integrated nutrient management system involving the application of 60:30:30 kg NPK ha^{-1} along with azospirillum inoculation through seed and soil would ensure high yields from rainfed maize in red soils.

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CORRELATION STUDIES IN F_2 GENERATION OF RICE (*ORYZA SATIVA* L.) CROSSES

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ABSTRACT

In an investigation with six F_2 generations along with their four parents of rice, it was found that the character ear bearing tillers showed positive and signficant association with grain yield in all the parents and F_2s. Grain number also had significant association with grain yield in all the F_2s and parents except one. Hence, it is suggested that the selection can more confidently be done based on these two characters for the improvement of grain yield in rice.

In rice, the grain yield is a complex character and influenced by other component characters considerably. Hence, a knowledge on the correlation between grain yield and its component characters as well as the inter- correlation between the component characters will be helpful for simultaneous selection for characters influencing the yeild. Therefore, the present study was initiated to study the inter-relationship of six traits in four parents and their six segregating F_2 generations to identify those characters which may be useful as indicators of high yield.

MATERIALS AND METHODS

Four short duration rice varieties, namely, ADT 37. Co 41, IR 50 and ADT 36 along with their six cross combinations, viz., Cross A (ADT 37/Co 41), Cross B (ADT 37/IR 50), Cross C (ADT/37/ADT 36), Cross D (Co 41/IR 50) Cross E (Co 41/ADT 36) and Cross F (IR 50/ADT 36) in F_2 generation were studied in a randomised block design with three replications during June-Septmeber, 1989 at Rice Research Station, Ambasamudram. A total of 90 plants in each of the parents and 360 segregants from each cross were studied. Thirty plants in each parent and 100 F_2 segregants in each cross were randomly selected and data recorded on palnt height, ear bearing tillers, ear length, grain number, 100-grain weight and grain yield. The method suggested by Goulden (1952) was adopted for estimating correlation coefficients for yield and its component traits and among the different component traits.

RESULTS AND DISCUSSION

Phenotypic correlation coefficients between different pairs of characters were estimated separetely in parents and in F_2 generations. The associations between plant height and ear bearing tillers in Co 41, and crosses B, C, E and F, ear length and plant height in ADT 37, and all six crosses, grain number and plant height in ADT 37, Crosses A, D, and E and 100-grain weight and plant height in Crosses A, D and E were positive and significant. Similarly, ear length with ear bearing tillers in Co 41 and crosses C, D, E and F, ear bearing tillers with grain number in Co 41 and crosses A, D and E and 100-grain weight with ear bearing tillers had positive and significant correlation. The association between grain number and ear length in ADT 37 and Co 41 and crosses A, D and E, ear length and 100-grain weight in crosses A, D and E and between grain number and 100-grain weight in crosses D, E and F also exhibited the same trend. But, the associations between grain number and ear bearing tillers in IR 50 and between 100-grain weight and grain number in cross B were negatively significant. This showed

Table 1. Phenotypic correlations between all possible pairs of six characters among parents and F_2 populations of rice crosses.

Characters	P_1	P_2	P_3	P_4	Cross A ($P_1 \times P_2$)	Cross B ($P_1 \times P_3$)	Cross C ($P_1 \times P_4$)	Cross D ($P_2 \times P_3$)	Cross E ($P_2 \times P_4$)	Cross F ($P_3 \times P_4$)
1	2	3	4	5	6	7	8	9	10	11
(a) I	it height with ear bearing tillers									
Ear bearing tillers	0.07	0.29**	-0.15	0.21	0.14	0.21*	0.38**	0.19	0.23*	0.21*
(b) E	length with other characters									
Plant height	.62**	-0.08	0.19	0.17	0.67**	0.22*	0.60**	0.72**	0.58**	0.61**
Ear bearing tillers	0.20	0.35**	0.03	-0.01	0.19	0.19	0.40**	0.31**	0.27**	0.24*
(c) G ain number with other characters										
Plant height	.25*	0.07	-0.08	-0.13	0.48**	0.14	0.15	0.44**	0.28*	0.08
Ear bearing tillers	-0.08	0.30**	-0.25*	0.12	0.29**	0.04	0.01	0.21*	0.34**	0.09
Ear length	0.41**	0.45**	0.18	0.13	0.44**	0.09	0.07	0.37**	0.22*	0.11
(d) 100-grain weight with other characters										
Plant height	0.19	-0.10	0.12	-0.11	0.61**	-0.03	0.13	0.29**	0.30**	-0.13
Ear bearing tillers	-0.06	0.05	-0.24	0.04	0.02	-0.10	0.10	0.20*	0.12	0.05
Ear length	0.19	0.06	0.12	0.11	0.37**	-0.03	0.07	0.26*	0.21*	0.02
Grain number	0.05	-0.16	0.01	0.04	0.18	-0.20*	0.10	0.35**	0.23	0.28*
(e) Grain yield with other characters										
Plant height	0.17	0.25*	-0.02	-0.03	0.51**	0.37**	0.38**	0.53**	0.50**	0.43**
Ear bearing tillers	0.33**	0.91**	0.52**	0.65**	0.73**	0.62**	0.66**	0.63**	0.81**	0.62**
Ear length	0.29*	0.44**	0.08	0.03	0.48**	0.14	0.32**	0.50**	0.39**	0.43**
Grain number	0.55**	0.37**	0.23	0.32*	0.55**	0.20*	0.34**	0.43**	0.41**	0.22*
100-grain weight	0.26*	0.16	0.09	0.14	0.23*	0.07	0.25	0.20*	0.24*	0.06

* Significant at 5% level ** Significant at 1% level

that the strength and direction of association vary independently in parents and its F2 cross combinations.

Plant height with ear bearing tillers in cross E and its parent Co 41, ear length with plant height in crosses A, B and C and its parent ADT 37, ear length with ear bearing tillers in crosses D and E and its parent Co 41, grain number with plant height in cross A and its parent ADT 37, grain number with ear bearing tillers in crosses A, D and E and its parent Co 41, grain number with ear length in crosses A, D and E and its parents ADT 37 and Co 41 showed positively significant correlation. It indicated that the presence of such positive correlation in F_2 population might be due to the existence of similar association in one or both of the parental lines.

The associations between ear bearing tillers and plant height in crosses B, C and F, ear length and plant height in crosses D, E and F, ear length and ear bearing tillers in crosses C and F, grain number and plant height in crosses D and E were observed to be positive and significant eventhough their corresponding parents had no such association. Similarly in parents, when inter-correlations were examined, excepting grain yield, none of the characters showed positive association with 100-grain weight. But, the F_2 generations of the crosses D, E, A and F showed positively significant correlation for all the four, three, two or one character combination respectively. The association between 100-grain weight and grain number was positive but not significant in parents of the cross B while the F_2 generation had negatively significant correlation for this character pair. Likewise, the F_2 generation of the cross F showed positiviely significant association between the characters grain yield and plant height but the association that existed in the parents was in the negative direction for the combination of characters. This clearly indicated that the association of characters that existed in the parents need not be maintained in the later generations and there were chances for the modifications in the strength and direction of

association between characters. This might, perhaps, be due to recombination of those genes found in parents controlling the characters under study.

The grain yield was significantly and positively associated with plant height in parent Co 41 and in all the six cross combinations, with ear bearing tillers in all the parents and crosses, with ear length in ADT 37 and Co 41 and in all the crosses except cross B, with grain number in all the parents but one and in all the crosses and with 100-grain in ADT 37 and in four crosses. The positive and significant association of plant height, ear bearing tillers, grain number and 100-grain weight with grainyield was confirmed by previous workers like Kalaimani and Kadambavana sundaram (1988) in rice verieties in F_2 generations. Mahajan *et al.*, (1981) in rice varieties observed the association between ear length and grain yield to be significantly positive.

The correlation studies thus revealed that the grain yield was positively related to ear bearing tillers in all the parents and F_2 generations and to grain number in all the F_2 generations and parents except one. So, ear bearing tillers and grain number had established a strong correlation with correlation with grain yield as observed by Kalaimani and Kadambavanasundaram (1988).

For other traits, the trend was not uniform. In some cases, the plant height, ear length and 100-grain weight had positive association with grain yield, while in other cases no such definite correlation could be seen. Therefore, it is suggested that the characters ear bearing tillers and grain number should be given importance while selection for the improvement of grain yield in rice.

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COMBINING ABILITY FOR YIELD AND FIBRE PROPERTIES OF COTTON (*G. HIRSUTUM* L.) WITH DIFFERENT FUZZ GRADES

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ABSTRACT

Combining ability analysis was conducted in a line X tester model with seven lines and four testers for yield characters (seed cotton yield) and fibre characters (ginning outturn, seed index, lint index and mean halo length). The seven lines belong to *G. hirsutum* but differ in fuzz grades ranging from full fuzz to sparsely fuzz and a naked one. The fuzzed lines (TCH.104/1, TCH 70/7) and the tester LRA 5166 are good combiners for seed cotton yield. The sparsely fuzzed lines (TCH 65/8) and naked line (TCH 89/7) are good combiners for ginning out turn. The sparsely fuzzed line TCH 96/6 and the testers MCU 5 and MCU 9 are good combiners for seed index. The sparsely fuzzed line TCH 65/8 and the testers MCU 9 and LRA 5166 are good combiners for lint index. The naked line TCH 89/7 and the testers MCU 5 and MCU 9 are good combiners for mean halo length.

The combining ability analysis has been utilized to know the gene action regarding yield and fibre properties in cotton. However, relatively little is known regarding the combining ability studies involving lines differing in fuzz grades in *G. hirsutum*. The present study reports the combining ability of yield and fibre properties of G. hirsutum lines differing in fuzz grades.

MATERIALS AND METHODS

Seven lines of **G. hirsutum** differing in fuzz grades such as full fuzzed (TCH 63/1, TCH 63/4, TCH 104/1, TCH 70/7) sparsely fuzzed (TCH 65/8, TCH 96/6) and naked (TCH 89/7), (Hutchinson and Ramaiah, 1938) were crossed with each of the four tester cultivars namely, MCU 5, MCU 7, MCU 9 and LRA 5166, in a line x tester mating design