https://doi.org/10.29321/MAJ.10.A02471

Madras Agric J 71 (5) May 1984

VARIABILITY, HERITABILITY, GENETIC ADVANCE AND GENE ACTION STUDIES IN SEGREGATING POPULATIONS OF RAGI (*Eleusine coracana Gaertn.*)

PRABHAKAR[2] and M. N. PRASAD[3]

In a study on three intervarietal crosses of ragi, phenotypic coefficient of variability was found to be high for grain yield and productive tillers .High heritability with high genetic gain was noted for grain yield in all the crosses. The type of gene action was mostly additive for grain yield and productive tillers.

By resorting to hybridisation, attempts are being made to widen the variability and for the evolution of high yielding strains. Yield is diversifying in inheritance governed by many genes, which include heritable and non-heritable variations. Thus, a study of the genotypic variation assumes importance in breeding new-genotypes. The present study was undertaken to evaluate F_4 progenies of the three intervarietal crosses to assess the magnitude of variability and to understand heritable component of variation.

MATERIAL AND METHODS

The seeds of F_4 population obtained from Minormillet Section, School of Genetics, T N. A. U., Coimbatore formed the material of study. The F_4 populations were raised during summer season, 1980.

The F_4 populations of three intervarietal ragi crosses, viz , PES 187 X IE 1022 (cross A), Colo X IE 1006 (cross B) and TNAU 9 X IE 1006 (cross C), were raised in a randomised block design replicated thrice. In every replication, there were 120 families per cross. Each family was allotted a row of ten plants. The observations on the characters namely, plant height, productive tillers, days to maturity, earhead length finger number per earhead, 1000 grain weight and grain yield were made on randomly selected five plants in each family.

Data from individual plants of F_4 families were subjected to statistical scrutiny by the method of analysis of variance (Panse and Sukhatme, 1961) and the significance tests were carried out for the 'F' values as per Goulden, (1952). Phenotypic coefficient of varit ability (PCV) and genotypic coefficient of variability (GCV) were computed by following the method of Burton (1952. Heritability estimates as per the method of Lush (1940) and genetic advance as per the method of Johnson *et al* (1955). were computed The mean of F_4 variance

1. Part of the M. Sc. (Agri.) Thesis, submitted to Tamil Nadu Agricultural University, Coimbatore-3.
2. Ph. D. Scholar, Department of Agricultural Botany, College of Agriculture, Dharwad-5.
3. Professor of Millets, School of Genetics, T. N. A. U. Coimbatore-3.

and co-variance between F_2 parental value and progeny mean (as per the method suggested by Goulden, 1952) were used in the estimation of 'D' and 'H' parameters (Mather and Jinks. 1971).

RESULTS AND DISCUSSION

It was observed that PCV was higher than the GCV in all the crosses for all the characters (Table 1.). Maximum GCV estimates were recorded for grain yield in cross A, for grain yield and earhead length in cross B and for finger number and 1000 grain weight in cross C. High GCV values were recorded for these characters by earlier workers. (Patnaik and Jana, 1973, Setty *et al.* (1974 and Agalodia *et al.* 1979). However in the present study low GCV estimates, were recorded for plant height and days to maturity, which gain support from the studies by Appadurai *et al.* 1977. Selection based on the characters which have recorded maximum GCV estimates might possibly indicate their utility in selection programme.

The estimates of heritability and genetic advance provide a reliable criterion in selection programme. High heritability with high genetic advance as percentage of mean was observed for grain yield and productive tillers in cross A, for grain yield, productive tillers, earhead length and 1000 grain weight in cross B, for grain yield and productive tillers in cross C, However, highest heritability estimates were obtained for 1000 grain weight in crosses A and B, and for plant height in cross C (Table 1.). This result is in accordance with the findings of Appadurai *et al.* (1977) and Mishra *et al.* (1980). High heritability associated with high genetic gain indicates the predominant role of additive gene action in controlling the expression of these characters. viz.

Table 1. Estimates of phenotypic coefficient of variability (PCV), genotypic coefficient of variability (GCV), heritability (h^2), genetic advance (GA), and genetic advance as percentage of mean in F_2 generation of ragi crosses.

CROSS A

Characters	Mean	PCV	GCV	Heritability (h^2)	Genetic advance	GA as percentage of mean
Grain yield	20.11	46.52	35.69	58.64	7.68	38.10
Plant height	97.59	17.34	17.01	96.30	15 04	15.40
Productive tillers	2.79	26.52	18.28	48.15	0.79	28.30
Days to maturity	108.90	6.52	6.39	69 64	5.18	4.80
Earhead length	6.17	20.75	18.16	77.16	1 27	20.60
Finger number	7.00	18.60	17.88	95.68	1.35	19.30
1000 grain weight	2.18	15.76	15.62	99.11	0.31	14.20

CROSS B

Characters	Mean	PCV	GCV	Heritability (h^2)	Genetic advance (GA)	GA as percentage of mean
Grain yield	18.78	45.95	34.40	56.01	7.26	38.70
Plant height	92.37	20.29	18.17	80 24	14.11	15 30
Productive tillers	2.76	40.79	28.88	50.39	0.74	25.90
Days to maturity	95.23	17 23	14.30	68.94	15.62	16.40
Earhead length	7.52	31.25	30.45	95.64	2.10	27.90
Finger number	6.35	26.93	19 37	51.54	1.21	19.10
1000 grain weight	2.14	24.61	24.17	98.21	0.60	28.00

CROSS C

Characters	Mean	PCV	GCV	Heritability (h_s)	Genetic advance (GA)	GA as percentage of mean
Grain yield	18.14	39.87	23.84	59.79	7.78	42.89
Plant height	104.11	12.43	12,42	99 92	16.76	16.04
Productive tillers	2.57	30.64	22.01	71.83	1.11	43.19
Days to maturity	104.47	7.06	5.77	81.73	9.48	9.07
Earhead length	8.58	8.07	7.28	90.21	1.78	20.75
Finger number	9.23	29.43	29.17	99.12	1.73	18.74
100 grain weight	2.38	29.74	28.52	95.90	0.49	20.61

Table-2: Components of Variance of three crosses of ragi in F_4 generation

Characters	Cross A			Cross B			Cross C		
	D	H	E	D	H	E	D	H	E
Grain yield	108 03	−301.40	36.37	205.79	— 559.88	32.80	145.42	−94.55	33.61
Plant height	*	*	*	381.51	— 859.39	9.42	1715.90	−295.06	0.28
Productive tillers	4.59	— 1.50	0.26	3.42	— 8.96	0.63	7.25	— 1.44	0.30
Days to maturity	1094.10	−2377.65	15.34	190.27	−1688 59	83.61	*	*	*
Earhead length	*	*	*	1 73	— 6.23	0.24	50.14	−97.98	0.08
Finger number	*	*	*	*	*	*	48.32	−90.25	0.13
1000 grain weight	*	*	*	0.07	— 0.29	0 01	0 19	−1.04	0 04

D= Additive variance H= Dominant deviation E= Environmental variance
X* Indicates negative covariance, hence the parameters were not calculated.

grain yield, productive tillers and 1000 grain weight in the present study.

The expression of a character depends on the type of gene action. In this study, pre-dominance of additive gene action was noticed for grain yield and productive tillers in all the crosses. in cross A, days to maturity also exhibited additive gene action while the other characters, viz, plant height, earhead length, finger number and 1000 grain weight showed non additive gene action. in cross B, all the characters except finger number showed additive type of gene action, while in cross-C it was for all the characters except days to maturity. The absence of additive gene action for the particular character may probably due to the fact that non-additive gene action alters the mean of the trait. This result is in complete harmony with earlier reports of Natarajamoorthy (1979) in rice, as he observed additive gene action for plant yield.

From the foregoing discussion, it was confirmed that crosses A and C were better than cross B, since the mean performance variability and type of gene action are in positive direction.

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