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Studies on genetic variability, heritability and genetic advance in okra (Abelmoschus esculentus (L.) Monech)

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Abstract: *Highly significant differences were found among the genotypes for all the characters studied except plant height, days to maturity, length of the fruit, diameter of the fruit, node at which mosaic disease appears and days at first mosaic symptoms appears. Highest phenotypic and genotypic coefficient of variation observed for node at which mosaic disease appears, days at first mosaic symptom appears and number of branches per plant. The GCV and PCV values for most of the characters were found to be very distant to each other, indicated that characters much influenced by environmental factors. The heritability estimates in broad sense were high for number of branches per plant, days to maturity, length of the fruit, days to 50% flowering and node at which mosaic disease appears, while low heritability estimates were observed for number of fruits per plant and node at which first flower appears. The genetic advance as percentage of mean was high for node at which mosaic disease appear, days at first mosaic symptom appear and number of branches per plant. High heritability coupled with high genetic advance was observed for number of branches per plant and days to maturity indicating that they are governed by additive genes and could be effectively improved through selection.*

Key words*: Genetic variability, heritability, genetic advance, okra*

Okra (Abelmoschus esculentus (L.) Monech) syn. Bhindi is an important vegetable crop grown for its tender green pods, throughout the India, Turkey, Sri Lanka and other neighboring countries. Fruit yield in okra is depends upon many yield components, since it is polygenic character. Exploitation of variability is of a great importance and prerequisite for the effective screening of superior genotypes. Magnitude and nature of genetic variability determined the progress of breeding for the economic characters and plays an important role in a crop in selecting the best genotypes for making rapid improvement in yield and other desirable characters, reported by Vavilov, N.I. 1951. Heritability is an index for calculating the relative influence of environment on expression of genotypes. It becomes very difficult to judge how much of the variability is heritable and how much is non heritable. Hence, it is essential to partition the overall variability into its heritable and non-heritable components with the help of genetic parameters like genotypic coefficient of variation, phenotypic coefficient of variation, heritability and genetic advance. Therefore, the present investigation was carried out to study the variability, heritability and genetic advance for thirteen quantitative traits in okra.

I. Materials And Methods:

The experimental material comprised of nineteen genotypes, containing four lines and fifteen testers along with sixty combinations. All genotypes were sown at spacing of 45 cm x 15cm in randomized block design (RBD) with three replications at Student form, College of Horticulture, Acharya N.G.Ranga Agricultural University, Rajendranagar, Andhra Pradesh, India, during kharif-2009 and spring summer 2010. The observations were recorded on five randomly selected plants of each genotypes in all the replications on thirteen important characters like plant height, days to 50% flowering, days to maturity, node at which first flower appears, number of branches per plant, number of fruits per plant, length of the fruit, diameter of the fruit, ten pods weight, fruit yield per plant, fruit yield per hectare, node at which mosaic disease appears and days at first mosaic symptom appear. The analysis of variance of was carried out as suggested by Fisher, R.A. et.al (1950) and Panse et.al (1957). Phenotypic and genotypic coefficient of variation, heritability and genetic advance were computed by the formula suggested by Burton, G.W.(1953) and Johnson, H.W. et.al (1955).

II. Results And Discussion:

Analysis of variance revealed the significant differences among the genotypes used in the present investigation for all the characters studied except plant height, days to maturity, length of the fruit, diameter of

the fruit, number of fruits per the plant, node at which mosaic disease appear and days at first mosaic symptoms appears rest traits viz., days to 50% flowering, node at which first flower appears, number of branches per plant, number of fruit per plant, fruit yield per plant and fruit yield per hectare, indicated wide spectrum of variation among the genotypes (Table-1).

High magnitude of genetic variability for many of these traits has been reported earlier by Kumar et.al (2006) and Mulge, et.al (2006). A wide range of variation was recorded for all the characters suggesting presence of high genetic variability. The extent of variability present in the okra genotypes was measured for various traits in terms of mean, range, phenotypic coefficient of variation (PCV), genetic coefficient of variation (GCV), heritability (broad sense), genetic advance and genetic advance as percent of mean are given in (Table-2). Among the thirteen traits showed a range of GCV for various characters varied from 3.27 fruit yield per plant to 45.09 (days at first mosaic symptom appears) in parents and 5.27(days to 50% flowering) to 55.91(node at which mosaic disease appears) in crosses. The GCV and PCV values were found to be very distant to each other for most of the characters suggesting the presence of large amount of variability. High amount of phenotypic variation observed for days at first mosaic disease appears in parents and node at which mosaic disease appears in crosses while high amount of Genotypic variation observed in crosses for the trait node at which mosaic disease appears. Characters like plant height, node at which first flower appears, length of the fruit, diameter of the fruit have moderate PCV and GCV values. For all the traits studied GCV values were recorded less than the PCV values, similar findings were also reported by Bendale, V.W. et.al (2004) and Mehta, et.al (2006) in okra.
To determinate the amount of heritable variation estimates of GCV alone is not sufficient. Therefore heritable variation can be found out with the greater degree of accuracy when heritability is studied in conjuction with genetic advance. The value of heritability in broadsence for all characters ranged from 57.4 for number of fruits per plant to 89.0 for number of branches per plant. The characters like days to 50% flowering, node at which mosaic disease appears, days at first mosaic symptom appears, length of the fruit and days to maturity had high heritability. The high heritability indicated that the characters were less influenced by the environment. Moderate heritability were recorded for node at which first flower appears and diameter of the fruit. These results are in close conformity with the findings of Bendale, V.W. et. al (2004), Mulge, et.al (2006) and Mehta, et. al (2006).

Table-2 also reveals that number of branches per plant, days to maturity showed high heritability and also showed equally high genetic advance (as percent of mean). High heritability coupled with high genetic advance wound respond to selection better than those with high heritability and low genetic advance is conformed with Johnson, H.W. et.al (1955). If heritability was mainly due to additive gene action, it would be associated with high genetic gain and if it is due to non-additive gene action, genetic gain would be low. Moderate heritability and genetic advance was observed for number of fruits per plant, node at which flower appears and diameter if the fruit indicating that these parameter were governed by additive gene action and could be equally improved through selection. Number of branches per plant, length of the fruit, node at which mosaic disease appears days at first mosaic symptom appear had high GCV, heritability and genetic advance as percentage of mean. This indicated that these characters were governed by additive gene effect and can be improved through selection effectively. Moreover ten pods weight, diameter of the fruit exhibited low GCV, genetic advance and heritability indicating non-additive gene effect and for improving this character, heterosis breeding or recurrent selection should be followed. Genotypes which exhibited both high variability and high genetic advance for certain characters may be evaluated in multi-location trials and isolated as donors for these characters or used as parents in hybrid development programme.

References:

[1]. Bendale, V.W; Kadam, S.R; Bhare, S.G; Mehta, J.L and Pethe, U.B. 2004. Genetic variability and correlation studies in okra. Orissa Journal of Horticulture. 31 (2) :1-4 pp

[2]. Burton, G.W. and De Vane, E.H. 1953. Estimating heritability in tall feschue from replicated clonal material. Agron. Journal., 45; 478-481 pp.

[3]. Fisher, R.A. 1950. *Statistical methods for Research Workers.11th ed.* Oliver & Boyd, London

[4]. Johnson, H.W., Robinson, H.F. and Comstock, R.E. 1955. Estimates of genetic and environmental variability in soyabean. *Agron. Journal.,* 47: 314-318 pp.

[5]. Kumar, P.S., Rodney, S.M. and Karuppaiah.P. 2006. Studies on certain genetic parameters in bhindi (*Abelmoschus esculentus (L.) Monech*). *Crop Research Hisar*, 32(1): 66-68 pp.

[6]. Mehta, D.R., Dhaduk, L.K and Patel, K.D. 2006. Genetic variability, correlation and path analysis studies in okra. (*Abelmoschus esculentus (L.) Monech*). *Agricultural Science, Digest*, 26(1) 15-18 pp.

[7]. Mulge, Ravindra.; Jaiprakashnarayan, R.P and Madalageri. M.B.2006. Studies on genetic variability for fruit and yield parameters in okra (*Abelmoschus esculentus (L.) Monech*). Karnataka Journal of Horticulture. 1(1): 1-5 pp.

[8]. Panse, V.G. and Su Khatme, P.V. 1957. *Statistical Methods for Agricultural Workers*. ICAR, New delhi.

[9]. Singh, B., Pal, A.K and Singth, sanjay 2006. Genetic variability and correlation analysis in okra. (*Abelmoschus esculentus (L.) Monech*). Indian Journal of Horticulture. 63 (3): 281-285 pp

[10]. Vavilov, N.I 1951. Phytogeographic basis of plant breeding. The origin, variation, immunity and breeding of cultivated plants. Chronica Botanica, 13: 1-366 pp

Table 1: Analysis of variance for yield and yield contributing characters of Hybrids in Okra

S.No.	Character	Mean sum of squares		
		Replications df=2	Treatments df=59	Error df=118
1	Plant height (cm)	4.554	611.125	66.226
2	Days to 50% flowering	30.955	13.481**	0.932
3	Days to maturity	0.504	0.425	0.024
4	Node at which 1st flower appears	0.342	0.365**	0.068
5	No. of branches/ plant	0.231	2.196**	0.105
6	No.of fruits/plant	1.825	13.294**	2.640
7	Length of the fruit	0.042	6.999	0.452
8	Diameter of the fruit	0.002	0.032	0.004
9	Ten pods weight (g)	3.320	274.921	29.760
10	Fruit yield/plant	252.671	1913.654**	302.226
11	Fruit yield/ha	4.805	41.609**	6.832
12	Node at which mosaic disease appears	2.944	64.980	4.459
13	Days at first mosaic symptom appears	45.000	1989.406	146.406

Table 2: Mean, range, coefficient of variation, heritability, genetic advance and genetic advance as per cent mean for 13 characters in 19 parents and 60 crosses in Okra.

Sl. No.	Character	General Mean		Range		Co-efficient 0f variation				Heritability (%)		Genetic Advance		Genetic Advance as per cent of mean	
						Genotypic		Phenotypic							
		Parents	F1's	Parents	F1's	Parents	F1's	Parents	F1's	Parents	F1's	Parents	F1's	Parents	F1's
1	Plant height (cm)	98.81	97.11	69.27-121.06	71.42-141.26	12.17	13.87	13.41	16.212	82.3	73.3	22.477	30.458	22.748	24.473
2	Days to 50% flowering	39.85	38.79	37.0-44.0	35.66-43.00	4.01	5.27	5.20	5.830	59.5	81.8	2.543	4.882	6.379	9.820
3	Days to maturity	4.99	4.64	4.53-5.48	4.05-5.54	5.31	7.87	6.31	8.557	71.0	84.5	0.461	0.888	9.232	14.904
4	Node at which 1st flower appears	4.59	4.42	3.85-5.04	3.69-5.23	5.29	7.11	7.95	9.246	44.4	59.1	0.334	0.639	7.275	11.264
5	No. of branches/ plant	1.96	2.33	1.01-2.86	0.43-4.37	26.12	39.65	31.91	42.024	67.0	89.0	0.866	2.304	44.060	77.062
6	No.of fruits/plant	10.39	12.40	8.93-11.59	8.13-17.90	5.44	15.19	11.65	20.058	21.9	57.4	0.545	3.768	5.246	23.701
7	Length of the fruit	12.84	12.60	9.54-15.53	9.18-15.88	10.07	11.72	12.87	12.876	61.3	82.8	2.087	3.549	16.243	21.968
8	Diameter of the fruit	1.77	1.72	1.54-2.08	1.43-1.90	8.56	5.64	10.25	6.814	69.6	68.6	0.261	0.213	14.717	9.627
9	Ten pods weight (g)	98.23	104.13	90.06-112.70	87.25-130.71	3.43	8.68	7.30	10.139	22.2	73.3	3.277	20.433	3.336	15.311
10	Fruit yield/plant	101.53	129.04	89.10-111.40	72.24-189.68	3.27	17.96	11.65	22.451	79.00	64.0	1.919	48.946	1.890	29.597
11	Fruit yield/ha	15.04	19.13	13.19-16.50	10.69-28.09	3.31	17.79	11.65	22.429	81.04	62.9	0.293	5.563	1.945	29.071
12	Node at which mosaic disease appears	8.34	8.03	0.0-12.72	0.00-17.05	42.42	55.91	56.76	61.79	55.9	81.9	5.450	8.373	65.330	104.243
13	Days at first mosaic symptom appears	45.75	47.50	0.0-70.00	0.00-90.00	45.09	52.17	61.43	58.074	53.9	80.7	31.221	45.870	68.184	96.569