

## Studies on stability analysis in upland rice (*Oryza sativa*)

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### ABSTRACT

A set of nine promising varieties of rice were evaluated for three consecutive years (2003-05) at Research Station Jagdalpur situated in Bastar plateau zone of Chhattisgarh state of India under Upland rice Shuttle Breeding network Project. The layout of the trial was in RBD with three replications. Variety 'Anjali' is found suitable for all environments due to low mean square deviation from regression function and regression value close to unity. Higher grain yield was recorded by Anjali (25.14q/ha) followed by Annada (24.73q/ha), Ashoka 200F (23.68q/ha), Ashoka 228 (22.24q/ha), Poornima (21.66q/ha) and Danteshwari (21.47q/ha). The varieties Danteshwari and Poornima can be grouped as highly responsive varieties and suitable for favorable environments, since their *bi* values (2.79, 2.71, respectively) exceeded unity.

**Key words :** Rice, Stability, Analysis and variance

### INTRODUCTION

A Phenotype is the interplay of genotype and environment. A specific genotype does not exhibit the same phenotype under the changing environments and different genotypes respond differently to a specific environment. The existence of interaction between genotype and environment has been recognized by Fisher and Mackenzie (1923). In present investigation, the approach suggested by Eberhart and Russell (1966) has been employed to understand the differential G x E interactions of varieties to assess the stability of the performance of different genotypes.

### MATERIALS AND METHODS

The material for the investigation comprised nine upland rice varieties. The experiment was conducted in the *kharif* season for three consecutive years *i.e.* 2003-05. Data was recorded in each plot for grain yield (kg/ha.). Data was subjected to stability analysis following Eberhart and Russell (1966).

### RESULTS AND DISCUSSION

The pooled analysis for variance revealed that the mean square of the genotypes as well as the environments were significant for grain yield, when tested against both the pooled deviation and pooled error (Table 2), indicating genetic control of response to environments and independent nature of genetic system in controlling stability response. The significance of mean squares due to G x E for grain yield indicated that genotype interacted significantly with the environments. The linear response

to environments also differed significantly, when tested against pooled deviation and pooled error revealing the importance of additive environmental variance. It also indicated that the simulated environments, selected for testing of genotype, varied in their effects on the

**Table 1 : Parameters of stability for grain yield in rice**

Sr. No.	Genotype	Mean yield (q/ha.)	<i>bi</i>	S <sup>2</sup> <i>di</i>
1.	Ashoka 228	22.24	0.62	29.29**
2.	Ashoka 200 F	23.68	0.57	35.30**
3.	Vandana	20.16	0.74	38.45**
4.	Anjali	25.14	0.90	6.84
5.	Danteswari	21.47	2.79	134.34**
6.	Poornima	21.67	2.71	93.37**
7.	Narender -97	18.91	0.06	2.13
8.	Annada	24.73	0.29	0.63
9.	Heera	13.54	0.43	1.36
	Mean	21.28	1.01	0.46

\* and \*\* indicates significance of values at P=0.05 and 0.01, respectively

**Table 2 : Pooled analysis of variance for grain yield in rice**

Sr. No.	Source	d.f.	S.S.	M.S.
1.	Total	26	931.70	-
2.	Genotype (G)	8	301.31	37.66*
3.	Environment (E) +(GXE)	18	630.39	35.02*
4.	Environment (Linear)	1	148.52	148.52**
5.	G x E (Linear)	8	140.15	17.51
6.	Pooled deviation	9	71.64	7.96**
7.	Pooled error	54	-	2.401

\* and \*\* indicates significance of values at P=0.05 and 0.01, respectively

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performance of genotypes. The fact that, environment (linear) differed wide could further be supported by widely rang of environmental indices obtained for grain yield studied. A highly significant pooled deviation was observed for grain yield revealing thereby that the genotypes differed considerably with respect to their stability. Higher grain yield was recorded by Anjali followed by Annada, Ashoka 200F, Ashoka 228, Poornima and Danteshwari. Considering the individual parameters of stability, variety Anjali and Annada exceeded the mean grain yield of varieties over environment and possess low mean square deviation from regression function. Hence, these two varieties can be treated as most desirable and stable with wider adaptation to all the environments. On the other hand the varieties Danteshwari and Poornima can be grouped as highly responsive varieties and suitable for

favorable environments, since their  $bi$  values exceeded unity. Ashoka 228 and Vandana showed the average mean yield but they possess lower regression values and as such they were found to be better suited for poor environments. However, the performance could not be predicted, as their  $S^2 di$  values are highly significant.

## REFERENCES

**Eberhart and Russell (1966)** has been employed to understand the differential G x E interactions of varieties to assess the stability of the performance of the genotypes.

**Fisher and Mackenzie (1923)**. The existence of interaction between genotype and environment has been recognized.

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