Plant Archives Vol. 15 No. 1, 2015 pp. 489-491 *ISSN 0972-5210*

ESTIMATION OF HERITABILITY AND GENETIC ADVANCE IN OKRA [*ABELMOSCHUS ESCULENTUS* (L.) MOENCH.]

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Abstract

The present investigation in okra [*Abelmoschus esculentus* (L.) Moench.] was carried out in R.B.D with three replications during summer 2010 at vegetable research station, Rajendranagar, Hyderabad. 30 genotypes were used with study based on eighteen quantitative characters namely plant height (cm), number of branches per plant, internodal length (cm), number of nodes on main stem, days to first flowering, days to 50% flowering, first flowering node, first fruiting node, fruit length (cm), fruit width (cm), number of ridges, number of fruits per plant, average fruit weight (g), fruit yield per plant (g), fruiting period, number of pickings, fruit and shoot borer infestation on plants (%), yellow vein mosaic virus infestation on plants (%). High heritability coupled with high genetic advance as per cent mean were observed for plant height, internodal length, number of nodes on main stem, first fruiting node, number of ridges, number of pickings, fruit and shoot borer infestation on plants, yellow vein mosaic virus infestation on plants and fruit yield per plant. High heritability coupled with moderate genetic advance per cent mean values were observed for days to first flowering, days to 50% flowering, fruit width and average fruit weight.

Key words : Okra [*Abelmoschus esculentus* (L.) Moench], genetic advance, randomized block design (RBD).

Introduction

Okra [*Abelmoschus esculentus* (L.) Moench.] is one of the most important vegetable crops grown throughout the world because of its wider adaptability, year round cultivation, high nutritive and medicinal value, export potential, good portability and bountiful returns (Thompson and Kelly, 1957). It is an often cross pollinated crop and a warm season fruit vegetable grown in the tropical and subtropical countries of the world. Heritability denotes the proportion of phenotypic variation due to genotypes thus helps the breeders to select the elite variety for a character. The genetic advance predicts the amount of gain expected by imposing a particular intensity of selection. However, high heritability alone is not enough to make efficient selection, unless the information is accompanied for substantial amount of genetic advance. The present investigations were, therefore, undertaken to ascertain magnitude and extent of heritability and genetic advance of yield and yield components.

Materials and Methods

The present investigation was carried out at Vegetable Research Station, Agricultural Research Institute, Andhra Pradesh Horticultural University, Rajendranagar, Hyderabad during summer 2010 using 30 genotypes obtained from NBPGR Regional Station, Rejendranagar, Hyderabad. The experiment was laid out in randomized block design replicated thrice at a spacing of 60 cm between rows and 45 cm between plants accommodating 10 plants per row. Observations were recorded for plant height (cm), number of branches per plant, internodal length (cm), number of nodes on main stem, days to first flowering, days to 50% flowering, first flowering node, first fruiting node, fruit length (cm), fruit width (cm), number of ridges, number of fruits per plant, average fruit weight (g), fruit yield per plant (g), fruiting period, number of pickings, fruit and shoot borer infestation on plants (%), yellow vein mosaic virus infestation on plants (%). Data was recorded on five competitive and randomly selected plants in each genotype and in each replication. The data obtained were subjected to statistical and

Table 1 : Heritability and genetic advance estimates for 18 characters in 30 genotypes of okra.

Characters	Heritability h^2 (%)	Genetic advance	Grand mean	Genetic advance as per cent of mean
Plant height (cm)	81.39	19.90	54.04	36.82
Number of branches per plant	56.21	0.61	2.31	26.45
Internodal length (cm)	84.23	0.72	2.81	25.52
Number of nodes on main stem	96.76	3.19	14.21	22.47
Days to first flowering	97.66	5.21	36.85	14.14
Days to 50% flowering	81.99	4.24	38.15	11.12
First flowering node	56.40	0.46	2.91	15.92
First fruiting node	96.81	0.82	3.34	24.49
Fruit length (cm)	65.11	0.74	11.08	6.71
Fruit width (cm)	95.77	0.23	1.57	14.55
Number of ridges	91.01	1.48	5.54	26.70
Number of fruits per plant	54.03	1.60	10.03	15.95
Average fruit weight (g)	75.25	2.32	12.16	19.07
Fruiting period	57.16	4.45	55.18	8.06
Number of pickings	71.53	2.53	9.67	26.13
Fruit and shoot borer infestation on plants(%)	87.88	13.31	44.67	29.79
Yellow vein mosaic virus infestation on plants (%)	76.58	11.59	45.93	25.23
Fruit yield per plant (g)	74.36	36.99	121.73	30.39

biometrical analysis were worked out according to heritability and genetic advance in per cent of mean.

Results and Discussion

Result of different parameters indicated in table 1. The data were subjected to statistical and biometrical analysis. In crop improvement programme, genetic variation is important. Heritability is the only component which is transmitted to the next generation. The ratio of genetic variance to the total variance *i.e.*, phenotypic variance is known as heritability. It is generally expressed in the per cent. Thus, the heritability is a good index of degree of transmission of the characters from parents to their off spring.

Heritability estimates gives a measure of transmission of characters from one generation to the next and the consistency in the performance of progeny in succeeding generations depends mainly on the magnitude of heritable portion of variation. Genetic advance denotes the improvement in the mean genotypic values of selected families over base population and thus helps the breeder to select the progenies in the earlier generation itself (Singh and Narayanan, 1993).

The estimates of heritability varied from 54.03 for number of fruits per plant to 97.66 for days to first flowering. Plant height, internodal length, number of nodes on main stem, days to first flowering, days to 50% flowering, first fruiting node, fruit length, fruit width, number of ridges, average fruit weight, number of pickings, fruit and shoot borer infestation on plants, yellow vein mosaic virus infestation on plants and fruit yield per plant recorded high estimates of heritability. High estimates of heritability for the traits suggested that the selection based on phenotypic performance would be more effective. Similar results were also observed by Yassin and Anbu (1997), Dhall *et al*. (2000) Gandhi *et al.* (2001), Dhall *et al*. (2003), Patro and Sankar (2004), Khan *et al.* (2005), Dakahe *et al.* (2007), Manivannan *et al.* (2007), Kumar *et al.* (2007), Singh and Singh (2006) and Pal *et al*. (2010).

Heritability estimates reported were only based on broad sense and hence the total genetic variance may include dominance and epistatic components which are not available for selection. Heritability being a single numerical expression on the ratio of the two variances, it may not lead to success if selection is based on heritability estimates alone. Therefore high heritability coupled with high genetic advance as per cent of mean was more valuable in predicting the effect of selection Johnson *et al*. (1955).

The characters like plant height, internodal length, number of nodes on main stem, first fruiting node, number of ridges, number of pickings, fruit and shoot borer infestation on plants, yellow vein mosaic virus infestation

on plants and fruit yield per plant recorded high genetic advance as per cent mean coupled with high heritability estimates, indicating that these traits were under the strong influence of additive gene action hence simple selection based on phenotypic performance of these traits would be more effective. Similar kind of results were observed in okra by Yasin and Anbu (1997), Dhall *et al*. (2000), Dhall *et al*. (2003), Khan *et al*. (2005), Dakahe *et al*. (2007), Manivannan *et al*. (2007).

High heritability and moderate GA as per cent mean values were observed for the characters days to first flowering, days to 50 per cent flowering, fruit width and average fruit weight. This indicates the influence of non additive gene action and considerable influence of environment on the expression of these traits. These traits could be exploited through manifestation of dominance and epistatic components through heterosis (Yassin and Anbu, 1997).

Hence, the breeder should adopt suitable breeding methodology to utilize both additive and non additive gene effects simultaneously, since varietal and hybrid development will go a long way in the breeding programmes especially in case of okra.

Acknowledgement

This paper forms a part of M.Sc. (Horticulture) thesis of the first author submitted to the Andhra Pradesh Horticultural University.

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