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ESTIMATION OF HERITABILITY THROUGH PARENT-OFFSPRING ANALYSIS IN SORGHUM (*SORGHUM BICOLOR* (L) MOENCH) CROSSES

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A study of parent progeny regression analysis and heritability in narrow sense between F_2 and F_3 population of three inter varietal crosses for six quantitative traits indicated that the correlation and regression co-efficients between F_3 mean and corresponding parental F_2 values were significant for plant height, ear length and 100 grain weight in one cross, number of leaves and ear weight in another cross and plant height and number of leaves in a third cross. This indicates that the transmission of genetic potentialities from F_2 to F_3 is more and is attributed to additive gene effects. Hence, the scheme of selection in the segregating generations will be effective for these characters of respective crosses. The correlation and regression co-efficients between F_3 mean and corresponding parental F_2 values were not significant for grain yield in all the three crosses.

Parent - offspring regression analysis enables to estimate heritability in narrow sense, resulting from additive gene effects only (Lush, 1940). The heritability estimate through parent progeny regression method is more reliable and Frey and Horner (1955) were of the opinion that this method may tend to reflect the true heritability. An evaluation of the transmission of genetic potentialities from F_2 F_3 of three inter varietal crosses through parent - offspring regressin analysis is presented.

MATERIALS AND METHODS

The F_2 s of three sorghum crosses namely, 2219 A X SPV 351 (Cross A), 2219 A x Usilampatti—2 (Cross B) and 2760 A x Co 24 (Cross C) with their parents *viz.*, 2219 B (P_1), 2760 B (p_2), CO 24 (p^3), Usilampatti - 2 (local) (p_4) and SPV 351 (p_5) were raised during August 1982. In each cross, thirty out of 600 segregants were randomly selected and advanced to F_3 generation. Each selected F_2 plant from each cross was raised in one row with parents during February 83. The observations were made on all plants in F_3 except the sterile segregants on plant height, number of leaves, ear length, ear weight, 100 grain weight and grain yield. The regression co - efficient 'b' was calculated following Kempthorne, 1957.

$$\text{'b'} = \frac{\text{Sum of products of } F_2 \text{ and } F_3}{\text{Sum of square of } F_3}$$

$$\text{Heritability in narrow sense between } F_2 \text{ and } F_3 = \frac{2}{3}Xb$$

The significance of 'b' co-efficient was tested by 't' test.

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RESULTS AND DISCUSSION

The inter generation correlation and regression between selected F_2 plants on their respective F_3 mean values are presented in Table 1. Heritability in narrow sense was estimated through parent-progeny regression of F_2 on F_3 and presented in Table 2.

Table 1. Inter-Generation Correlation (r) and Regression Coefficients (b) Between F_2 and F_3 Means

Character	Cross A		Cross B		Cross C	
	r	b	r			
Plant height (cm)	0.25**	0.64	0.72**	1.72**	0.52**	1.18**
Number of leaves	0.52**	0.96**	-0.23	-0.65	0.44**	0.95**
Ear length (cm)	0.21	0.66	0.61**	2.02**	-0.001	-0.02
Ear weight (g)	0.61**	2.59**	-0.14	-0.87	0.14	0.59
100 grain weight (g)	0.13	0.25	1.00**	1.50**	0.11	0.25
Grain yield (g)	0.08	0.39	0.06	0.41	0.04	0.17

* Significant at 5 per cent level
** Significant at 1 per cent level

Table 2. Estimates of Heritability in Narrow Sense in F_3 Generation of Sorghum Crosses

Characters \ Crosses	Heritability (2/3 b)		
	A	B	C
Plant height (cm)	—	1.15	0.79
Number of leaves	0.64	**	0.64
Ear length (cm)	0.44	1.35	
Ear weight (g)	1.74	**	0.46
100 grain weight (g)	0.36	1.01	0.17
Grain yield (g)	0.26	0.27	0.11

** Parent-progeny regres ion was not significant and hence heritability was not calculated

The correlation and regression co-efficient estimates between F_3 means and corresponding parental F_2 values were significant for number of leaves and ear weight in cross A, plant height, ear length and 100 grain weight in cross B and plant height, and number of leaves in cross C (Table 1). This indicated that there was some relationship between F_2 value and its progeny mean. The grain yield was not significant in all the three crosses indicating that there was no relationship between F_2 values and its progeny mean. McGinnis and Shebaski (1968) also obtained non-significant correlation between F_2 and F_3 and reported that on this basis alone there was no advantage in selecting F_2 plants for high yield. The absence of relationship between F_2 and F_3 perhaps indicated that the

interference of non-additive components were very considerable, and hence, the scheme of selection should be postponed to later generations.

In the present investigation, high heritability in narrow sense was obtained in cross B followed by cross C for plant height, cross A and cross C for number of leaves, cross B followed by cross A for ear length, cross A followed by cross C for ear weight, cross B followed by cross A for 100 grain weight and grain yield (Table 2). The environment contribution to the total variability in these characters was quite low and consequently the transmission potential of the parental material for these characters was appreciably high. Panchal *et al* (1979) noticed high heritability in narrow sense for plant height, ear length and ear weight

For grain yield, low heritability was noticed in all the three crosses which indicated that the environment effect on this character is high.

The negative values of parent-off spring regression in some instances showed that the F_2 performance was not a good indicator of F_3 progeny performance for these traits. There are several possible reasons given by Meredith and Bridge (1973) to explain why the F_2 performance may not be closely related to that of the F_3 progeny mean. The environment of an individual plant may differ greately from that of progeny rows A second factor may be that the genotype X environment interactions from one year to the next at a single location may differ. Dominance gene action in an F_2 population i. e large non-additive gene effects may not be usable in later generations.

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