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Research Article

KHP-10 -- A new red rice variety for Mid Lands in Rainfed ecosystem of Hill zone of Karnataka

B.M.Dushyantha Kumar and Y.G.Shadakshari
College of Agriculture, Shivamogga, UAS, Bangalore, Karnataka, INDIA
Email: dushyanth123@yahoo.com

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Abstract:
KHP-10 was found most promising in multilocation trials during 2002 to 2006 at ZARS-Mudigere, ARS-Sirsi, Ponnampet and Madikeri. It recorded 25% and 23% increased grain yield over recommended checks KHP-2 and IET-7191 respectively. The variety has also recorded 9% higher grain yield than local check IET-7191 in farmers field tested in four districts in the zone. KHP-10 is tall non-lodging plant stature and tolerance to leaf and neck blast compared to the checks. The variety has semi-compact panicle with intermediate thresh-ability and grains are medium bold with red kennel. Farmers prefer this variety because of its tall plant stature, higher grain yield, non-lodging and bold red kernel with higher market price.

Key words: Rice, red rice, variety, Karnataka

Introduction

Rice is being cultivated in hill zone ($11^0$56' and $15^0$46' N latitude and $74^0$31' and $76^0$4' E longitude) of Karnataka mostly during *kharif* as rainfed crop in all the situations such as uplands, mid lands and low lands. Rainfall in the zone ranges from 1,363 to 3,466 mm, with an average 2173 mm. Crop area in the zone is approximately 2.85 lakh ha. with a production of 7.23 tones. It represents nearly 23% of the rice area in the state. The farmers in these areas usually grow local varieties of both white and red-grained types. Some of the local varieties of red grain are low yielder and tall plant stature that are susceptible for lodging at maturity. There is preference among the farmers for red-grained types since it fetches higher price in the market. Thus, the present investigation was undertaken to assess red rice variety under multi locations and farmers field .

Material and Methods

Attempts were made at the Zonal Agricultural Research Station, Mudigere to identify a suitable red rice variety through pure line selection, KHP-10 was the most promising one and it is a progeny of (M 63-83 x RP-79-5) x Rikuto Norin 21. It was evaluated over four locations Viz: ZARS, Mudigere; ARS, Ponnampet; ARS, Madkeri and ARS, Sirsi, Karnataka during *Kharif* from 2002 to 2006 using a randomized block design with three replications. Twenty five day old seedlings were transplanted at a spacing of 20 x 10 cm. All the recommended cultural practices were followed for raising a normal crop. Observations on days to 50 per cent flowering, plant height (cm), panicle numbers, panicle length, grain yield ,quality parameters , pests and diseases were recorded from randomly selected five plants in each replication .

Results and discussion

The ancillary characters of rice variety KHP-10 in comparison with check varieties are presented in Table.1. KHP-10 having a higher plant height of 100-105cm, Panicle length of 20-23cm, 1000grain weight (30gm) with medium bold grains compared with KHP-2 and IET-7191. The ancillary characters of KHP-10 showed that it could be taller by 15-20cms and red grain type compared to the ruling varieties.

The results from different trials conducted for five years from 2002 to 2006 revealed that KHP-10 recorded higher grain yield at different locations (ZARS-Mudigere, ARSs-Ponnampet, Madikeri & Sirsi). At Mudigere,KHP-10 is significantly superior and recorded 16% and 13% increased higher grain yield compared to KHP-2 and IET-7191 respectively (Table 2). It also recorded higher grain yield of 26% and 22% at Sirsi,17% and 14% at Ponnampet and 49% and 57 % at Madikeri compared to KHP-2 and IET-7191 respectively (Table 3-5). By considering overall per cent increase over check, KHP-10 recorded 25% and 23% higher grain yield compared to KHP-2 and IET-7191 respectively (Table:2-6). KHP-10 also recorded higher grain yield in AICRP Trial during *kharif* 2005 compared to national check Jaya and regional check Tringa (Table:7). As revealed by the data from the trials conducted in different stations and AICRP , KHP-10 was better

than the other two varieties with higher grain yield . Similar observations were made by Shadakshari et al. (2000) and Shadakshari et al. (2003) and Dushyantha kumar and Shadakshari (2006).

The variety is being tested in trials in farmers fields across four districts of hill zone of Karnataka as a supplement to IET-7191 (Table-8) and recorded 9 percent increase over check IET-7191 for grain yield. In addition it also tested pest and disease tolerance (Table-9 & 10) at ZARS, Mudiere, ARS Ponnampet (Hot spot) and Sirsi and there was no incidence of pest and disease during years of study. The milling characteristics of KHP-10 showed that it contains less broken rice (8.8 %) and more of bran (8.5%) compared to check IET-7191 (Table -11).

The variety has all the qualities of an ideal plant type for the zone/region (tall plant stature, medium duration, non lodging, medium bold red grains besides high grain yield compared to ruling varieties) and it has better market price because of medium bold red kernel and hence it is suitable for midlands of the hill zone of Karnataka as supplement variety.

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Table 1: Ancillary characters of KHP-10 in comparison with check varieties

Entries	Days to 50% flowering	Plant height (cm)	Panicle length (cm)	1000 grain weight (g)	Grain type	Kernel colour	Lodging Resistance
KHP-10	126	100 - 105	20-23	30-32	Medium Bold	Red	Resistant
KHP 2 (ch)	121	70 - 75	20-22	30-32	Long Bold	White	Resistant
IET 7191 (ch)	126	80 - 85	20-21	29-30	Medium Bold	White	Resistant

Table 2: Performance of KHP-10 for grain yield over years in MLRVT at ZARS,Mudigere

Entry	Grain yield (kg/ha)						% Increase over checks	
	2002	2003	2004	2005	2006	Average	KHP 2	IET 7191
KHP-10	7196	6255	6388	7166	6895	6780	16	13
KHP 2 (ch)	5875	5592	5224	6593	5852	5827		
IET 7191 (ch)	6963	5987	4749	6468	5836	6000		
Expt. Mean	6605	5424	5745	6674	5736			
CD 5%	464	225	401	378	401			
CV %	4	6	4	5	4			

MLRVT = Mid land rice varietal trial

Table 3 : Performance of KHP-10 for grain yield over years in MLRVT at ARS, Sirsi

Entry	Grain yield (kg/ha)						% Increase over checks	
	2002	2003	2004	2005	2006	Average	KHP 2	IET 7191
KHP-10	7366	5707	8773	3500	8130	6695	26	22
KHP 2 (ch)	6048	4863	6390	2900	6320	5304		
IET 7191 (ch)	6098	5203	5500	3000	7770	5514		
Expt. Mean	5448	4126	6628	2970	8020			
CD 5%	1254	828	2123	NS	2.23			
CV %	12	10	19	31	13			

Table 4 : Performance of KHP-10 for grain yield over years (2003-2006) at ARS, Ponnampet

Entry	Grain yield (kg/ha)					% Increase over checks	
	2003	2004	2005	2006	***Average***	KHP 2	IET 7191
KHP-10	4638	5384	5805	5225	5263	17	14
KHP 2 (ch)	4613	3647	4708	5068	4509		
IET 7191 (ch)	3854	5083	5007	4550	4624		
Expt. Mean	4065	3889	5132	4048			
CD 5%	NS	1101	NS	512			
CV %	21	17	21	19			

Table 5 : Performance of KHP-10 for grain yield over years in MLRVT at ARS, Madikeri

Entry	Grain yield (kg/ha)					% Increase over checks	
	2003	2004	2005	2006	Average	KHP 2	IET 7191
KHP-10	5179	5125	4600	5725	5157	49	57
KHP 2 (ch)	3155	4229	3183	3308	3469		
IET 7191 (ch)	3330	2917	3750	3166	3291		
Expt. Mean	3138	3263	1759	3073			
CD 5%	2029	1420	NS	2693			
CV %	21	20	25	19			

Table 6 : Grain yield Performance of KHP-10 over locations and years in comparison with check varieties

Entries	Grain yield (kg/ha)					
	Mudigere (2002-06)	Sirsi (2002-06)	Ponnampet (2003-06)	Madikeri (2003-06)	***Mean***	% increase over check
KHP-10	6780	6695	5263	5157	5974	
KHP 2 (ch)	5827	5304	4509	3469	4777	25
IET 7191 (ch)	6000	5514	4624	3291	4857	23

Table 7: Performance of KHP-10 for grain yield (kg/ha) in AICRP trial in IVT-IM, *Kharif* 2005

Variety	JYP	CHN	KNP	ALH	PTB	MND	MTU	CBT	Mean
KHP-10	5937	5166	5200	5952	5214	7488	5234	4911	4599
Jaya (NC)	5269	4291	5250	6026	3952	5638	3829	4573	4982
Tringa (RC)	5598	4458	5275	6175	2523	4866	3050	4073	4975
Expt.Mean	4499	4487	4966	5984	4688	5371	3857	3966	
CD(0.05)	890	347	NS	272	1915	1031	225	1796	
CV%	9.9	3.9	7.8	2.3	20.4	9.6	2.9	22.7	
Local Variety	Kanchana	CR-580-17-2	Purnendu	Sudha	Vaidehi		JalaPriya	Manohari	

JYP – Jeypore CHN – Chinsurah KNP–Kanpur ALH– Allahabad
PTB–Pattambi MND–Mandya MTU– Maruteru CBT–Coimbatore

Table 8 : Performance of KHP-10 in different districts of Hill Zone in farm trials

Season/District		Grain Yield kg/ha		% increase over check	
Kharif:2005		**KHP-10**	**IET-7191**		
Chikamagalur (3)		6667.00	6520.00		
Shimoga	(4)	5625.00	5562.00		
Coorg	(4)	5862.00	5218.00		
EEU,Mudigere 1)		5600.00	5050.00		
Mean	(12)	5938.54	5520.31	7.58	
Kharif:2006					
Chikamagalur (9)		6602.22	6058.88		
Shimoga	(8)	5312.50	4775.00		
Coorg	(7)	6005.28	5301.71		
EEU,Mudigere(2)		7175.00	6650.00		
Mean	(26)	6273.75	5696.40	10.13	
Grand Mean	(38)	6106.15	5608.36		8.87

Table 9: Reaction of KHP-10 in comparison with checks to major pests of hill zone

Varieties	Major pests			
	Leaf Folder	Case Worm	Stem Borer	Corid Bug (Gandhi bug)
KHP-10	1	3	1	1
KHP 2 (ch)	3	3	1	1
IET 7191 (ch)	1	1	1	1

Scale (%damage) : 1= Light infestation ; <1%, 3= Medium light infestation; 1-5%

Table 10: Disease reaction of KHP-10 over checks in Midland Rice Varietals Trial

Entries	Ponnampet								Sirsi					
	2002		2003		2004		2005		2002		2003		2004	
	LB	NB	LB	NB	LB	NB	LB	NB	LB	NB	LB	NB	LB	NB
KHP-10	4	1	5	0	2	0	0	0	2	0	0	0	1	0
KHP –2	4	1	7	3	0	3	0	0	4	0	1	0	2	0
IET -7191	6	3	7	3	4	0	0	0	4	0	1	0	0	0

LB = Leaf Blast NB = Neck Blast

Table 11. Milling characteristics of KHP-10 in comparison with checks*

Particulars	**KHP-10**	**IET-7191 (Ch)**
Moisture (%)	11	10
Weight of paddy sample (g)	200	200
Weight of Brown rice (g)	158.50	158.00
Weight of Husk (g)	41.5	42.0
Weight of Milled rice (g)	141.50	147.50
Weight of bran (g)	8.5	7.5
Weight of Head rice (g)	129.00	129.00
Weight of broken rice (g)	8.8	12.5