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Research Article

Study of Genetic Variability and Inter-Relationship among Fruit Yield and Its Attributes in Germplasm of Okra (*Abelmoschus esculentus* L. Moench)

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ABSTRACT

Thirty okra accessions were grown during the kharif seasons, 2016 at Horticulture Research Farm, Department of Horticulture, R.A.K. College of Agriculture Sehore, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, assessed to determine their genetic variability, heritability and genetic advance from different characters. The experiment was laid out in a Randomized Complete Block Design with three replications. There was high phenotypic coefficient of variation, genotypic coefficient of variability, heritability and genetic advance in traits such as LAI at 60 DAS (42.92), LAI at 90 DAS (40.25), 100 seed weight (97.22) and fruit yield per plant (69.51), suggesting the effect of additive genes and reliability of selection based on phenotype of these traits for crop improvement. The highest positive and significant phenotypic correlation observed with number of fruits per plant, number of leaves per plant, days to maturity,number of seeds per fruit and fruit girth, suggests that selection on the basis of the phenotype of these characters will lead to high seed and pod yield in okra.

Keywords: *Genetic Variability, GCV, PCV, Heritability, Genetic advance, Corelation coefficient and Okra.*

INTRODUCTION

Okra (*Abelmoschus esculentus* (L.) Moench) having chromosome number 2n = 130 is one of the important vegetable crops grown for its tender green fruits throughout the India. It is native to Tropical Africa and commonly known as Bhindi or lady's finger in India. Okra is a polyploidy belongs to the family Malvaceae and classified as an often cross pollinated crop due to protogyny plant nature. Occurrence of out crossing to an extent of 5–20 percent with the insect assisted pollination behaviour. Crop improvement depends upon the magnitude of genetic variability and the extent to which desirable characters are heritable. Genetic variability for fruit yield and its components is essential in the base population for successful crop improvement (Allard, 1960).

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Yield and yield components are quantitative characters and are polygenic inherited which are greatly influenced by environment. The phenotype of a character is the resultant of interaction between genotype and environment. Genetic parameters such as Genotypic, Phenotypic coefficient of variation (PCV and GCV) are useful in detecting the amount of variability present in the available genotypes.

Heritability and genetic advance help in determining the influence of environment in expression of the characters and the extent to which improvement is possible after selection (Robinson et al., 1949). Heritable variation can be effectively studied in conjunction with genetic advance. High heritability alone is not enough to make efficient selection in segregating population, unless the information is accompanied for substantial amount of genetic advance (Johnson et al., 1955). The Knowledge of association between fruit yield and its components obtainable through estimation of genotypic and phenotypic correlations helps a great deal to formulate suitable selection criteria as outlined by Miller et al. (1958).

MATERIAL AND METHODS

Collected thirty genotypes were evaluated in Completely Randomized Block Design with three replications at Horticulture Research Farm, Department of Horticulture, R.A.K. College of Agriculture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Sehore during *Kharif* season, 2016 Each genotype was accommodated in a single row of 3 m length. The row to row spacing of 60 cm and plant to plant spacing of 30 cm was adopted. The recommended packages of practices were followed. The observations were recorded on five randomly selected plants of each genotype and yield contributing traits such as plant height (cm), number of branches per plant, days to first flowering, days to 50% flowering, days to first fruit harvest, number of fruits per plant, fruit length (cm), fruit girth (cm), fresh fruit weight (g), dry fruit weight (g), number of seeds per fruit, 100 seed weight and fruit yield per plant (g).Analysis of variance & coefficient of variance have been worked out as per procedure suggested by Panse and Sukhatme (1967). Heritability and genetic advance estimated following (Johanson et al., 1955) and corelation coefficients was calculated as per method given by (Miller et al., 1958) were adopted.

Table 1: List of genotypes of Okra

S. No	Genotypes Code no.	S. No	Genotypes Code no.
1	RVO-1	16	RVO-16
2	RVO-2	17	RVO-17
3	RVO-3	18	RVO-18
4	RVO-4	19	RVO-19
5	RVO-5	20	RVO-20
6	RVO-6	21	RVO-21
7	RVO-7	22	RVO-22
8	RVO-8	23	RVO-23
9	RVO-9	24	RVO-24
10	RVO-10	25	RVO-25
11	RVO-11	26	RVO-26
12	RVO-12	27	Arka Abhay
13	RVO-13	28	Arka Anamika
14	RVO-14	29	Pusa Sawani
15	RVO-15	30	VRO-6

RESULTS AND DISCUSSIONS

The result revealed that phenotypic coefficient of variations were high for LAI at 60 DAS (42.92%), LAI at 90 DAS (42.20%), fruit yield per ha (38.50%), and fruit yield per plot (37.39%). High genotypic coefficient of variation was recorded for LAI at 90 DAS (40.25%), fruit yield per ha (39.76%), LAI at 60 DAS (39.67%), fruit yield per plot (36.71%) and number of fruits per plant (35.62%). These findings are in close harmony with the result of Ahamed et al. (2015) for fruit yield per plant. Bendale et al. (2003) for fruit yield per plant. Somashekhar et al. (2011), Nwangburuka et al. (2012) for fruit yield per plant. Prashant Kumar et al. (2011) and Katagi et al. (2013) for fruit yield per plant. The high heritability estimates were recorded for 100 seed weight (97.22%), fruit yield per ha (97.10%), fruit yield per plot (96.38%), fruit yield per plant (92.89%), days to maturity (92.46%), number of fruits per plant (90.95%), LAI at 90 DAS (90.94). High estimates of heritability coupled with high genetic advance expressed as percent of mean was recorded for fruit yield per plant (75.24%) followed by fruit yield per plot (74.22%). The similar findings were also reported in agreement to the findings by of Dhankar and Dhankar (2002), Nagre et al. (2011), Prakash et al. (2011) and Senapati et al. (2011) for fruit yield per plant.

Significant positive correlation of fruit yield per plant has been observed with number of fruits per plant (0.793), number of leaves per plant (0.721), days to maturity (0.466), number of seeds per fruit (0.315) and fruit girth (0.217), there is big list of scientist who reported similar findings namely Choudhary (2006), Verma et al. (2007) and Saryam et al. (2015) for number of fruits per plant and fruit girth.

Similarly among character association Plant height at 90 DAS was recorded highly significant and positive association with fresh fruit weight, (0.347) and 100 seed weight (0.315). These results are similar with the findings of Jaiprakash Narayan and Mugale (2004) for fruit yield per plant.

LAI at 90 DAS was observed highly significant and positive correlation for days to maturity (0.457) and fruit girth (0.416). Average fruit weight was noticed highly significant and positive association with fruit length (0.400) and 100 seed weight (0.257). Similar result correlated with Sreenivas et al. (2015) for fruit length. Fruit length expressed significant and positive correlation with 100 seed weight (0.457) and fruit girth with days to maturity (0.353) and number of fruits per plant (0.245). Number of seeds per fruit exhibited highly significant and positive correlation coefficient with fruit yield per plant and number of fruits per plant (0.244). These findings corroborated with Dash and Mishra (1998) reported that fruit yield per plant was positively correlated with number of seeds per fruits.

Correlation coefficient of 100 seed weight showed significant and positive with days to maturity (0.391). Days to maturity showed significant and positive correlation with number of fruits per plant (0.550) and fruit yield per plant (0.466). Number of fruits per plant recorded significant and positive correlation with fruit yield per plant (0.793).These findings corroborated the earlier finding of Niranjan and Mishra (2003), Bendale et al. (2003), Subrata et al. (2004), Bhalekar et al. (2005), Pawar (2005) and Choudhary (2006) for fruit yield per plant. Jaiprakash Narayan and Ravindra (2004) reported that total yield per plant was positively and significantly correlated with number of fruits per plant, average fruit weight, fruit length and plant height.

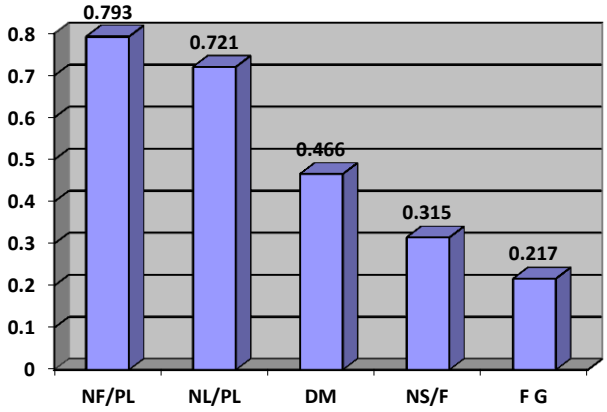

Fig. 1: Showing of phenotypic correlation coefficients among fruit yield and its attributing traits in okra

NF/PL= Number fruits per plant, NL/PL= Number leaves per plant,DM= Daya to maturity, NS/F= Number seeds per fruit,FG= fruit girth

Table 2: Estimates of genetic parameters of variations for various characters in okra

Characters		Mean	Range		Coefficient of variations %		Heritability % (BS)	Genetic Advance	GA as % of mean
			Min.	Max.	Phenotypic	Genotypic			
Plant height (cm) at	30 DAS	26.18	20.90	34.11	13.58	9.73	51.26	3.76	14.35
	60 DAS	107.89	85.90	129.36	11.33	9.87	75.92	19.12	17.73
	90 DAS	124.28	102.19	147.69	9.13	8.41	84.78	19.81	15.94
No. of branches/ plant at	60 DAS	1.45	1.23	1.70	9.86	4.62	21.95	0.06	4.45
	90 DAS	2.28	1.47	3.64	23.04	17.16	55.51	0.60	26.31
No. of leaves/ plant at	60 DAS	23.93	18.08	30.80	13.61	11.45	70.87	4.75	19.87
	90 DAS	32.56	25.18	40.23	11.50	10.91	89.90	6.94	21.30
LAI at	60 DAS	1.7718	1.1687	5.27	42.92	39.67	85.41	1.34	75.52
	90 DAS	2.5181	1.4296	7.37	42.20	40.25	90.94	1.99	79.06
Days to 50% flowering		55.12	50.00	64.33	8.07	6.72	69.36	6.35	11.52
Days to maturity		96.64	87.33	121.33	9.24	8.88	92.46	17.00	17.60
No. of fruits/plant		7.54	4.70	16.30	37.35	35.62	90.94	5.28	69.99
Fruit length (cm)		13.45	10.89	16.58	10.75	10.11	88.48	2.64	19.60
Fruit girth (cm)		1.73	1.43	2.37	14.54	12.21	70.43	0.37	21.12
Fresh fruit weight (g)		16.51	13.41	19.71	10.78	9.48	77.27	2.83	17.16
No. of seeds/fruit		45.18	35.74	56.59	15.92	12.84	65.10	9.64	21.34
100 seed weight (g)		9.13	6.62	12.61	18.57	18.31	97.22	3.40	37.21
Fruit yield/ plant (g)		117.31	63.94	168.14	30.97	29.85	92.89	69.51	59.25
Fruit yield/plot (kg)		1.281	0.629	2.82	37.39	36.71	96.38	0.95	74.22
Fruit yield/ha (q/ha)		71.14	34.93	156.94	38.50	39.76	97.10	52.82	75.24

Table 3: Estimates of genotypic and phenotypic correlation coefficients among fruit yield and its attributing traits in okra

Characters		Days to 50% flowering	No. of branches plant^{-1} at 90 DAS	No. of leaves plant^{-1} at 90 DAS	LAI at 90 DAS	Average fruit weight (g)	Fruit length (cm)	Fruit girth (cm)	No. of seeds fruit^{-1}	100 seed weight (g)	Days to maturity	No. of fruits plant^{-1}	fruit Yield plant^{-1} (g)
Plant height (cm) at 90 DAS	G	-0.097	-0.135	-0.193	0.109	0.394	0.266	0.264	-0.188	0.346	0.297	-0.251	-0.288
	P	-0.057	-0.070	-0.193	0.107	0.347**	0.250*	0.238*	-0.171	0.315**	0.278**	-0.242*	-0.272**
Days to 50% flowering	G		-0.118	-0.195	-0.075	-0.377	-0.235	0.058	-0.034	-0.199	-0.171	-0.043	-0.176
	P		-0.070	-0.132	-0.072	-0.301**	-0.175	0.057	-0.040	-0.160	-0.126	-0.056	-0.143
No. of branches plant^{-1} at 90 DAS	G			-0.308	0.009	0.101	0.186	0.290	0.234	-0.018	0.013	-0.116	-0.268
	P			-0.217*	0.001	-0.031	0.153	0.074	0.138	-0.027	0.020	-0.130	-0.169
No. of leaves plant^{-1} at 90 DAS	G				0.307	0.021	-0.037	0.255	0.415	0.039	0.447	0.782	0.792
	P				0.265*	-0.003	-0.043	0.231*	0.308**	0.043	0.407**	0.702**	0.721**
LAI at90 DAS	G					-0.225	0.095	0.463	-0.164	0.263	0.502	0.206	0.211
	P					-0.146	0.080	0.416**	-0.131	0.256*	0.457**	0.172	0.184
Average fruit weight (g)	G						0.488	-0.043	0.218	0.291	0.137	-0.294	-0.124
	P						0.400**	-0.013	0.138	0.257*	0.139	-0.263*	-0.157
Fruit length (cm)	G							0.201	0.044	0.485	0.160	-0.084	-0.110
	P							0.132	0.010	0.457**	0.175	-0.068	-0.089
Fruit girth (cm)	G								0.225	0.153	0.414	0.324	0.300
	P								0.118	0.132	0.353**	0.245*	0.217*
No. of seeds fruit^{-1}	G									-0.181	0.064	0.345	0.402
	P									-0.158	0.054	0.244*	0.315**
100 seed weight (g)	G										0.414	0.044	0.006
	P										0.391**	0.038	0.002
Days tomaturity	G											0.610	0.505
	P											0.550**	0.466**
No. of fruits plant^{-1}	G												0.845
	P												0.793**

Significant at 5% level = * Significant at 1% level = **

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