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Stability analysis of upland rice under different agro-climatic conditions

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ABSTRACT

The genotype x environment(GxE) interaction for grain yield and some associated traits was studied in forty five rainfed upland rice genotypes under eight different environments in Allahabad (U.P) and Ranchi (Jharkhand) during wet season 2009-10 and 2010-11. The pooled analysis of variance indicated that the mean sum of square due to genotypes for all the traits and G E interaction for many traits were significant which clearly indicated that the genotypes differ in their adaptability and stability. The significant G x E interaction (linear) of many traits indicated differential response of the genotype to environmental changes. The pooled deviations were also significant for all the traits studied which suggested that these genotypes differed in their deviation from linearity. Stability parameters (mean, bi and s^2di) of the genotypes estimated separately over eight environments. Considering all the stability parameters, seven genotypes namely BAU 438-6-2, OR 2084-2, BAU 363-96 , RR-410-79-1-B-D_2-B , NDR-1054-4-1 , BAU/GVT 435-06 and UPRI-2004-6 were selected as stable and desirable for rainfed upland condition.

Key words: *Upland rice, agro-climates, environment, stability*

Rice is the world's most important staple food crop and is widely cultivated in India. Of all the ecotypes, the upland ecology is more variable and the varietal improvement is challenging. Only 15 % of the varieties released are for rainfed upland ecology and thus there is a need to develop varieties with yield potential and stable performance over a wide range of environments. Identification of such varieties will have a considerable significance in crop improvement. Therefore, an effort has been made to identify stable rice genotypes under upland rice.

The experimental material of the present investigation comprised of forty five upland rice genotypes collected from different institute. The genotypes were grown under eight environments consisted of two locations (Allahabad & Ranchi), two seasons (wet 2009-10 and 2010-11) and two dates of sowing (normal and late) in each season and each location. The experimental materials were sown as direct seeded in randomized complete block design with three replications. The experiment were conducted at the field experimentation centre, Department of Genetics and Plant Breeding, Sam Higginbottom Institute of Agriculture, Technology and Science, Deemed University, Allahabad and in Rice Experimental Area of Department of Plant Breeding and Genetics, Birsa Agricultural University, Ranchi, Jharkhand. Each entry was sown in 5 rows plot of 5 m. length with 20 cm. row spacing. Five plants from each replication were selected randomly and observation were recorded on ten characters *viz*; plant height (cm), panicle length (cm), panicles/ plant, spikelets/ panicle, days to maturity, filled grains/ panicle, unfilled grains/ panicle, harvest index %, test weight (g) and yield / plant (g) while days to maturity was computed on plot basis. The mean data of each character was subjected to analysis of variance. For computation of stability parameters, pooled analysis over environments was carried out following Eberhart and Russell (1966).

The analysis of variance for stability revealed significant differences among genotypes and the environments (Table1). The significant genotype x

Table.1. Estimation of Pooled analysis of variance for 10 characters involving 45 genotypes over two locations (Allahabad and Ranchi), two dates of sowing and two seasons (wet, 2009-10 & 2010-11)

Sourceof variation	d.f	Plant height	Panicles/ Plant	Panicle length	Spikelets/ Panicle	Filled grain	Unfilled grain	Days to maturity	Harvest index	Test weight	Grain yield/ Plant
Rep withinEnv.	16	5.06	0.16**	0.54	3.16	3.67	1.38	2.50	3.92	0.14	0.34
Varieties	44	602.71**	0.45**	4.04**	112.24**	142.32**	35.47**	401.94**	99.31**	23.97**	11.69**
Env.+(Var.*Env.)	315	33.77**	0.11**	1.41**	20.79**	22.71**	7.14*	4.51**	15.88**	0.51**	0.98**
Environments	7	714.91**	2.46**	30.05**	269.21**	348.85**	35.38**	76.68**	456.56**	9.23**	22.68**
Var.* Env.	308	18.29**	0.06	0.76	15.14**	15.30**	6.50*	2.87	5.87**	0.31	0.48*
Environments(Lin)	1	5004.36**	17.22**	210.35**	1884.48**	2441.95**	247.64**	536.77**	3195.92**	64.58**	158.75**
Var.* Env(Lin.)	44	29.26**	0.05	0.78	16.96	26.67**	11.38**	1.07	19.48**	0.27	0.81**
Pooled Deviation	270	16.10**	0.06**	0.74**	14.51**	13.11**	5.56**	3.11**	3.52**	0.31**	0.42**
Pooled Error	704	0.56	0.01	0.09	0.68	0.77	0.86	0.42	0.62	0.05	0.07
Total	359	103.50	0.15	1.74	32.00	37.37	10.61	53.22	26.11	3.39	2.29

* and ** Significant at 5% and 1%

environment interaction were also observed for the characters like plant height, spikelets/ panicle, filled grain/ panicle, unfilled grain/ panicle, harvest index and yield / plant indicating that all the genotypes interacted considerably well with the varying environmental condition. The results are in close agreement with the earlier findings of Kumar and Prasad (1991), Mishra and Das (1997), Kumar Raja *et al.* (2004), Pande *et al.* (2006) and Panwar *et al.* (2008). The significant pooled deviation for all the characters indicated the importance of non-linear components in determining the interaction of genotypes with grain yield and their deviation from linear response. It also indicated that genotypes differed considerably with respect to their stability for grain yield. Similar findings were also reported by Arumugan *et al.* (2007), Bastia *et al.* (2010), Chaudhari *et al.* (2002) , Kumar and Prasad (1991) and Nanita Devi *et al*. (2009).

Genotypes were considered to be stable when the regression coefficient (bi) was near unity *i.e.* non significant, the deviation from regression (s^2di) was either zero or non significant with high mean performance. The estimates on the three stability parameters *viz.*, mean performance (µi), regression coefficient (bi) and deviation from regression (s^2di) for different characters are presented in Table 2.

In the present study, Birsa Dhan-108 was earliest in maturity. Considering all the three stability parameters, six genotypes namely Birsa Dhan-108, Vandana, BAU/GVT 435-06, BAU 419-05, Richa-6 and BAU/GVT 470-07 had lower mean value *i.e.* desirable and stable for days to maturity. In respect of plant height RICHA-6, BAU/GVT437-06 and RPHR 288-6 were found to be stable. The genotype RICHA-6 and BAU/GVT437-06 received higher mean plant height where as RPHR 288-6 gave medium plant height. The genotype Birsa Dhan-108 and WR-1-1-9-1-1 having bi < 1 and s^2di =0 expected to give stable plant height in poor rice growing condition.

Seventeen genotypes were found to be stable for panicles per plant. Six genotypes namely Birsa VikashDhan-110, Vandana, PY-84, BAU/GVT 471-08, OR 2084-2 and UPRI-2004-6 were found with higher mean panicles per plant. Therefore, these six genotypes were considered as stable and desirable for panicles per plant. R-1448-35-18-3-1 had bi <1 and s^2di =0 may perform well in poor rice growing condition.

Table 2. Estimation of stability parameters of the forty five genotypes

Genotypes	Plant height (cm)			Panicles plant			Panicles length (cm)		
	Mean	bi	S²Di	Mean	bi	S²Di	Mean	bi	S²Di
Birsa Dhan -108	70.833	0.325**	1.297	3.708	0.492	0.001	19.842	1.131	0.892**
Birsa Vikas Dhan -109	83.388	0.654	12.792**	3.754	0.536	0.038*	20.642	0.723	0.344**
Birsa Vikas Dhan -110	86.696	0.809	29.924**	3.871	0.478	0.020	20.021	0.438	1.967**
Birsa Gora 102	88.983	1.011	6.029**	4.188	0.916	0.075**	20.042	0.300	1.396
Vandana	90.112	1.434	16.200**	4.013	0.838	0.015	19.750	0.540	0.229*
Anjali	79.950	1.138	43.722**	3.650	0.656	0.053**	20.075	0.675	0.395*
PY-84	86.958	1.669	27.554**	3.846	0.805	0.029	19.146	0.264*	0.475**
BAU/GVT435-06	87.250	1.489	12.231**	3.617	0.475	0.091**	20.100	1.191	1.090**
BAU404-02	70.842	0.731	12.795**	3.725	1.211	0.042**	19.129	0.920	0.221*
BAU 363-96	92.175	1.204	4.047*	3.988	0.956	0.125**	20.888	1.283	0.638**
BAU 438-6-2	93.008	0.311	23.353**	3.542	0.769	0.014	19.908	0.913	0.979**
BAU/GVT 471-08	88.325	0.986	5.377**	3.904	0.755	0.015	20.713	1.237	0.175
KALINGA III	76.942	0.830	26.054**	3.429	0.779	-0.006	18.638	0.752	0.090
BAU 419-05	92.850	1.374	9.427**	3.488	0.779	0.007	19.733	0.588	0.695**
BAU 409-05	92.142	1.210	4.117*	3.663	0.960	0.003	20.563	0.973	0.698**
RICHA -6	91.238	1.037	0.398	3.933	0.985	0.014	21.058	0.699	0.092
RR-410-79-1-B-D2-B	87.492	1.651	7.685**	3.450	0.240*	0.077**	19.721	0.579	0.663**
RR-433-1	86.633	1.086	4.656*	3.767	0.981	0.013	21.367	0.700	0.380**
OR-1509-4	71.342	0.745	6.220**	3.383	0.739	0.027*	18.488	0.202*	0.892**
OR 2084-2	65.025	0.308*	5.591**	3.825	0.744	0.018	19.363	0.519	0.485**
R-1448-35-18-3-1	74.717	1.760	32.004**	3.088	0.068*	0.015	18.621	1.069	0.521**
RR-363-2-1	95.863	1.297	37.181**	3.500	1.381	0.022*	21.046	1.096	0.810**
HUR-1003-6	86.629	1.048	55.580**	3.596	1.333	0.160**	18.958	0.535	1.011**
OR-17377-4	67.054	0.485	21.973**	3.600	1.658*	0.051**	19.188	1.306	1.515**
NDR-1054-4-1	85.842	1.606	18.681**	4.013	1.339	0.103**	19.988	0.724	0.049
BAU/GVT 469-07	90.550	2.589*	28.533**	3.450	0.814	0.048**	20.500	1.072	0.289**
BAU/GVT437-06	96.329	1.416*	1.214	3.633	1.122	0.051**	20.904	1.526	1.459**
CR-2340-2	72.475	0.229	11.374**	3.196	0.879	0.080**	19.496	1.616*	0.939**
RRU-2840	80.933	0.785	7.993**	3.708	1.325	0.053**	19.708	1.330	0.526**
BAU/GVT470-07	82.896	1.802*	10.587**	3.254	1.152	0.045**	20.358	1.447	0.196*
HUR-SG-107-06	83.758	1.700	30.524**	3.450	1.475	0.053**	19.250	1.369	1.046**
DDR-105	86.608	0.732	14.296**	3.996	0.874	0.088**	19.496	1.584*	0.614**
OR-1774-4	77.242	0.765	9.351**	3.392	1.258	0.058**	19.321	1.508	0.273*
RPHR 288-6	80.550	1.048	2.662	3.858	1.070	0.130**	19.625	1.751*	1.311**
WR-1-1-9-1-1	70.050	0.556**	-0.246	3.629	1.416	0.040*	18.708	0.838	0.207*
CRR-614-IR74-371-46-1-1	76.508	0.806	16.490**	3.804	1.718*	0.069**	19.163	1.770*	0.673**
TRC-87-251	67.038	0.644	9.172**	3.729	1.502	0.010	19.538	0.929	0.071
CB-04-108	74.758	-0.163	28.146**	3.479	1.472	0.008	19.333	1.225	2.245**
R-1831-RF-16	78.408	0.542	4.967**	3.471	0.980	-0.006	18.867	1.282	0.236*
ANANDA	69.258	0.806	10.794**	3.742	1.018	0.022*	19.404	0.741	0.028
JGL-11097	73.325	0.735	9.727**	3.500	1.093	0.032**	19.354	1.331	0.292**
GOVIND	74.883	0.576	27.036**	3.896	1.245	0.033**	19.392	1.130	0.811**
NDR-1036-4-1	75.711	0.962	31.942**	3.533	1.209	0.006	19.333	1.137	0.313**
IR 74371-70-1-1-CRR-1	71.125	0.866	4.041*	3.404	1.502	0.030*	19.233	1.407	0.182
UPRI-2004-6	77.567	1.404	11.287*	3.896	1.005	0.027	19.550	0.650	0.445**
Population Mean	81.161			3.657			19.723		
Std. Err. Mean	1.516			0.092			0.326		
Bi Mean	1				1			1	
Std. Err. Bi	0.381				0.392			0.398	

*and ** Significant at 5% and 1%

Conted.........

Genotypes	Spikelets / panicle			Filled grain			Days to Maturity		
	Mean	bi	S²Di	Mean	bi	S²Di	Mean	bi	S²Di
Birsa Dhan -108	68.104	1.573	2.098**	59.196	0.522	5.171*	83.417	1.058	0.704
Birsa Vikas Dhan -109	64.967	-0.042*	9.762**	57.350	-0.457*	26.166**	89.208	1.322	2.428**
Birsa Vikas Dhan -110	64.521	-0.076*	20.689**	55.717	-0.428*	18.933**	91.417	1.142	4.339**
Birsa Gora 102	66.075	0.309	30.206**	61.013	0.185	23.350**	96.292	1.066	2.993**
Vandana	66.392	0.544	13.398**	60.279	0.167	8.439**	96.375	0.996	-0.201
Anjali	64.746	0.912	1.485	57.946	0.533	1.734	96.875	1.082	1.906**
PY-84	63.496	1.294	6.183**	56.250	0.566	2.021	95.000	1.257	2.022**
BAU/GVT435-06	66.733	1.761	27.528**	58.696	1.346	8.247**	95.708	1.055	0.077
BAU404-02	67.483	1.494	8.271**	58.304	0.585	6.583*	104.292	1.882*	3.581**
BAU 363-96	65.617	-0.256*	62.210**	56.267	-0.070	49.891**	104.708	1.139	0.708
BAU 438-6-2	71.513	1.797	9.451**	59.917	1.697	21.173**	108.083	0.697	9.113**
BAU/GVT 471-08	64.413	1.578	6.282**	54.379	0.945	3.631*	93.542	0.831	1.600**
KALINGA III	70.349	1.313	21.952**	59.646	1.019	7.183*	95.458	1.041	2.151**
BAU 419-05	73.313	2.248*	11.755**	62.513	1.256	7.539*	97.125	1.137	0.332
BAU 409-05	65.533	0.321*	2.468**	56.900	0.118*	4.345*	94.625	1.168	6.726**
RICHA -6	71.096	0.018	40.271**	61.517	0.174	35.961*	93.500	1.098	0.357
RR-410-79-1-B-D2-B	67.088	1.447	5.803*	54.663	1.603	2.739*	107.917	0.775	0.513
RR-433-1	59.117	0.486	10.234**	49.483	1.125	14.515**	107.500	1.107	0.613
OR-1509-4	63.729	1.526	3.460**	51.700	1.485	1.561	109.167	1.112	1.630**
OR 2084-2	69.271	0.824	0.791	59.180	0.641**	-0.730	103.833	1.139	5.247**
R-1448-35-18-3-1	63.900	1.222	11.805**	54.446	0.879	10.378*	111.042	0.910	2.607**
RR-363-2-1	67.075	1.313	1.123	52.946	1.797	7.687*	101.875	1.645*	4.703**
HUR-1003-6	66.358	1.364	8.180**	57.754	1.336	5.281*	104.833	0.811	1.630**
OR-17377-4	68.071	1.347	16.388**	58.058	1.110	26.751**	107.708	1.207	4.649**
NDR-1054-4-1	76.863	1.485	24.753**	67.733	1.231	15.511**	104.583	1.605*	2.031**
BAU/GVT 469-07	65.492	0.836	18.801**	56.167	1.295	22.202**	100.333	1.034	5.479**
BAU/GVT437-06	72.442	1.582	35.057**	61.442	1.649	13.612*	107.333	0.692	0.580
CR-2340-2	62.983	1.473	19.674**	50.013	1.593	24.126**	110.667	0.848	2.437**
RRU-2840	64.179	-0.292*	10.782**	53.304	0.453*	1.189	107.500	1.005	7.228**
BAU/GVT470-07	65.896	-0.045*	22.210**	56.704	-0.025	23.261**	99.958	1.338	0.283
HUR-SG-107-06	61.046	0.880	3.820**	48.883	1.075	1.754	113.417	0.581*	0.186
DDR-105	73.150	0.535	1.924*	63.675	0.727	0.574	101.917	0.622	4.642**
OR-1774-4	63.488	0.782	5.579**	51.142	1.846	7.079*	109.792	0.511*	0.936*
RPHR 288-6	70.621	0.732	2.428**	61.567	0.563	5.482*	109.292	0.724	5.322**
WR-1-1-9-1-1	72.125	1.860	24.011**	60.479	2.325	17.461**	108.500	0.919	3.927**
CRR-614-IR74-371-46-1-1	65.850	1.146	2.763**	55.583	1.292	2.103	109.375	0.872	4.334**
TRC-87-251	68.354	1.377	4.972**	58.253	0.966	3.407*	110.458	1.197	3.164**
CB-04-108	58.592	0.670	1.670*	48.383	1.030	-0.236	109.125	0.736	2.081**
R-1831-RF-16	64.213	0.391	4.917**	52.129	1.378	2.907*	107.625	0.839	1.851**
ANANDA	72.746	1.942	45.019**	62.325	2.161	51.650**	107.083	1.018	4.834**
JGL-11097	65.588	1.489	1.540*	52.529	1.693	4.344*	111.083	0.779	0.092
GOVIND	65.396	0.646	1.109	56.421	0.315*	3.078*	109.792	0.166*	3.845**
NDR-1036-4-1	69.096	1.302	42.983*	54.888	2.430	37.656**	108.333	0.954	2.758**
IR 74371-70-1-1-CRR-1	67.917	1.248	2.952**	51.829	1.954	8.624*	110.875	0.864	-0.213
UPRI-2004-6	67.046	0.643	11.012**	55.692	0.915	7.984*	102.042	1.019	2.445**
Population Mean	66.683			56.695			103.3		
Std. Err. Mean	1.440			1.368			0.700		
Bi Mean		1			1			1	
Std. Err. Bi		0.589			0.491			0.500	

* and ** Significant at 5% and 1%

Conted.........

Genotypes	Harvest index %		Test weight (g)	Grain yield / plant (g)					
	Mean	bi	S²Di	Mean	bi	S²Di	Mean	bi	S²Di
Birsa Dhan -108	32.544	1.096	4.399**	19.872	0.941	0.011	6.597	0.786	0.003
Birsa Vikas Dhan -109	36.003	0.738	1.407*	22.452	1.079	0.038	7.419	0.450	0.620**
Birsa Vikas Dhan -110	35.491	0.318*	1.969**	23.180	1.593	1.035**	6.868	0.325*	0.338**
Birsa Gora 102	41.938	0.364**	0.468	24.941	1.227	0.076	10.453	0.875	0.252**
Vandana	42.079	0.916	4.498**	23.747	1.346	0.256**	9.410	2.234*	1.419**
Anjali	37.633	0.452*	4.646**	23.024	0.362*	0.015	8.280	0.504	0.491**
PY-84	38.518	0.894	4.943**	23.559	0.939	0.493**	9.021	2.200*	0.737**
BAU/GVT435-06	38.263	1.014	0.826	23.468	0.779	-0.013	8.731	1.455	0.401**
BAU404-02	33.123	-0.260**	5.715**	23.407	0.905	0.018	7.419	0.769	0.102
BAU 363-96	34.300	0.800	1.151	22.843	0.460*	-0.014	8.113	1.259	0.002
BAU 438-6-2	38.550	0.728	2.619**	22.453	0.991	0.132*	9.156	0.946	0.125
BAU/GVT 471-08	39.323	1.674*	9.498**	21.225	0.536	0.466**	7.344	1.494	0.622**
KALINGA III	33.247	0.842	0.820	22.654	0.550	-0.027	7.183	1.598*	0.361**
BAU 419-05	31.683	0.539*	0.888	22.288	0.812	-0.022	7.419	1.216	0.176*
BAU 409-05	30.825	0.274**	1.884*	24.388	1.496	0.208**	7.371	0.920	0.074
RICHA -6	33.371	-0.374**	2.880**	24.417	1.273	0.141*	8.317	-0.219*	1.348**
RR-410-79-1-B-D2-B	34.108	1.074	5.947**	22.946	0.781**	-0.047	7.719	1.006	0.016
RR-433-1	36.402	0.284*	4.898**	23.037	0.536	0.018	8.682	1.170	0.299**
OR-1509-4	30.796	0.957	0.473	22.868	0.706	-0.028	6.792	1.099	-0.048
OR 2084-2	34.871	0.799	2.454**	22.966	0.793	0.000	8.368	0.845	0.125
R-1448-35-18-3-1	26.228	1.058	2.345**	19.308	0.866	0.574**	4.783	0.460*	0.192*
RR-363-2-1	32.719	1.082	1.329*	21.763	0.292**	0.794**	6.770	0.726	0.219**
HUR-1003-6	34.986	1.210	0.683	21.155	0.276**	1.308**	7.027	0.289*	0.665**
OR-17377-4	33.258	1.991*	4.601**	22.294	1.401	0.178**	6.666	1.344	0.044
NDR-1054-4-1	37.796	0.999	1.656*	23.046	1.120	0.007	7.683	0.819	0.037
BAU/GVT 469-07	30.690	1.603*	10.273**	21.593	0.465	1.123**	5.926	0.976	0.687**
BAU/GVT437-06	34.160	1.422	4.256**	19.660	0.963	0.315**	7.632	1.163	0.039
CR-2340-2	32.396	1.691*	2.525**	19.662	0.923	0.159**	6.457	1.014	0.052
RRU-2840	33.125	1.114	1.597*	18.614	0.666	0.033	6.125	0.804	0.032
BAU/GVT470-07	33.773	1.219	1.271*	20.208	0.685	0.583**	6.751	0.753	0.012
HUR-SG-107-06	26.665	0.627	2.915**	20.502	1.827**	0.191**	4.898	0.624	0.077
DDR-105	37.172	1.039	4.422**	21.967	1.834*	0.061	8.190	0.852	1.227**
OR-1774-4	31.833	1.231	0.439	20.305	1.471	0.096*	5.307	0.933	0.025
RPHR 288-6	30.963	0.795	1.095	20.863	1.298	0.302**	7.169	0.439*	0.191*
WR-1-1-9-1-1	31.126	1.307	1.744*	20.903	1.508	1.367**	6.580	1.096	0.026
CRR-614-IR74-371-46-1-1	32.615	0.909	1.628*	19.576	0.932	0.017	7.411	0.755	0.950**
TRC-87-251	36.249	1.668*	3.341**	19.334	0.980	0.122*	6.682	1.443	0.562**
CB-04-108	30.951	1.597*	4.941**	19.059	0.565	0.028	5.423	1.530	0.427**
R-1831-RF-16	31.785	1.576*	2.013**	18.874	0.846	0.169**	6.084	1.200	0.158*
ANANDA	32.429	2.202**	0.777	20.988	1.731**	0.427**	6.654	1.436	0.808**
JGL-11097	29.096	1.343	1.613*	19.568	0.822	-0.014	5.475	0.902	0.126
GOVIND	36.858	1.142	1.409*	19.378	0.661	0.055	8.318	1.918*	1.050**
NDR-1036-4-1	31.378	1.393*	1.003	19.762	1.751**	0.721**	6.302	1.174	0.144*
IR 74371-70-1-1-CRR-1	28.163	0.981	6.643**	20.319	1.684*	0.261**	6.298	0.532	0.376**
UPRI-2004-6	34.380	0.672	0.430	20.041	1.327	0.104*	7.457	0.888	0.067
Population Mean	33.841			21.522			7.216		
Std. Err. Mean	0.709			0.211			0.245		
Bi Mean		1			1			1	
Std. Err. Bi		0.223			0.466			0.345	

For panicle length, only two genotypes namely BAU/ GVT 471-08 and Richa-6 were found with higher average mean panicle length and were stable. Although RR-433-1 having maximum panicle length with bi as unity but s^2 di significant therefore it is unstable. In respect of spikelets per panicle four genotypes *viz.*, Anjali, OR 2084-2, RR-363-2-1 and Govind were found to be stable. Among these four genotypes RR-363-2-1 had the highest average mean of spikelets per panicle and found as desirable one.

Among seven these stable genotypes for grains/panicles only two genotypes *i.e.*, DDR-105 and Anjali had higher average mean filled grain and considered as desirable and stable genotypes. OR 2084-2 and RRU -2840 had bi< 1 and s^2di =0 may give better performance in poor or unfavorable environments. In respect of unfilled grain, the Birsa Gora-102 and Anjali had lower mean group for unfilled grain.

Regarding harvest index, eight genotypes were stable. Of these stable genotypes BAU/GVT 435-06 (38.26), BAU 363-96 (34.30) and HUR-1003-6 (34.99) were found with higher mean harvest index and therefore they are desirable genotypes for harvest index. Although highest harvest index was observed in the Vandana variety, genotypes like Birsa Gora -102 and BAU 419-05 showed bi<1 and s^2di =0 may perform well in poor environment whereas Annanda and NDR-1036-4-1 having bi>1 and s^2di =0 were although not stable but expected to perform better in rich rice growing condition.

Out of all the stable genotypes, ten genotypes were found with higher average mean test weight than population mean. The genotype Birsa Gora-102 having highest test weight bi = 1 (unity) and s^2di =0 was adjudged as the best desirable and stable genotype.

The characters grain yield per plant, which is one of the most economic character was found to be stable in nineteen genotypes. Out of the nineteen stable genotypes, only three genotypes *i.e.*, BAU 363-96, BAU 438-6-2 and OR 2084-2 were of commercial interest, because they had higher average grain yield per plant along with desirable stability parameters also. Birsa Dhan-108 although recorded as a medium duration group with average yielder but was stable and early maturity duration. Therefore this variety is also suitable for rainfed upland situation.

Further out of the nineteen stable genotypes, only seven genotypes namely BAU 363-96, BAU 438-6-2, OR 2084-2, RR-410-79-1-B-D2-B, NDR-1054-4-1, BAU/ GVT437-06 and UPRI-2004-6 were of commercial interest, because they had higher average grain yield per plant as well as showing desirable stability parameters. Birsa Dhan-108, a medium duration maturing variety of average yielding but was stable showing minimum duration among the studied genotypes. The OR 2084-2 was found as stable for maximum yield contributing characters like panicles / plant, spikelets / panicle, test weight and grain yield / plant.

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