The Andhra Agric. J 69 (4): 501-505, 2022

Correlation Studies of various traits in Okra [*Abelmoschus esculentus* (L.) Moench.]

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ABSTRACT

Correlation analysis were studied using parents (VRO-3, VRO-6, 440-10-1, TCR-1674, JPM-20-16-39 and HRB-9-2), their F_1. Observations were recorded on eighteen yield and its contributing characters. Fruit yield per plant had significant and positive association with traits like plant height, number of fruits per plant, fruit length, fruit girth, fruit weight, seeds per fruit and test weight at both phenotypic and genotypic levels indicating all these traits should be considered collectively for improving the yield in okra.

Keywords: *Breeding programmes, Correlation, Okra and Yield*

Okra [*Abelomoschus esculentus* (L.) Moench] commonly known as lady's finger belongs to the family Malvaceae. Tender okra fruits are used as vegetable in countries like India, Brazil, West Africa and is also available in dehydrated and canned forms. The sun-dried (Africa, India), frozen and sterilized (USA) fruits are other important market products. Okra fruit contains 90% water, 3% dietary fibre, 7% carbohydrates, 2% protein, good quantities of minerals, vitamin C and A and moderate contents of thiamin, folate and magnesium (Chopra *et al*., 1956). A wide range of variation in quantitative characters provides the basis for selection in plant breeding programmes. The knowledge of association among the characters is useful to the breeder for improving the efficiency of selection. Correlation coefficient analysis measures the mutual relationship between plant characters and determines the component characters on which selection can be made for genetic improvement of yield. Investigation regarding the presence of component and nature of association among themselves is essential and prerequisite for improvement in yield. Correlation coefficient provides a clear picture of the extent of association between a pair of traits and indicates whether simultaneous improvement of the correlated traits may be possible or not.

MATERIAL AND METHODS

The experimental materials consisted of 22 genotypes and were evaluated in randomized block design with three replications with spacing of 60 cm x 30 cm during *Kharif*, 2018. Observations were recorded on five randomly selected plants from each plot for traits *viz.,* plant height (cm), days to first flowering, internodal length (cm), first flowering node, days to 50% flowering, days to first picking, days to last picking (days), number of fruits per plant, fruit length (cm), fruit diameter (cm), fruit weight (g), ridges per fruit, number of seeds per fruit, test weight (g/100), fruit yield per plant (g), fruit yield per hectare (t), fibre content (g/100g), ascorbic acid content (mg/100g) and shelf life (d). the phenotypic and genotypic correlation coefficients were worked out to determine the degree of association of a chracter with yield and also among the yield components by using covarience technique as per the Falconer (1964).

RESULTS AND DISCUSSION

Fruit yield was significantly and positively correlated with 7 out of 15 characters *viz.,* plant height (0.338^{**} and 0.333^{**}), number of fruits per plant (0.770^{**} and 0.786^{**}), fruit length (0.286^{**} and 0.308^{**}), fruit girth (0.264** and 0.279**), fruit weight (0.385** and 0.419**), seeds per fruit (0.444** and 0.464**) and test weight (0.189* and 0.566**) at both phenotypic and genotypic levels indicating all these 7 traits should be considered collectively for improving the yield in okra crop. Fruit yield was significantly and negatively correlated with internodal length (-0.192* and -0.270**), days to first flowering (-0.325** and -0.338**), days to 50%

flowering (-0.346** and -0.355**), first flowering node (-0.114 and 0.116), days to first picking (-0.317** and -0.330**), days to last picking (-0.073 and -0.105) and ridges per fruit (-0.094 and -0.096) at both phenotypic and genotypic levels .

Plant height showed significant positive association with yield per plant and also with all the traits studied except with fruit weight and ridges per fruit (negative association) at both phenotypic and genotypic levels. These results are conformity with the findings of Jain and Nileshsharma (2018), Vrunda *et al*. (2019) and Rambabu *et al*. (2019). Days to first flowering showed significant negative association with all remaining traits studied except with days to 50% flowering, first flowering node and days to first picking (positive association) at both phenotypic and genotypic levels. These results are conformity with the findings of Rambabu *et al*. (2019). Internodal length showed significant negative association with yield per plant, number of fruits per plant, fruit girth and ridges per fruit at both phenotypic and genotypic levels. These results are conformity with the findings of by Thulasiram *et al*. (2016). First flowering node showed significant positive correlation with days to first picking and days to last picking and negative non-significant correlation with yield per plant at both phenotypic and genotypic levels, respectively. These findings are in agreement with those reported by Thulasiram *et al*. (2016). Days to 50% flowering showed significant negative association with all remaining traits studied except with first flowering node and days to first picking (positive association) at both phenotypic and genotypic levels. These findings are in agreement with those reported by Rambabu *et al*. (2019). Days to first picking showed significant negative association with yield per plant, fruits per plant, fruit length, fruit girth, seeds per fruit and test weight at both phenotypic and genotypic levels respectively. These findings are in agreement with those reported by Rambabu *et al*. (2019). Days to last picking recorded significant negative association with fruits per plant and fruit girth and significant positive association with number of seeds per fruit at genotypic level where as at both phenotypic and genotypic levels this trait showed negative and non-significant association with yield per plant. Similar association of these characters with yield was noticed by Simon *et al.* (2013) and Rambabu *et al*. (2019).

Number of fruits per plant recorded significant positive association with yield per plant, fruit length, fruit girth, seeds per fruit and test weight at both phenotypic and genotypic levels. These findings are in agreement with those reported by Rambabu *et al.* (2019). Fruit length recorded significant positive correlation with yield per plant and also with fruit girth and seeds per fruit at both phenotypic and genotypic levels. These results are conformity with the findings of by Tulasiram *et al*. (2016) and Vrunda *et al*. (2019). Fruit girth recorded significant positive correlation with yield per plant and test weight while, it had positive and non significant association with fruit weight, ridges per fruit and number of seeds per fruit at both phenotypic and genotypic levels. These results are conformity with the findings of by Tulasiram *et al*. (2016) and Vrunda *et al*. (2019). Fruit weight showed significant positive association with yield per plant and seeds per fruit. These results are conformity with the findings of Vrunda *et al*. (2019). Ridges per fruit recorded non-significant positive correlation with seeds per fruit at both phenotypic and genotypic levels while it had negative non-significant association with yield per plant at both genotypic and phenotypic levels. Seeds per fruit recorded significant positive correlation with yield per plant at phenotypic and genotypic levels respectively while it had significant positive correlation with test weight of seeds and fruit length at genotypic level. These results are conformity with the findings of Rahulkumar *et al.* (2016) and Vrunda *et al*. (2019). Test weight of seeds recorded significant positive association with yield per plant at both phenotypic and genotypic levels and positive highly significant correlation with plant height, fruit length, fruit girth, number of fruits per plant and number of seeds per fruit at genotypic level. Similar results were obtained by Prakash *et al.* (2017), Rambabu *et al.* (2019) and Vrunda *et al*. (2019).

The genotypic correlations in general were higher in magnitude than their corresponding phenotypic correlations for most of the traits indicating that genotypes are superior but their expression are lessened under the influence of environment. Fruit yield per plant had significant and positive association with traits like plant height, number of fruits per plant, fruit length, fruit girth, fruit weight, seeds per fruit and test weight both at phenotypic and genotypic levels.

Table 1: Phenotypic correlations among fruit yield and yield contributing characters in okra

Character	Internodal length	Days to first flowering	Days to 50% flowering	First flowering node	Days to first picking	Days to last picking	Fruits per plant	Fruit length	Fruit girth	Fruit weight	Ridges per fruit	Seeds per fruit	Test weight of seeds	Yield /plant
Plant height	0.387**	-0.119	-0.138	0.025	-0.147	-0.051	0.583**	0.003	0.108	-0.257**	-0.348**	0.091	0.103	0.338**
Internodal length		0.119	0.123	0.1486	0.107	0.117	-0.270**	0.193*	-0.187*	-0.085	-0.365**	-0.116	-0.059	-0.192*
Days to first flowering			0.990**	0.646**	0.984**	0.058	-0.301**	-0.340**	-0.205*	0.013	0.166*	-0.338**	-0.191	-0.325**
Days to 50% flowering				0.329**	0.983**	0.058	-0.332**	-0.356**	-0.227**	0.015	0.155	-0.339**	-0.217**	-0.346**
First flowering node					0.314**	0.166*	-0.123	-0.148	0.061	0.102	0.08	0.125	-0.112	-0.114
Days to first picking						0.072	-0.308**	-0.359**	-0.209*	0.017	0.198*	-0.335**	-0.195*	-0.317**
Days to last picking							-0.089	-0.05	-0.123	0.044	-0.061	0.143	-0.051	-0.073
No.of fruits per plant								0.183*	0.272**	-0.132	-0.078	0.308**	0.238**	0.770**
Fruit length									0.409**	0.079	0.037	0.329**	0.114	0.286**
Fruit girth										0.039	0.157	0.146	0.165*	0.264**
Fruit weight											0.131	0.241**	-0.087	0.384**
Ridges per fruit												0.049	-0.041	-0.094
Seeds per fruit													0.097	0.444**
Test weight of seeds														0.189*

*significant at 5% level **significant at 1% level

Table 2: Genotypic correlations among fruit yield and yield contributing characters in okra

Character	Internodal length	Days to first flowering	Days to 50% flowering	First flowering node	Days to first picking	Days to last picking	Fruits per plant	Fruit length	Fruit girth	Fruit weight	Ridges per fruit	Seeds per fruit	Test weight of seeds	Yield /plant
Plant height	0.345**	-0.124	-0.136	0.04	-0.153	-0.079	0.588**	0.019	0.129	-0.238**	-0.357**	0.094	0.322**	0.333**
Inter nodal length		0.142	0.158	0.204*	0.129	0.201*	-0.469**	-0.196*	-0.175*	-0.009	-0.416**	-0.142	-0.214**	-0.270**
Days to first flowering			0.996**	0.305**	0.992**	0.073	-0.324**	-0.361**	-0.229**	0.003	0.170*	-0.354**	-0.549**	-0.338**
Days to 50% flowering				0.295**	0.987**	0.072	-0.351**	-0.379**	-0.254**	0.002	0.158	-0.352**	-0.623**	-0.355**
First flowering node					0.271**	0.276**	-0.116	-0.177*	0.038	0.09	0.089	0.147	-0.342**	-0.116
Days to first picking						0.095	-0.334**	-0.388**	-0.240**	0.006	0.204*	-0.349**	-0.487**	-0.330**
Days to last picking							-0.167*	-0.051	-0.188*	0.095	-0.087	0.218**	-0.152	-0.105
Fruits per plant								0.253**	0.345**	-0.06	-0.085	0.352**	0.807**	0.786**
Fruit length									0.409**	0.039	0.038	0.333**	0.379**	0.308**
Fruit girth										-0.003	0.162*	0.149	0.415**	0.279**
Fruit weight											0.137	0.247**	-0.332**	0.419**
Ridges per fruit												0.049	-0.126	-0.096
Seeds Per Fruit													0.359**	0.464**
Test weight of seeds														0.566**

*significant at 5% level **significant at 1% level

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Received on 08.07.2022 and Accepted on 19.12.2022