



FIELD EVALUATION OF HIGH YIELDING AND LOCAL PADDY CULTIVARS OF FARMERS SEEDS SOURCE IN SOUTHERN TRANSITIONAL ZONE (ZONE-7) OF KARNATAKA AGAINST BLAST DISEASE

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ABSTRACT

A total of twenty nine paddy cultivars (twenty one varieties, one hybrid and seven Local) were collected from different farmers comes under southern transitional zone (Zone - 7) of Karnataka and screened for Leaf blast disease under field conditions at Agricultural and Horticultural Research Station, Bavikere during *Kharif* 2012 and 2013 seasons. The results indicate that all the twenty one high yielding varieties and a hybrid do not possess the resistance level against blast disease. However, early variety Jyothi, hybrid KRH-2, four mid duration and five long duration varieties were moderately susceptible, while eight varieties were susceptible and the remaining three are highly susceptible. The local paddy cultivars remained moderately resistant to leaf blast disease. Hybrid KRH-2 and varieties *viz.*, KHP-2, KHP-5 and KHP-9 gave significantly higher grain yield (61 to 67 q/ha) compared to local cultivars and other high yielding varieties. The local cultivar Bhagya Jyothi performed better yield (55 q/ha) and can be exploited for blast tolerance breeding work.

KEY WORDS: Screening, varieties, Leaf blast, *Pyricularia oryzae*, *Oryza sativa* L.

INTRODUCTION

Rice (*Oryza sativa* L.) is the most important staple food crop of India and is a major source of calories for about 60% of the world population. In India, it is cultivated on an area of 53.2 million hectares with a total production of 99.8 million tons. In Karnataka it is cultivated to an extent of 1.53 million hectares with a total production of 3.80 million tons (Anonymous, 2011). Thus present levels are poor compared to other developed countries of the world due to several biotic and abiotic factors. Disease spectrum and intensity are changing continuously because of dynamic nature of rice culture, where in local weather fluctuations and water need are crucial. Rice blast, caused by *Magnaporthe oryzae* B. Couch (anamorph = *Pyricularia oryzae* Cavara) [previously known as *Mangaporthe grisea* (Hebert Barr) (Couch and Kohn, 2002), is the most destructive seed borne disease and widely prevalent in all rice growing ecosystems (Talbot, 2003). Blast may reduce rice yield significantly, particularly in the temperate flooded and tropical upland rice ecosystems (Ou, 1985). In Karnataka blast occurrence is very common and often resulting in severe losses. In transitional, hilly and coastal zones it is quite endemic in certain patches especially under Coorg conditions. Among the different approaches, developing and using resistant varieties is the most practical and economical to overcome blast incidence. However, their use has not been completely successful due to the presence of different strains overcoming host resistance. In recent years, many paddy varieties have been introduced into the zone of local importance for yield and quality benefits. It is

likely that within the growing conditions of farmers, the original seed gets admixture and so also loss of original tolerance capacity. It necessitates screening of these introduced varieties then and now taking seeds from farmers end against any major diseases under prevailing habitat. Under natural field scenario, owing to changing weather conditions, varying cultural practices and prevalence of different strains paves way for interactions resulting through screening. Keeping these points in view, the present study was under taken by collecting seeds of local cultivars, high yielding varieties and as well hybrids from farmers end and screening them against blast incidence.

MATERIALS & METHODS

The present study was carried out at Agricultural and Horticultural Research Station, Bavikere (13°42'21.8"N, 75°41'55.09"E), Tarikere (Tq), Chickamagalur (Dist.), Karnataka during kharif 2012 and 2013 seasons. The soil of the experimental plot was clay loam, neutral in reaction (Ph 6.8), high in organic carbon content (1.0%), low with respect to available nitrogen (192 kg/ha) and available phosphorus P₂O₅ (19.6 kg/ha), wherein medium with respect to available potassium (185 kg/ha) status. Through survey, seeds of seven local rice cultivars as well twenty one introduced high yielding varieties and a hybrid were collected from farmers of various villages in southern transitional zone (Zone-7). Healthy seeds of each cultivar were tested for germination and those seeds with viable germination rate of >85% was taken up for experimentation. The experiment was laid out

in a randomized complete block design (RCBD) with 29 treatments replicated twice. Twenty five day old seedlings were transplanted in the plots using two seedlings/ hill with a spacing of 20 x20 cm in 3m x3m plots. The crop was translated during 4th week of June and 1st week of July respective for 2012 & 2013 *kharif* seasons. The crop was managed as per the standard practices mentioned in the package of practices. The disease occurrence and other aspects were managed with respect to time. The disease index scales developed by IRRI was adopted for evaluation (IRRI, 1996).

RESULTS & DISCUSSION

In the study, one early variety, eleven mid duration varieties including a hybrid and seven local cultivars were screened against leaf blast incidence. It was commonly observed across both the years of study that all local cultivars were found far good with respect to resistance compared to high yielding cultivars (Table 1). Early variety Jyothi showed moderately susceptible reaction with average leaf lesion area of around 8.5 per cent. Among the mid duration varieties/hybrid, five varieties including KRH-2, a hybrid were moderately susceptible while, the remaining once are susceptible. Similarly, among the long duration varieties, five varieties were moderately susceptible, two were susceptible and the remaining there was highly susceptible.

TABLE 1: Screening of paddy cultivars against blast disease (*kharif* 2012 and 2013)

Sl. No.	Varieties	Kharif 2012			Kharif 2013		
		Disease index	Lesion area (%)	Disease reaction	Disease index	Lesion area (%)	Disease reaction
Early Duration Varieties							
1	Jyothi	5	8.44	MS	5	9.16	MS
Mid Duration Varieties							
2	KHP-2	5	7.82	MS	5	9.64	MS
3	IET-7191	5	8.26	MS	5	9.86	MS
4	MTU-1001	7	35.62	S	7	38.96	S
5	JGL-1798	7	38.40	S	7	46.82	S
6	Rashi	5	7.36	MS	5	8.56	MS
7	IET- 13901	7	38.62	S	7	44.86	S
8	KRH-2 (Hybrid)	5	8.92	MS	5	9.36	MS
9	MTU-1010	7	36.84	S	7	39.96	S
10	IR 64	5	8.52	MS	5	8.18	MS
11	DPT-sona	7	38.34	S	7	40.92	S
12	Uma (MO16)	7	36.64	S	7	39.82	S
Long Duration Varieties							
13	Jaya	5	8.42	MS	5	9.08	MS
14	Intan	8	68.82	HS	8	74.76	HS
15	MO - 4	5	8.72	MS	5	9.22	MS
16	Sharavathi	7	36.56	S	7	39.84	S
17	KHP-5	5	8.64	MS	5	8.92	MS
18	KHP-9	5	7.44	MS	5	9.02	MS
19	TO-39 (sus.check)	9	78.62	HS	9	84.42	HS
20	HR-12(sus.check)	9	84.62	HS	9	89.66	HS
21	Sona Masuri	7	44.72	S	7	46.88	S
22	Hemavathi	5	8.88	MS	5	9.94	MS
Local Varieties							
23	BhagyaJyothi	3	1.66	MR	3	1.82	MR
24	Bharani	3	1.86	MR	3	1.98	MR
25	Ankura Sona	3	1.78	MR	3	1.88	MR
26	Bangarasanna	3	1.74	MR	3	1.92	MR
27	Gowri sanna	3	1.88	MR	3	1.96	MR
28	Mallige	3	1.86	MR	3	1.94	MR
29	Girige Sanna	3	1.76	MR	3	1.84	MR

MR- Moderately Resistant MS- Moderately Susceptible, S- Susceptible, HS- Highly Susceptible

The trend remained same across two years of study. Since the experiment was conducted in a field conditions, each variety/cultivars had obtained similar micro climate situation like ambient humidity and heat flux viz., moisture content in

the leaf/surrounding air, temperature fluctuations, wind movement *etc.* Under these set of conditions, the reaction obtained by the varieties are quit realistic. Khan *et al.* (2001) screened 39 course and 40 fine entries/varieties for

three years at Rice Research Institute, Faisalabad. The screening revealed that amongst the entries/varieties, IR-6 and KS-282 were found highly resistant. Haq *et al.* (2002) screened twenty five rice germplasm lines and found that two lines KSK-282 and IRRI-6 were highly resistant. In the

present study, the evaluation of 22 high yielding varieties and 7 local paddy cultivars against leaf blast disease revealed that none of the cultivar was found immune or highly resistant.

TABLE 2: Influence of blast disease of rice on grain and straw yield (*Kharif* 2012 and 2013)

Sl. No.	High yielding varieties/hybrid	Grain yield (kg/ha)		Straw yield (kg/ha)	
		2012	2013	2012	2013
Early Duration Varieties					
1	Jyothi	5300.00	5388.88	8611.11	8833.33
Mid Duration Varieties					
2	KHP-2	6122.22	5944.44	9833.33	9583.33
3	IET-7191	5288.89	5222.22	9416.66	9500.00
4	MTU-1001	5077.78	5044.44	6222.22	5944.44
5	JGL-1798	4794.44	4750.00	6500.00	6111.11
6	Rashi	4900.00	4972.22	9916.66	9638.88
7	IET- 13901	4533.33	4638.88	6000.00	5916.66
8	KRH-2 (Hybrid)	6766.67	6694.44	9611.11	10027.77
9	MTU-1010	5111.11	5000.00	6222.22	6444.44
10	IR 64	4933.33	5083.33	9083.33	9583.33
11	DPT-sona	4788.89	4694.44	6472.22	6555.55
12	Uma (MO16)	4677.78	4638.88	6444.44	6166.66
Long Duration Varieties					
13	Jaya	5583.33	5472.22	10083.22	9472.22
14	Intan	3555.55	3388.88	4694.44	4638.88
15	MO - 4	4844.44	5138.88	9388.88	9416.66
16	Sharavathi	4888.89	4777.77	6416.66	6555.55
17	KHP-5	6644.44	6533.33	9805.55	9694.44
18	KHP-9	6244.44	6361.11	9361.11	9461.11
19	TO-39 (sus.check)	3261.11	3138.88	4527.77	4833.33
20	HR-12(sus.check)	3377.78	3322.22	4638.88	5055.55
21	Sona Masuri	4711.11	4611.11	6416.66	6333.33
22	Hemavathi	5011.11	5055.55	11944.44	10777.77
Local Varieties					
23	BhagyaJyothi	5472.22	5577.77	14388.88	13388.88
24	Bharani	4611.11	4666.66	12194.44	12361.11
25	Ankura Sona	4211.11	4233.33	11472.22	11333.33
26	Bangarasanna	3750.00	3805.55	10555.55	10416.66
27	Gowri sanna	3855.55	3861.11	10305.55	9833.33
28	Mallige	4416.67	4472.22	11083.33	10333.33
29	Girige Sanna	3700.00	3750.00	10250.00	9611.11
	SEm+- =	177.78	188.89	455.56	422.22
	C.D (0.05%) =	522.22	566.67	1333.33	1222.22
	C.V(%) =	6.36	6.80	7.52	7.02

On the contrary, all the local paddy cultivars were found moderately resistant to leaf blast disease during both the seasons of study. Mohanta *et al.* (2003) screened twenty eight restored line and four standard checks at Baro and T. Aman, Bangladesh. And reported the three were highly resistant, 12 resistant, 16 moderately susceptible. Field screening of 40 entries/varieties during 2005-2006 against the blast disease revealed that only one entry 99513 of PARC showed resistance (Arshad *et al.*, 2008). A total of 35 inbred and 13 hybrids including susceptible checks were screened against blast disease and found that none of the

tested high yielding varieties (HYV) were resistant to blast, while the hybrids like Sonarbanga, Alock 6201, KRH2, IR7110H, IR68877H and IR76901H and inbreds BR12, BR15 and IR72 were moderately resistant in the irrigated rice ecosystem (Latif *et al.*, 2011). Results clearly envisage the importance of management of blast disease through control measures while growing these selected high yielding varieties or else hybrid. In the study, mid duration hybrid KRH-2 gave significantly higher grain yield (6766.67 kg/ha and 6694.44 kg/ha) compared to all other varieties in test (Tbale-2). This was followed by long duration varieties

KHP-5 (6644.44 kg/ha and 6533.33 kg/ha) and KHP-9(6244.44 kg/ha and 6361.11 kg/ha) and mid duration variety KHP-2(6122.22 kg/ha and 5944.44 kg/ha) which among themselves were non significant. Though they were all found to be moderately susceptible to leaf blast incidence, yet could able to perform better in a given situation. On the other hand, all the local cultivars yielded significantly lower grain yield as compared to high yielding varieties/hybrid in test. Their yield level vary from 37 to 54 q/ha. Among local cultivars, Bhagya Jyothi performed significantly highest with 5472.22 and 5577.77 kg/ha respectively for 2012 and 2013. This clearly indicates the validity of cultivar that can be utilized as a resourceful donor gene in crossing programmes for improving the tolerance level of other varieties in future. The yield levels of other local cultivars were best in comparison to highly susceptible long duration varieties like TO-39, HR-12 and Intan (Table. 2). However, the local cultivars gave significantly higher straw yield over the seasons and compared to high yielding varieties/hybrid (Table-2). On the basis of results obtained, it is conclude that all the twenty on high yielding varieties and a hybrid do not possess the resistance level against blast disease. Since the reaction varies, the timely control measures need to be adopted for successful crop performances. Further, it is conclude that the comparatively prevalence of the resistance against rice blast pathogen is more common in the local cultivars than in the high yielding varieties /hybrid. Such local cultivars could be used in hybridization programmes for further varietal improvement against blast disease.

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