(4):1254-1260.
3. Dewey DR, Lu KH. A correlation and path coefficient analysis of crested what grass seed production. Agronomy Journal. 1959;51(5):515-518.
4. Kumar RK, Patil RV. Mean performance, character association and path analysis studies for quantitative characters in okra (*Abelmoschus esculentus* (L.) Moench) genotypes. International Journal of Current Microbiology and Applied Sciences. 2020;9(11):1357-1365.
5. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. ICAR New Delhi; c1985. p. 381.
6. Pawar Y, Sarode SB, Shaikh AB, Kharad DA. Phenotypic and genotypic path coefficient analysis studies in okra (*Abelmoschus esculentus* (L.) Moench). Journal of Pharmacognosy and Phytochemistry. 2020;9(55):488-493.
7. Rajani A, Naidu L, Madhavi Y, Srikanth D. Path coefficient analysis studies in okra [*Abelmoschus esculentus* (L.) Moench]. The Pharma Innovation International Journal. 2022;11(2):2050-2053.
8. Rathod S, Parmar VL, Patel AI. Correlation and path coefficient analysis for quantitative traits in F2 population in okra [*Abelmoschus esculentus* (L.) Moench]. International Journal of Chemical Studies. 2019;7(5):1030-1033.
9. Raval V, Patel AI, Vashi JM, Choudhari BN. Correlation and path analysis studies in okra [*Abelmoschus esculentus* (L.) Moench]. International Journal of Chemical Studies. 2019;7(1):1230-1233.
10. Rynjah S, Arumugam T, Ganesan KN, Kamal Kumaran PR. Correlation and path coefficient analysis studies in okra (*Abelmoschus esculentus* (L.) Moench). Journal of Pharmacognosy and Phytochemistry. 2020;9(3):1423-1427.
11. Sharma PK, Mishra DP, Pandey A. Genetic variability studies for yield and its contributing traits in okra (*Abelmoschus esculentus* (L.) Moench). Journal of Applied and Natural Science. 2016;8(3):1634-1637.
12. Shinde SL, Zate DK, Gavade SS, Zate AK, Shinde JV. Correlation analysis for fruit yield and its related traits in okra (*Abelmoschus esculentus* (L.) Moench). The Pharma Innovation Journal. 2023;12(1):215-220.
13. Sri Ranganayaki S, Joshi JL, Muraleedharan A, Praveen SC, Babu Rajan R. Correlation and path analysis of yield and yield attributing traits of okra (*Abelmoschus esculentus* (L). Moench). Plant Archives. 2020;2(20):1612-1614.
14. Sujata P, Satish D, Babu AG, Chittapur R, Prabhuling G, Peerjade D. Studies of character association and path analysis for productivity and quality traits in okra (*Abelmoschus esculentus* (L.) Moench). Journal of Pharmacognosy and Phytochemistry. 2019;8(4):1513-1516.