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GENE ACTION IN UPLAND COTTON

Biometrical estimation of genetic parameters governing yield and yield components have been attempted by many workers in upland cotton *(Gcssypium hirsutum L.)* and varying estimates of additive, dominance and epistatic components of gene effects have been reported. The relative importance of these gene effects vary with the genetic material involved and the genetic model used. Gene action in the six crosses between four varieties of different geographical regions is presented in this paper.

Four varieties of upland cotton viz. Laxmi, Bhagya, Hancock and Reba-B-50 along with their six F_1S, F_2S, BC_1 (F_1 x P_1) and BC_1 (F_1 x P_2) were sown at the College of Agriculture, Dharwar during Rabi 1973-74. Randomised complete block design with three replications was adopted. One row each of parents and F_1S while 6 and 10 rows of back crosses and F_2S respectively were sown in each replication. Observations on yield of seed cotton per plant, number of bolls per plant and boll weight were recorded. D (additive), H (non-additive) and E (error) components were calculated following Mather (1949).

The data pertaining to the genetic components and heritability (broad sense) for the three characters are presented in the Table 1.

Yield of seed cotton per plant: Dominance variances were higher in magnitude and highly significant compared to additive variances in all the six crosses which is in accordance with the earlier findings of Baker and Verhalen (1973) and others. Additive variance was found to be significant but negative in four of the crosses while positive significant additive variance was observed in cross Bhagya x Reba-B-50. Environmental variance was considerably low in magnitude when compared to the non-additive component.

Number of bolls per plant: Additive variances were positive and significant only in two crosses, Bhagya x Reba-B-50 and Hancock x Reba-B-50, while it was negative and significant in crosses Laxmi x Bhagya and Laxmi x Hancock. Error variances were considerably low in all the crosses indicating the negligible influence of environment on this character. The magnitude of dominance was considerably high in all the crosses. Importance of dominance gene action for boll number was reported by Joshi *et al.* (1961).

Boll weight; Crosses Laxmi x Hancock, Bhagya x Reba-B-50 and Hancock X Reba-B-50 exhibited significant and greater magnitude of additive genetic component while cross Laxmi x Bhagya showed more of dominance effect.

Table 1 Genetic components and heritability for three characters in upland cotton

Genetic components	Laxmi X Bhagya	Laxmi X Hancock	Laxmi X Reba-B-50	Bhagya X Hancock	Bhagya X Reba-B-50	Hancock X Reba-B-50
Seed cotton yield						
D	2.30	—99.00**	—147.00**	— 238.52**	39.50**	—36.50**
H	275.736**	728.96**	337.68**	511.26**	597.35**	735.00**
E	95.416*	86.75**	88.16**	94.00**	95.46**	88.83**
Heritability (B. S) %	42.34*	60.47**	75.97**	59.18**	42.407**	64.95**
No. of bolls/plant						
D	-6.32**	—4.16**	—2.64**	6.88t*	11.60**	6.66**
H	33.48**	23.76**	31.60**	23.48**	13.78**	25.04**
E	6.786	6.70**	5.506**	6.973**	5.69**	5.86**
Heritability (Broad sense) %	43.26**	42.832**	54.42**	25.819**	61.91**	53.19**
Boll weight						
D	-0.52	2.336**	1.074**	— 0.20	1.244**	1.62**
H	2.94**	0.408	1.180**	4.844**	0.910*	1.156**
E	0.323	0.281	0.408	0.242	0.280	0.381
Heritability (Broad sense) %	59.37**	81.63**	67.09**	81.804**	75.22**	74.256**

* Significant at 5% ** Significant at 1%

The magnitude of both additive and dominance component was more or less equal in the cross Laxmi x Reba-B-50. The significance of environment as indicated by error variance was considerably low for this character also. Heritability estimates in broad sense was higher as compared to that of yield and boll number.

From the above results it is evident that additive effects had negligible contribution towards the expression of yield. The number of bolls had dominance in greater magnitude and hence exploitation of hybrid vigour for this character is possible. It was evident that boll weight had little contribution towards the expression of yield, as opined by earlier workers. In general, additive effects were more common to boll weight than to either yield or number. This confirms the earlier findings of White and Kohel (1964) and Virupakshappa *et al.* (1978).

സംഗ്രഹം

നാലിനം ചെടികാ സങ്കരം നടത്തിയെടുത്ത ആറിനം പരുത്തിചെടികളെ കുറിച്ച പഠനം നടത്തിയതിൽ വിളവിനെയും കായ്കളുടെ എണ്ണത്തിനെയുംകാാം കായ്കളുടെ തൂക്കത്തെ 'അഡിറ്റീവ്ജീൻ ഇഫക്ട്' വിളവിനെ 'നാൺഅഡിറ്റീവ്' ഇഫക്ട്' സ്വാധീനിക്കുന്നതായ് കണ്ടു.

REFERENCES

Baker, J. L. and Verhalen, L, M., 1973, The inheritance of several agronomic and fibre properties among selected lines of Upland cotton, *Gossypium hirsutum* L. *Crop Sci.*, **13**, 444—450.

Joshi, A, B,, Jain, S, K and Hukeri, P. D., 1961. Inheritance studies on components of yield in a cross of two *Gossypium hirsutium* varieties I. Boll number and weight, *Indian J, Genet.*, 21. 98—105.

Mather, K. 1949. Biometrical genetics, Douer publictaions, New York.

Virupakshappa, K., Katarki, B. H. and Gururaj Rao, M. R. 1978. Genetic analysis of yield in Upland cotton (*Genetic analysis hirsutum* L.). *Mysore J. Agric, Sci.* **12**, 52—61.

White, T. G. and Kohel, P. J. 1964. A diallel analysis of agronomic characters in selected lines of cotton. *Crop. Sci.* 4, 254—257.

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