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GENOTYPIC ASSOCIATION AND PATH ANALYSIS IN F₃ GENERATION OF RICE CROSSES

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ABSTRACT

Genotypic correlation and path co-efficient analyses were carried out in F₃ populations of two intervarietal crosses of rice for grain yield and its components. Tiller number, panicle length and plant height showed positive correlation with grain yield. Hundred grain weight exhibited negative correlation with grain yield. Due stress must be laid on number of productive tillers per plant and panicle length during the selection for higher yield in rice.

INTRODUCTION

A detailed study of nature and direction of association between yield components and with yield and a knowledge of their direct and indirect causes on yield are the prime requisites for an efficient plant breeding programme. The present paper reports the results of an investigation carried out in intervarietal crosses of rice (*Oryza sativa* L.) in F₃ generation bring out useful relationships among different traits associated with yield.

MATERIALS AND METHODS

The study was conducted with intervarietal cross of rice in F₃ generation. The F₃ populations of Co 37 X Co 41 (cross 1) and its reciprocal Co 41 X Co 37 (cross 2) formed the material for the present study. Twenty five families in each cross combinations were raised in a randomised block design with three replications. Each family was allotted to a row of three meter length. Row to row and plant to plant distances were

maintained at 20 X 10 cm. Biometric observations were recorded on days to panicle emergence, plant height, panicle length, total number of tillers, number of productive tillers, hundred grain weight and single plant yield on five randomly selected plants in each family row and in each replication. Genotypic correlation coefficients were estimated according to the methods suggested by Aljibouri et al. (1958) and path coefficients using the methodology described by Dewey and Lu (1959).

RESULTS AND DISCUSSION

The genotypic correlations between all possible combinations of seven characters in cross 1 and cross 2 are presented in Table 1. Single plant yield showed positive and significant association with tillers per plant, panicle length and plant height in both the crosses whereas with hundred grain weight it was negative. Significant positive correlation of yield with plant height (Rama Rao et al., 1977) tiller number (Ghorai and Pande, 1982; Gopinath et al., 1984) and panicle length (Brar and Saini, 1976) was reported earlier by different workers in the segregating generations of rice. Gopinath et al. (1984) reported negative association between grain weight and yield.

Days to panicle emergence showed positive and significant correlation with panicle length in cross 1 (Co 37 X Co 41) whereas negative correlation in cross 2 (Co 41 X Co 37). This might be due to the differential behaviour of the genotypes in the reciprocal crosses. Similarly plant height showed positive

correlation with hundred grain weight in cross 1 and negative correlation in the reciprocal cross. Panicle length recorded positive correlation with hundred grain weight. Number of productive tillers per plant exhibited negative correlation with hundred grain weight.

The path analysis furnishing the cause and effect of different yield components would provide a better index for selection rather than the mere correlation co-efficients. The results of path coefficient analysis summarized in Table 2 indicated that number of productive tillers per plant and panicle length had high direct effect on yield in both the crosses. High positive direct effect of number of productive tiller and panicle length on grain yield was reported earlier by Gangadharan and Ghosh (1975). In the present study days to panicle emergence, plant height and hundred grain weight exhibited moderate direct effect on yield. Plant height recorded negative indirect effect via panicle length whereas positive indirect effect via other characters. Panicle length registered negative indirect effect through plant height and hundred grain weight which was counter balanced by other characters. Direct effect of hundred grain weight was positive with single plant yield but negative effects of other characters like number of productive tiller and panicle length indirectly made as overall negative correlation of hundred grain weight with grain yield. Thus it may be concluded that selection programme in rice will be efficient if due weighage is given to the characters number of productive tillers and panicle length.

Table : 1. GENOTYPIC CORRELATION COEFFICIENTS BETWEEN DIFFERENT PAIRS OF TRAITS
IN F₃ GENERATION OF RICE CROSSES

Character	F ₃ Cross	Plant height	Panicle length	Total number of tillers	Number of productive tillers	Hundred grain weight	Single plant yield
Days to panicle emergence	1	0.4123*	0.4247*	-0.2944	-0.3274	0.3457	0.0763
	2	0.3528	-0.4818*	0.3014	0.3984*	-0.3372	0.3826
Plant height	1		-0.6827**	0.3976*	0.4521*	0.3624	0.4257*
	2		-0.8428**	0.4316*	0.5214**	-0.3216	0.5773**
Panicle length	1			0.2718	0.3011	-0.2648	0.6621**
	2			0.2148	0.3044	-0.1452	0.1617
Total number of tillers	1				0.4208*	-0.2822	0.9033**
	2				0.2316	0.1216	0.8340**
Number of productive tillers	1					-0.4984*	0.9779**
	2					-0.3324	0.9528**
Hundred grain weight	1						-0.2630
	2						-0.1186

F₃ Cross 1 - CO 37 x CO 41 * Significant at 5 per cent level

Cross 2 - CO 41 x CO 37 ** Significant at 1 per cent level

Table 2: DIRECT AND INDIRECT EFFECTS OF YIELD COMPONENTS IN F₃ GENERATION OF RICE CROSSES

Characters	Cross	Days to panicle emergence	Plant height	Panicle length	Total number of tillers	Number of productive tillers	Hundred grain weight	Genotypic correlation with single plant yield
Days to panicle emergence	1	0.0692	0.0526	0.2319	-0.1502	-0.2358	0.1086	0.0763
	2	0.1132	0.1349	-0.1462	0.1210	0.2399	-0.0802	0.3826
Plant height	1	0.0285	0.1278	-0.3728	0.2028	0.3256	0.1138	0.4257
	2	0.0399	0.3824	-0.2557	0.1733	0.3139	-0.0765	0.5773
Panicle length	1	0.0293	-0.0872	0.5462	0.1386	0.2168	-0.0832	0.6621
	2	-0.0545	-0.3222	0.3034	0.0862	0.1833	-0.0345	0.1617
Total number of tillers	1	-0.0204	0.0508	1.484	0.5101	0.3031	-0.0887	0.9033
	2	0.0341	0.1650	0.0651	0.4015	0.1394	0.0289	0.8340
Number of productive tillers	1	-0.0227	0.0577	0.1645	0.2147	0.7203	-0.1566	0.9779
	2	0.0451	0.1993	0.0923	0.0929	0.6022	-0.0790	0.9528
Hundred grain weight	1	0.0239	0.0463	-0.1446	-0.1439	-0.3589	0.3142	-0.2630
	2	-0.0382	-0.1229	-0.0440	0.0488	-0.2001	0.2378	-0.1186

Cross 1 CO 37 x CO 41

Cross 2 CO 41 x CO 37

Bold figures denote direct effects

Residual effect Cross 1 0.2032

Cross 2 0.2460

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EFFECT OF N LEVELS AND SOILS ON THE N, P AND K UPTAKE BY MAIZE

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ABSTRACT

Pot culture experiment conducted with fifteen soils (ten representing low N and five medium N soils) under graded doses of N to study the uptake of nutrients revealed that the N P K uptake showed a positive trend with N application at all stages of crop growth. Application of 202.5 Kg N/ha recorded the highest N uptake by shoot and grain. The N uptake was higher in medium N soils compared to low N soils.

Maize (*zea mays* Linn) is one of the important food crops grown in Tamil Nadu. This cereal is cultivated widely

due to its high yield potential and the capacity to utilize the added nutrients especially the nitrogen. Numerous