THE ASIAN JOURNAL OF HORTICULTURE
Volume **9** | Issue 1 | June, 2014 | 248-250
e ISSN- 0976-724X | Open Access-*www.researchjournal.co.in* |

Research Paper

Article history **:**
Received : 08.07.2013
Revised : 18.05.2014
Accepted : 28.05.2014

Genetics of quantitative characters associated with pod in okra [*Abelmoschus esculentus* (L) Moench]

■ **P.K. PANDA** AND **K.P. SINGH**[1]

Members of the Research Forum

Associated Authors:
[1]Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, VARANASI (U.P.) INDIA

Author for correspondence :
P.K. PANDA
College of Horticulture (O.U.A.T.), Chiplima, SAMBALPUR (ODISHA) INDIA
Email : pkpandaouat@gmail.com

ABSTRACT : The gene effects for five quantitative characters *i.e.* number of pod/s plant, length of pod, girth of pod, number of seeds/pod and pod yield/ plant were studied in six crosses of okra. The additive component was significant and present in sizeable proportion of the characters studied. Dominance was higher in magnitude than additivity. Additive x additive and dominance x dominance observed in most of the crosses for all the characters. To exploit all these genetic effects, characters associated with pod can be improved through the use of recurrent selection to ultimately improve pod yield in okra.

KEY WORDS : Generation means, Gene effects, Okra

HOW TO CITE THIS ARTICLE : Panda, P.K. and Singh, K.P. (2014). Genetics of quantitative characters associated with pod in okra [*Abelmoschus esculentus* (L) Moench]. *Asian J. Hort.*, **9**(1) : 248-250

Yield is a complex character, but its component traits are relatively less complex, therefore, an estimation of the components of genetic variance is essential to formulate effective breeding procedure for the improvement of desired attributes. It depends mostly upon the nature and relative magnitude of the components of genetic variances and gene action involved. So the present investigation was undertaken to study the genetics of attributes relating to pod in okra.

RESEARCH METHODS

The material consisted of six crosses generated by crossing five morphologically and genetically diverse varieties of okra *i.e.* Satdhari local, EC- 117010, EC-117126, Arka Anamika and Pusa Sawani. In each cross, six generations *viz.*, P_1, P_2, F_1, F_2, B_1 and B_2 were developed. The materials were raised in a Randomized Block Design with three replications adopting a spacing of 45 x 30 cm^2 during summer and rainy seasons at Vegetable Research Farm, Department of Horticulture, Institute of Agricultural Sciences, B.H.U., Varanasi (U.P.). The data were recorded on ten random plants in F_{1s} as well as parents and forty plants in F_2s and back crosses for five quantitative characters *i.e.* number of pod/s plant, length of pod, girth of pod, number of seeds/pod and pod yield/ plant. Scaling tests were performed to detect deviation due to non-allelic interactions. The gene effects m, (d) and (h) were estimated according to the weighted least squares of Cavalli (1952). The genetic parameters on digenic model m, (d), (h), (i), (j) and (l) were obtained by the perfect fit method from the equations formulated by Mather and Jinks (1971).

RESEARCH FINDINGS AND DISCUSSION

The scaling tests and components of generation means for five characters of six crosses are presented in Table No. 01. Simple additive-dominance model was adequate in one cross in summer and three crosses in rainy season for length of pod, pods / plant, three crosses in summer and one cross in rainy season for length of pod, four crosses in summer and two crosses in rainy season for girth of pod, four crosses in rainy season for number of seeds/pod, two crosses in summer and three crosses in rainy season for pod yield/plant.

For number of pod/s plant, the mid parental effect was significant in all the crosses during both the summer and rainy seasons. Additivity was negatively significant in three crosses during summer and one cross during rainy season. Dominance effect was significant in three crosses during summer and rainy seasons. Dominance was positively significant during rainy season in all the crosses whereas two crosses were found to

Table 1 : Scaling tests and components of generation means

Cross	Season	Scaling tests			Genetic effects					
		A	B	C	m	(d)	(h)	(i)	(j)	(l)
Number of post per plant										
Satdhari Local x Arka Anamika	S	x	x	x	7.15**	-1.19**	4.46	1.82	3.70**	-1.43
	R	-	-	-	8.65**	-0.30	1.40*	--	--	--
Satdhari Local x Pusa Sawani	S	-	-	-	7.53**	0.34	2.24**	--	--	--
	R	x	-	-	8.89**	0.16	0.51	-1.39	3.02*	-0.75
EC-117010 x Arka Anamika	S	-	x	-	7.02**	-1.47**	1.86**	1.77**	3.24	4.25*
	R	-	-	-	8.70**	-0.27	0.66	--	--	--
EC-117010 x Pusa Sawani	S	-	x	-	8.37**	-0.09	-5.44*	-1.53*	1.68	6.14**
	R	-	-	-	7.82**	0.33	1.86**	--	--	--
EC-117126 x Arka Anamika	S	-	x	-	6.98**	-1.30**	1.46	1.65	4.14	0.35
	R	-	x	-	6.76**	-0.67**	2.49	1.56	2.98	0.54
EC-117126 x Pusa Sawani	S	-	x	-	6.92**	0.02	-1.44	0.29	0.76	1.93
	R	-	-	-	7.83**	0.09	1.69**	--	--	--
Length of POD										
Satdhari Local x Arka Anamika	S	-	x	-	11.98**	-1.19**	-0.79	0.65	1.96	1.68
	R	-	-	-	14.17**	-0.72**	2.03**	--	--	--
Satdhari Local x Pusa Sawani	S	x	-	-	12.57**	-0.55	-3.34	-1.63*	1.45	3.50*
	R	x	-	-	12.87**	0.01	-0.34**	0.28	-0.23	1.65
EC-117010 x Arka Anamika	S	-	x	x	14.99**	-1.01	-5.54*	-1.50	4.14**	4.29**
	R	-	x	-	14.14	-0.21	-5.21*	-0.70	2.42**	4.47**
EC-117010 x Pusa Sawani	S	-	-	-	13.15**	-0.71**	1.08	-0.06	3.42**	0.81
	R	x	-	x	11.74**	1.27**	1.02**	--	--	--
EC-117126 x Arka Anamika	S	-	-	-	12.49**	-0.89**	-0.05	--	--	--
	R	-	x	-	13.05	-0.77**	-0.67	0.72	2.98**	0.64*
EC-117126 x Pusa Sawani	S	-	-	-	11.79**	0.74**	1.41**	--	--	--
	R	-	x	-	12.99**	-0.41	-1.25*	-0.19	2.61**	2.13
Girth of POD										
Satdhari Local x Arka Anamika	S	-	-	-	1.77**	-0.05**	0.06**	--	--	--
	R	-	-	-	1.79**	0.03**	0.02	--	--	--
Satdhari Local x Pusa Sawani	S	-	x	x	1.73**	0.08**	0.17**	-0.03	-0.16**	-0.09*
	R	x	-	-	1.68**	0.07**	0.24	0.04	-0.1	-0.14*
EC-117010 x Arka Anamika	S	-	x	-	1.7**	-0.06**	-0.24**	-0.05	0.18	0.15
	R	x	x	-	1.67**	0.01	0.06	0.08*	0.09	0.05
EC-117010 x Pusa Sawani	S	-	-	-	1.59**	-0.01	0.04**	--	--	--
	R	x	x	-	1.89**	0.04**	-0.50**	-0.19**	0.01	0.42**
EC-117126 x Arka Anamika	S	-	-	-	1.69**	-0.04	-0.01	--	--	--
	R	-	-	-	1.7**	-0.04**	-0.05*	--	--	--
EC-117126 x Pusa Sawani	S	-	-	-	1.64**	0.02	0.08**	--	--	--
	R	x	-	-	1.75**	0.02	-0.28**	-0.07*	-0.03	0.28**
Number of seeds per POD										
Satdhari Local x Arka Anamika	S	x	-	-	40.97**	-2.21**	20.13*	5.39	5.42	-13.85**
	R	-	-	-	45.8**	0.69	2.69*	--	--	--
Satdhari Local x Pusa Sawani	S	x	-	-	40.61**	0.51	-3.67	2.47	-0.49	9.48**
	R	-	-	-	44.52**	-0.41	5.21**	--	--	--
EC-117010 x Arka Anamika	S	-	-	x	40.05**	-0.25	9.59	7.33**	3.91	-3.45
	R	-	-	-	49.2	0.27	-0.94	--	--	--
EC-117010 x Pusa Sawani	S	x	x	x	44.94**	2.35**	15.62**	0.68	-1.92	17.93**
	R	-	-	-	45.6**	1.07	-0.77	--	--	--
EC-117126 x Arka Anamika	S	-	x	x	36.87**	-0.72	9.16	10.34**	7.95*	-3.71
	R	-	-	-	47.5**	0.5	-0.48	--	--	--
EC-117126 x Pusa Sawani	S	x	x	x	45.18**	1.07	-15.29	-1.36	-1.35	13.34**
	R	-	x	-	44.35	1.04	-5.41	1.83	2.56	6.27
POD yield per plant										
Satdhari Local x Arka Anamika	S	-	x	x	109.16**	-15.95**	44.21**	27.02*	54.32**	1.39
	R	-	-	x	100.74**	15.07**	11.96	21.22*	35.52	19.22
Satdhari Local x Pusa Sawani	S	X	-	x	119.17**	11.51**	18.67	-0.198	22.14	-10.15
	R	-	-	-	105.94**	7.39**	28.63**	--	--	--
EC-117010 x Arka Anamika	S	-	x	x	111.65**	-28.56**	-17.21	21.42**	64.07**	45.72
	R	-	-	-	126.64**	-7.96*	9.11	--	--	--
EC-117010 x Pusa Sawani	S	-	-	-	96.93**	8.15**	31.83**	--	--	--
	R	-	-	-	105.04**	5.91**	26.95**	--	--	--
EC-117126 x Arka Anamika	S	x	x	-	103.14**	-24.67**	31.57	27.52*	72.71**	-14.37
	R	-	x	x	116.03**	-13.64**	-35.6	8.38	46.50**	63.46**
EC-117126 x Pusa Sawani	S	-	-	-	100.93**	10.88**	14.59**	--	--	--
	R	x	-	-	98.12**	3.68	69.2	4.92	18.12	-29.77

X - Indicates significance of Scale * and ** indicate significance of values at P=0.05 and 0.01, respectively S – Summer R- Rainy

be positively significant. In all the crosses, dominance was greater than additivity. Additive x additive was significant in the crosses EC-117010 x Arka Anamika and EC-117010 x Pusa Sawani and additive x dominance was significant in the cross Satdhari Local x Arka Anamika during summer. Dominance x dominance effect was positively significant only in the cross EC-117010 x Pusa Sawani during summer season. In the cross EC-117126 x Pusa Sawani during summer, none of the genetic parameters except 'm' were significant perhaps due to complex interactions or linkage effect. Duplicate epistasis plays a role for inheritance of this trait. The results are in conformity with the findings of Aher *et al*. (2003) and Arora and Ghai (2007).

For length of pod, the mean (m) was significant in all the crosses during both the seasons. Addivity was significant in four and three crosses during summer and rainy seasons, respectively. Three and two crosses registered significant (h) effects during summer and rainy seasons, respectively. Considering epistasis, additive x additive effect was negatively significant in Satdhari Local x Pusa Sawani and EC-117010 x Arka Anamika during summer and rainy season, respectively. Effect (j) was significant for one combination in summer and three combinations in rainy season. The dominance x dominance (l) effect was significant for two crosses (Satdhari Local x Pusa Sawani and EC-117010 x Arka Anamika) in summer and one cross (EC-117010 x Arka Anamika) in rainy season. Duplicate epistasis was observed for inheritance of this character also. Higher magnitude of dominance with epistatic interaction was reported by Singh and Singh (1978), Elangovan *et al*. (1981) and Korla and Sharma (1987).

Considering girth of pod, 'm' effect was significant for all the cross combinations during both the seasons. Additive effect was positively significant for one cross in summer and two crosses in rainy season. Dominance was significant for four and three crosses during summer and rainy season, respectively. Additive x additive effect was significant in three crosses during rainy season and of them, it was positively significant in one cross (EC-117010 x Arka Anamika). In one cross (Satdhari Local x Pusa Sawani), additive x dominance was negatively significant. Dominance x dominance effect was significant in two cross combinations during rainy season. The cross EC-117010 x Arka Anamika during rainy season recorded complementary epistasis, while others registered duplicate epistasis.

For number of seeds/pod, the mid parental effect 'm' was significant for almost all the crosses during both the seasons. Additivity was found to be significant in two crosses during summer, while dominance effect was significant in three and two crosses during summer and rainy seasons, respectively. During summer season, the additive x additive effect was found to be positively significant in two crosses (EC-117010 x Arka Anamika and EC-117126 x Arka Anamika). Additive x dominance was significant only for one cross combination *viz*., EC-117126 x Arka Anamika in summer season. Dominance x dominance effect was significant in four and one cross during summer and rainy season, respectively. Duplicate epistasis plays a role for inheritance of this trait.

For pod yield/ plant, 'm' effect and additive (d) were significant in all the cross combinations during both the summer and rainy seasons. In three crosses during summer and in three crosses during rainy season, significant dominance effects were observed. The additive x additive and additive x dominance effects were positively significant in three crosses during summer season. Only one cross (EC-117126 x Arka Anamika) was found to be significant for dominance x dominance effect in rainy season. Complementary epistasis was observed in Satdhari Local x Arka Anamika during rainy season, while in all other crosses, duplicate epistasis was observed. The results revealed that major portion of dominance, a sizeable amount of additivity along with epistasis were important for the inheritance of these pod characters.

REFERENCES

Aher, R.P. Mehale, V.D. and Aher, A.R. (2003). Genetic studies on some quantitative characters in okra [*Abelmoschus esculentus* (L.) Moench]. *J. Maharastra Agric. Univ.,* **28** (2): 151- 153.

Arora, D. and Ghai, T.P. (2007). Quantitative inheritance in intervarietal crosses of okra [*Abelmoschus esculentus* (L.) Moench]. *Crop Improve.*, **34**(1): 100-105.

Cavalli, L.L. (1952). An analysis of linkage in quantitative inheritance: *Quantitative Inheritance* (eds E.C.R. River and C.H. Waddington, HMSO, London, pp. 135-144.

Elangovan, M., Muthukrishnan, C.R. and Irulappan, I. (1981). Combining ability in Bhindi [*Abelmoschus esculentus* (L) Moench]. *South Indian J. Hort.*, **29** (1) : 15-22.

Korla, B.N. and Sharma, P.P. (1987). A note on genetics of yield in orka [*Abelmoschus esculentus* (L) Moench]. *Haryana J. Hort. Sci.*, **16** (3-4): 304-307.

Mather, K. and Jinks. J.L. (1971). Biometrical Genetics. IInd Ed. Champon and Hall Ltd., London, UNITED KINGDOM.

Singh, S.P. and Singh, H.N. (1978). Study of genetic variability and inheritance of certain characters in orka [*Abelmoschus esculentus* (L) Moench]. *Haryana J. Hort. Sci.,* **7** (1) : 68-73.