From the results, it is concluded that seedling broadcast planting method of crop establishment is favourable compared to line and random planting to obtain higher returns per rupee invested. However, this practice requires a careful water management for the first 7-10 days of establishment stage. Older seedlings (35 day old) from semidry nursery broadcasted at normal density is favourable during *Kharif*, while during *Rabi* there is need to increase seedlings by 30 per cent to get higher yields.

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GENETIC VARIABILITY, CORRELATION AND PATH COEFFICIENT ANALYSIS IN UPLAND EARLY RICE GENOTYPES

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ABSTRACT

Twenty eight rice genotypes of *Oryza sativa*, L. were evaluated for genetic parameters under upland condition. High heritability estimate combined with high genetic advance was observed for grain yield indicating the presence of additive genes. Number of panicles/m^2 recorded high positive significant association with grain yield. In path coefficient analysis, number of panicles/m^2 exerted high positive direct effect with grain yield. Days to 50 per cent flowering exerted high positive indirect effect on grain yield through number of panicles/m^2.

KEY WORDS : Upland rice, Variability, Correlation, Path analysis

Rice is cultivated under rainfed conditions in parts of Chengalpattu, Pudukottai, Sivagangai, Virudhunagar and Ramanathapuram districts of Tamil Nadu. Rice genotypes are being evaluated under upland conditions at the Directorate of Rice Research, Rajendra Nagar, Hyderabad. Twenty eight such rice genotypes were evaluated in terms of variability, correlation and path co-efficient analysis.

MATERIALS AND METHODS

Twenty eight rice genotypes were dry seeded on 28th September 1994 before the onset of North, East monsoon. The trial was laid out in a randomised block design with three replications. The plot size was 3.5 m x 2.5 m with a spacing of 20 cm x 10 cm between rows and plants respectively. The recommended fertiliser dose of 50:25:25 kg of N, P, K ha^{-1} was adopted. Entire P was applied as basal, entire N as top dress and the half of K as basal and the another half of K as top dress. The other recommended agronomic practices were followed. Observations were recorded on five randomly selected plants in each replication for four biometric characters. The genotypic and phenotypic variances and genetic advance were worked out according to the formula given by Johnson *et al.*, (1955). The method suggested by

Table 1. - Variability, heritability and genetic advance in upland rice

Character	Range	GV	PV	GCV	PCV % of mean	Heritability	Genetic advance
Days to 50% flowering	62.7-81.7	19.97	20.52	6.41	6.50	97.0	13.03
Plant height (cm)	64.4-106.9	96.20	101.2	12.10	12.43	95.0	24.32
No. of panicles/m²	250-652	13042.5	13619.0	28.75	29.38	95.0	57.97
Grain yield (kg/plot 8.75 m²)	0.056-2.84	0.4	0.43	42.34	43.84	93.0	84.26

GV = Genotypic variance PV = Phenotypic variance

GCV = Genotypic co-efficient of variation

PCV = Phenotypic co-efficient of variation

Burton (1952) was used to compute phenotypic and genotypic co-efficients of variation (PCV and GCV). Heritability in broad-sense was estimated according to the method suggested by Lush (1940).

RESULTS AND DISCUSSION

The heritability and genetic advance of four characters are presented in Table 1. In the present study, the highest GCV was observed for grain yield (Kaul and Kumar, 1982) followed by number of panicles/m². The GCV alone is not sufficient for the determination of amount of heritable variation. Burton (1952) suggested that GCV together with heritability estimates would give the best picture of the extent of advance to be expected by selection. Apart from showing high GCV, grain yield recorded high heritability estimates thereby pointing to the improvement of this character through simple mass selection. High heritability of days to 50 per cent flowering but with low GCV implying the non-additive gene action, resulted in low genetic advance and hence its response to selection would be poor.

In the present investigation, all the four characters recorded high heritability estimates and selection based on phenotypic values would be effective, but it does not mean a high genetic gain for a particular character. However high heritability estimates along with high genetic gain render the selection effective (Johnson *et al.*, 1955).

Genetic advance was high for grain yield followed by number of panicles/m². Association of high heritability with high genetic advance was observed in grain yield. This indicated the presence of additive gene effects and consequently a high genetic gain and phenotypic selection would

Table . Genotypic and Phenotypic Correlation Co-efficient between the characters

Characters		Plant height	No. of panicles/m²	Grain yield (kg/plot)
Days to 50%	P	0.147	0.773**	0.759**
flowering	G	0.154	0.808**	0.802**
Plant height	P	-	0.016	0.058
	G	-	0.025	0.069
No.of panicles / m²	P	-	-	0.951**
	G	-	-	0.963**

Table 3. Direct and indirect effects of different characters with grain yield

Character	Days to 50% flowering	Plant height	No. of panicles/m²	Genotypic correlation with grain yield
Days to 50% flowering	0.05602	0.00579	0.74047	0.802**
Plant height	0.00860	0.03768	0.02258	0.069**
No.of panicles/m²	0.04527	0.00093	0.91632	0.963

Underlined figures denote the direct effect

Residual Effect : 0.2655

be effective. This result was in agreement with the findings of Sawant and Patil (1955) Sarathi *et al.* (1969) and Paramasivan (1981). High heritability and moderate genetic advance for number of panicles/m² would indicate the importance of both additive and non-additive gene action in the control of the above character.

The genotypic correlations were generally higher than the phenotypic correlations, indicating the inherent association between the traits (Table 2). Number of panicles/m² showed positive and significant association with grain yield followed by days to 50 per cent flowering. Positive association of number of panicles/m² would result in more number of grains, finally leads to increased grain yield. Non significant association between grain yield and plant height indicated that both the characters inherited independantly. Days to 50 per cent flowering showed positive and significant association with number of panicles/m² and its association with plant height was positive but non-significant.

The cause and effect relationships as indicated by direct and indirect effects of component characters on yield were studied by path co-efficient analysis. Number of panicles/m² recorded the highest positive direct effect on grain yield (Table 3). Number of panicles/m² recorded high magnitude of positive genotypic correlation with grain yield. The indirect effect of days to 50 per cent flowering via number of panicles/m² was also high indicating the importance of these characters on grain yield. Days to 50 per cent flowering assumed significance in the manifestation of indirect effect.

It is evident from the study that number of panicles/m² would serve as the best criterion for increasing grain yield and due importance may be given for number of panicles/m² and grain yield in the breeding programme for the selection of suitable rice genotypes.

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