VARIABILITY IN YIELD AND OTHER QUANTITATIVE CHARACTERS IN
Gossypium barbadense L.*

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F_2 and F_3 generations of four G. barbadense crosses studied for varaiablity in bol number per plant, yield of seed cotton, ginning percent and halo length showec that crosses B (Allepo x suvin) and D (Sudan G. 45 x Giza 7) registered high mean fo: boll number, yield of seed cotton and ginning percent, while cross C (suvin x sujata, recorded high mean for mean halo-length. High mean variability for all the four traits were found in cross D. Transgressive segregation beyond the parental means wa: observed in F_3 generation, indicating that commencement of selection in F_3 would be ideal. Positive deviates over the means of the respective sibs indicated that crosses B and D had relatively high potentiality as compared to other two crosses.

Plant breeders are commonly faced with the problems of handling segregating populations and selection procedures. Mean and variability are the important factors for selection. Mean serves as a basis for eliminating undesirable crosses and variability helps to choose a potential cross since variability indicates the extent of recombination for initiating effective selection. Selection for the improvement of quantitative characters can be effective only when the segregating generations possess the potential variability. A study was conducted to find out the variability in four barbadense cotton crosses.

MATERIALS AND METHODS

F2 and F3 progenies of four barbadense cotton crosses (cross A: ERB 4492 x Giza7. cross B : ALLEPO x SUVIN. cross C : SUVIN x SUJATA and cross D : SUDAN G. 4. S x Giza7) were evaluated during 1976 - 77 and 1977 - 78 respectively along with their parents in the Cotton Breeding Station, Tamil Nadu Agricultural University, Coimbatore. The four F2 crosses and their six parents were grown in a randomized block design with three replications. Each plot consisted of four rows having twenty plants each. The following observations were recorded on boll number, yield, ginning percentage and mean halo length on individual plant basis in all the avilable populations. From the 240 F2 plants in each cross, ten per cent of the population was selected randomly. Selfed seeds of F2 plants were sown and evaluated as F3 pro-

Table 1. Mean and Variabitty in yield and other quantitative characters

Crosses	Ovule parent	pollen parent	cross performance		
	Mean ± S. E	Mean ± S. E	Mean ± ·E	Range	C·V%
1. Boll number					
Cross A					
F$_2$	17·04±0·57	16·57±0·67	16 47±0·60	2—55	54.36
F$_3$	15·04±0·57	8.75±0·49	9 96±0 24	1—45	61·99
Cross B					
F$_2$	17.13±0 56	15.56±0.65	19·63±0·67	1—56	50.03
F$_3$	9·48±0·51	6·80±0.34	11.33±0·27	1—38	59.05
Cross C					
F$_2$	15.56±0.65	17.28±6.34	15.66±0·23	1—46	52·40
F$_3$	6·80±0.34	8·57±0·42	9.06±0·57	1—44	63·60
Cross D					
F$_2$	21·21±0·45	16 57±0·67	19.98±0·62	1—52	45.53
F$_3$	11·75±0·66	8.75±0·49	10·13±0·26	1—48	66.13
2. Seed cotton yield					
Cross A					
F$_2$	51·44±1 52	49.08±1.57	53·28±1·69	5—160	47.15
F$_3$	39·42±0·81	22.07±0.62	29.13±0.71	5—125	61.84
Cross B					
F$_2$	54.11±1·55	42·99±1.38	66·60±1.15	5—150	24.12
F$_3$	37.07±0·90	19·20±0 43	33·99±0.87	5—150	64.65
Cross C					
F$_2$	42 99±1·38	56·95±1·25	53.46±1.70	5—140	45.55
F$_3$	19·20±0.43	31·25±0·65	26.81±0.69	5—115	65.55
Cross D					
F$_2$	59.54±1·90	49 08±1·57	66.06±1·97	5—220	43.48
F$_3$	35.54±0·67	22·07±0.62	29.60±0.87	5—160	74·11

3. Ginning percentage

Cross A

F_{4}	32.26 ± 0.44	31.45 ± 0.18	32.26 ± 0.21	$29-39$	9.82
F_{3}	33.93 ± 0.26	32.21 ± 0.21	33.10 ± 0.07	$26-39$	5.12

Cross B

F_{2}	32.29 ± 0.34	28.35 ± 0.57	32.71 ± 0.09	$22-38$	3.98
F_{3}	33.19 ± 0.21	30.68 ± 0.19	33.29 ± 0.08	$24-39$	5.77

Cross C

F_{2}	28.35 ± 0.51	32.40 ± 0.13	29.95 ± 0.41	$23-38$	19.51
F_{3}	30.68 ± 0.19	33.17 ± 0.18	32.57 ± 0.09	$24-39$	6.50

Cross D

F_{2}	32.93 ± 0.12	31.45 ± 0.20	32.15 ± 0.16	$25-38$	7.20
F_{3}	33.04 ± 0.17	32.21 ± 0.21	33.16 ± 0.08	$24-39$	5.63

4. Mean Halo length

Cross A

F_{2}	25.17 ± 0.21	26.80 ± 0.25	25.96 ± 0.53	$22-34$	30.24
F_{3}	23.30 ± 0.19	23.25 ± 0.19	25.80 ± 0.10	$20-32$	9.76

Cross B

F_{2}	28.60 ± 0.22	32.03 ± 0.53	27.63 ± 0.10	$22-32$	5.03
F_{3}	28.26 ± 0.21	31.14 ± 0.29	27.08 ± 0.10	$20-34$	8.85

Cross C

E_{2}	32.03 ± 0.53	30.88 ± 0.34	31.80 ± 0.45	$27-37$	21.56
F_{3}	31.14 ± 0.27	28.41 ± 0.18	29.28 ± 0.13	$21-35$	11.40

Cross D

F_{2}	27.58 ± 0.12	26.80 ± 0.25	29.96 ± 0.12	$25-35$	5.70
F_{3}	27.12 ± 0.26	26.25 ± 0.19	27.38 ± 0.10	$20-34$	88.8

genies with their parents. Mean, standard error, and coefficient of variation were calculated for F2 and within as well as between the F3 families following the method of Goulden (1952). Positive deviates over the means of the respective sibs for the combination of characters were also calculated in F3.

RESULTS AND DISCUSSION

The results of mean and variability for parents, F_2 and F_3 genera-

Table 2 Number of plants with values of positive deviates for combination of characters

Cross	Yield, ginning percent and mean halo length	Yield and ginning percent	Yield and mean halo length	Ginning percent and mean halo length
A	60	114	123	122
B	80	128	141	130
C	52	97	113	101
D	98	140	147	141

tion are presented in Table 1 and positive deviates over the means of the respective sibs in F_3 in Table 5. It is necessary that the cross itself should have high order of mean for the traits for obtaining sibs expressing high mean for the character under consideration. According to Finkner *et al.*, (1973) cross or family with highest mean was relatively effective in identifying the superior segregants. The crosses B and D registered high expression of mean both in F_2 and F_3 generations for boll number, yield of seed cotton and ginning per cent. Cross C registered higher mean values for mean halo length than other crosses both in F_2 and F_3.

The variability of the population is another criterion in selection. The potentiality of a cross is measured not only by mean. but also on the extent of variability. According to Allard and Hansche (1964), success in improving adaptation requires that the population under selection be genetically variable. In all the four crosses studied, the variability in F_2 for all the four traits in general was considerable. Expression of wide variability and transgressive segregation was observed in F_3 also, indicating that the commencement of selection in F_2 generation is not ideal for the present material. This is in agreement with the findings of McGinnis and Shebaski (1968) who concluded that there is no advantage in selecting F_2 plants for high yield. While considering the mean and variability of the segregating populations together, high mean with high variability for all the four characters, cross D could be preferred, since it was consistent for in these criteria in F_2 and F_3 generations.

The relative merits of the crosses were also assessed by studying the recombination potential in the selected sibs of the third generation. Positive deviates over the means of the respective sibs. were selected. The

number of plants for the combina-
tion of characters obtained under
each cross (Table 2) indicated that
the crosses B and D had relatively high
potentiality compared to other
crosses.

REFERENCES

ALLARD, R. W. and P. E. HANSCHE, 1964.
Some parameters of population variablity

and their implications in plant breeding,
Advan Agron 16 : 281-235

FINKNER, V. C., C. G PONELEIT and D. L.
DAVIS. 1973. Heritablity of rachis node
number of Avena sativa L. crop. Sci.
13 (1) : 84-85.

GOULDEN, C. H. 1952. Methods of statisti-
cal Analysis. John wiley and sons Inc.,
New york.

Mc GINNIS, R C and L. H. SHEBESKI 1968.
The reliability of single plant selection
in F2. Third International wheat Genetics
symposium, 410-15.

EFFECT OF INTERCROPPING OF PULSES AND SUNFLOWER ON THE INCIDENCE OF SUCKING PESTS OF RAINFED COTTON

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Incidence of sucking pests in cotton based intercropping system was studied in
crop combinations of cotton + greengram, cotton + blackgram, cotton + cowpea,
cotton + sunflower and cotton + lablab raised in paired rows and were compared
with sole crops of cotton, blackgram, greengram, cowpea, lablab and sunflower.
The population of leafhopper was significantly less in cotton when intercropped
with sunflower, greengram and blackgram. Contrary to this, aphid infestation was
less in pure crops of greengram, blackgram and sunflower compared to crop combi-
nations. Among the crop combinations tested, cotton + greengram recorded the
highest gross income.

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