exhibited significant association with grain and straw yields. Leaf length, though important due to the fact that the correlation of number of leaves and leaf breadth with grain yield were predominantly high due to their indirect effects through this character, can not be relied upon to a greater extent because of its low GCV, heritability and genetic gain. Therefore, a selection programme with due emphasis on number of leaves and leaf breadth, keeping the plant height constant at an optimum level is desired for developing superior genotypes with high grain yield coupled with high straw yield.

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CORRELATION AND PATH ANALYSIS IN RICE *(Oryza sativa)*

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ABSTRACT

Three lines 12 testers and their 36 hybrids of rice were studied for correlation and path analysis for grain yield using ten characters. Grain yield was significantly and positively correlated with panicle length, spikelets per panicle, grains per panicle, 100 - grain weight and harvest index. Grains per panicle was the main component character affecting yield directly. High and positive indirect effects were contributed by panicle length and spikelets per panicle through grains per panicle.

KEY WORDS : Rice, Correlation, Path Analysis

Yield is a complex character being influenced by various component characters. A knowledge of the association of component traits with yield may greatly help in making selection precise and accurate. Path analysis is an important tool in determining the contribution of genotypic characters to yield and its components. The aim of this study was to estimate genotypic correlation coefficients and path-coefficients among different plant characters in rice.

MATERIALS AND METHODS

Thirty six hybrids involving 12 male parents *viz.*, As 89044, As 90043, AD 90190, Kasturi, Pusabasmati, IR 50, ADT 39, IR 64, IR 72, TKM 9, ASD 16, CO 37 and 3 isogenic maintainer (B) lines *viz.*, V 20 B, IR 580025 B and IR 62829B of the CMS (A) lines of 'wild abortive' source were raised during *kharif* 1993 at the Agricultural College and Research Institute, Killikulam in a randomised block design with three replications. A spacing of 20 cm between rows and 15 cm between plants was adopted. Two rows of F_1s and one row of parents were raised in each replication with single seedling per hill. Observations were recorded on five random and competitive plants for days to flowering, plant height, panicles per plant, panicle length, spikelets per panicle, grains per panicle, spikelets fertility, 100- grain weight, grain yield per plant and harvest index. Mean values were utilised for statistical analysis. Genotypic correlations were computed among the characters. The path analysis was done as described by Dewey and Lu (1959).

RESULTS AND DISCUSSION

The genotypic correlations are presented in Table 1. Panicle length, spikelets per panicle,

Table 1. Genotypic correlation coefficients between different traits in rice

Character	Plant height	Panicles per plant	Panicle length	Spikelets per panicle	Grains per panicle	Spikelet fertility	100-grain weight	Grain yield per plant	Harvest index
Days to flowering	-0.127	-0.083	-0.488**	0.218	0.102	-0.310*	-0.496**	-0.137	-0.058
Plant height		0.161	0.251	0.485**	0.508**	0.372**	-0.142	0.135	-0.252
Panicles per plant			0.059	0.069	0.115	0.216	0.181	0.009	-0.165
Panicle length				0.379**	0.436**	0.413**	0.054	0.340*	0.176
Spikelets per panicle					0.973**	0.450**	-0.087	0.434**	0.081
Grains per panicle						0.641**	-0.001	0.444**	0.146
Spikelet fertility							0.272	0.232	0.259
100-grain weight								0.307**	0.273
Grain yield per plant									0.517**

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

grains per panicle, 100- grain weight and harvest index were significantly correlated with grain yield in positive direction. Similar associations were reported for grain yield with panicle length and grains per panicle (Manuel and Palanisamy, 1989), spikelets per panicle (Kim, 1985), 100 - grain weight-Suarez *et al.*, 1989) and harvest index (Murthy *et al.* 1991). Panicle length, spikelets per panicle, grains per panicle, 100 - grain weight and harvest index were thus important in improving yield of rice.

Path analysis provided an aid for sorting out the total correlations into direct and indirect effects of different characters on yield. The results of path analysis (Table 2) revealed that the maximum positive direct effect on grain yield was exerted through grains per panicle followed by harvest index and 100-grain weight. Plant height, panicles per plant and panicle length also contributed positively to grain yield but were very low. The positive direct effects of plant height, panicles per plant and panicle length on grain yield was also reported by Sukanya Subramanian and Rathinam (1984) and Tahir *et al.* (1988). Days of flowering, spikelets per panicle and spikelet fertility recorded negative direct effects on grain yield. The negative direct effects of spikelet fertility on grain yield was also reported by Sheng and Li (1988).

The indirect effects of plant height on yield of present study was in agreement with the findings of Anandakumar and Sree Rangasamy (1986). Positive indirect effect of panicle length through grains per panicle of present study was in confirmity with the results of Rao *et al.* (1980).

Spikelets per panicle which showed significant positive correlation with grain yield, have exhibited negative direct effects. This may be due to the fact that the negative effects exerted by spikelets per panicle might have been nullified by their high positive indirect effects through grains per panicles.

Table 2. Path coefficient analysis showing direct and indirect effects of different traits in rice

Character	Days to flowering	Plant height	Panicles per plant	Panicle length	Spikelets per panicle	Grains per panicle	Spikelet fertility	100-grain weight	Harvest index	Genotypic correlation coefficient
Days to flowering	-0.095	-0.012	-0.004	-0.053	-0.206	0.176	0.236	-0.184	-0.023	0.165
Plant height	0.012	0.091	0.008	0.027	-0.458	0.874	-0.283	-0.052	-0.099	0.120
Panicles per plant	0.008	0.015	-0.048	0.006	-0.065	0.199	-0.164	0.067	-0.065	0.049
Panicle length	0.047	0.023	0.003	0.109	-0.359	0.750	-0.314	0.020	0.069	0.348*
Spikelets per panicle	-0.021	0.044	0.003	0.041	-0.945	1.674	-0.342	-0.032	0.032	0.454**
Grains per panicle	-0.010	0.046	0.006	0.047	-0.919	1.721	-0.487	-0.001	0.057	0.460**
Spikelet fertility	0.03	0.034	0.01	0.045	-0.426	1.103	-0.760	0.101	0.101	0.238
100-grain weight	0.047	-0.013	0.009	0.006	0.082	-0.003	-0.207	0.370	0.107	0.398**
Harvest Index	0.006	-0.023	-0.008	0.019	-0.007	0.251	-0.197	0.101	0.392	0.534

Underlined figures show the direct effects; Residual effect -= 0.590

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

It can be inferred form the results of genotypic correlation coefficients and path analysis that panicle length, grains per panicle, 100 - grain weight and harvest index showed not only positive correlation coefficients but also positive direct effects on yield.

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HETEROSIS AND COMBINING ABILITY IN INTER-SPECIFIC HYBRIDS BETWEEN CMS OF *Bajra* AND NAPIER GRASS

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ABSTRACT

General and specific combining ability variances and effects for seven fodder characters were studied in bajra-napier interspecific hybrids obtained in line x tester programme involving 9 CMS lines of *bajra* as female and 6 genotypes of napier grass, as male. The mean squares due to general and specific combining ability were significant indicating the importance of both additive and dominance components. The magnitude of sca variances was greater than that of gca for all characters suggesting the predominance of non-additive gene action. The parents, 405 A, 306 A, and 732 A among the CMS lines of *bajra* and FD 466 and FD 435 among napier grass were identified as best general combiners. The crosses 306 A x FD 466, 306 A x FD 435, 437 were the best specific combinations for forage yield. High heterosis observed for different forage yield characters was mostly due to the desirable sca effects.

KEY WORDS : *Bajra*, Napier Grass, Inter - Specific Hybrids, Heterosis, Combining Ability

Among the cultivated perennial grasses, bajra-napier hybrid grass has been acclaimed as the highest forage yielder in an unit time and space. Bajra-napier hybrid grass is an inter-specific hybrid produced after crossing *bajra (Pennisetum glaucum*) with napier *(P. purpureum*). In the past, the production of bajra- napier grass had been due to the involvement of *bajra* genotypes that were either grain or fodder types (Patil and Goshe, 1962; Gupta 1969; Narayanan and Debadghao, 1972; Gupta and Bhardwaj, 1975; Amirthadevarathinam and Stephan Dorairaj, 1992 ; Suthamathi, 1993). The set seeds obtained in such crosses that involved grain or fodder bajra genotypes as ovule parents, were made of both hybrid and selfed seeds of *bajra*. The CMS lines of *bajra* were used in hybridisation programme with napier and the resulting inter - specific hybrids were studied for their performance relating to fodder yield and its component characters besides estimating the