



PDKV AKSHAD : High milling recovery of rice genotype

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Abstract

Milling recovery is one of the most important criteria of rice quality especially from the standard point of marketing. A variety should possess a high turnout of whole grain (head) rice and total milled rice. As a part of continuous effort to evolve high milling recovery with good cooking quality rice variety, the cross made between PKV HMT x Tarori Basmati resulted in the development of new culture SYE-705-17-12. It has been tested extensively in Maharashtra level research trials. PDKV Akshad (SYE-705-17-12) recorded 80.39, 76.33 and 67.68 % of milling which is higher than most popular variety PKV HMT (76.11, 72.66 and 64.75 %) and RTN-24 (78.82, 76.53 and 62.24%) during the year 2012, 2013 and 2014 respectively. This genotype has more head rice recovery with 68.62 % (on two years average basis). It has also recorded good amylose percentage (22.18%) with good cooking quality. The genotype is found short slender grain type with 14.43 g test weight which having acceptability in Vidarbha market. Beside this it found significantly superior yield over the best check Vidarbha PKV HMT and State check RTN 24.

Introduction

Rice is staple food of 2/3rd of the population of the world. Globally Rice is planted in about 150 m ha and 497 million tons of produce is harvested annually (FAO, 2014), Asia account for 90 % production and consumption of rice. In India, it ranks first, contributing for 43 % of the total food grain production and 55% of cereal production followed by wheat (41%). The total area under rice cultivation in the country is 44.6 (20 % of cropped area) million hectares producing 104.32 million tons with the productivity of 2.40 tons /ha (FAO, 2015).

The total area under rice in the Maharashtra state is 15.57 lakh ha with an annual rice production of 29.46 lakh tons (43.12 lakh tones rough rice) and the average productivity is 1.90 ton/ha (2.71 ton/ha rough rice). (Maharashtra State Statistics Department, Pune Report 2014-2015).

Vidarbha region is the major rice producing area of Maharashtra. Nearly 7.69 lakh ha area of Vidarbha (contributes 49.57 % of the state area) is under rice crop with production of 15.93 lakh tones rough rice (11.14 lakh tones milled rice). The average productivity of rough rice in Vidarbha region is 2.07 tones/ha (1.44 tones/ha milled rice) (Maharashtra State Statistics Department, Pune Report 2014-2015).

Over the years, efforts were made to increase the rice production transformed the state from food deficit to net surplus. For achieving and maintaining self-sufficiency in rice, in view of ever increasing population, continuous enhancement of rice production is the need of hours as suited the irrigated ecological condition. The mid-late duration varieties are very popular in Vidarbha region. In Vidarbha region the proportion of area under early, midlate and late varieties is about 30, 40 & 30 percent respectively.

In Vidarbha region short slender grain type have more demand in market and also from farmers for cultivation. So this research station was trying to develop short slender genotype with

good quality parameter varieties in crop improvement programme. As a part of continuous efforts to evolve high yielding good quality variety in midlate duration, the cross effected between PKV HMT x Tarori Basmati at Agriculture Research station, Sindewahi resulted in the development of new culture PDKV Akshad (SYE-705-17-12) to fulfill the requirement of fine grain type (Short Slender) midlate duration high yielding rice variety for the farmers of Maharashtra state.

The culture PDKV Akshad (SYE-705-17-12) was accepted for pre-release for Eastern Vidarbha region of Maharashtra state during research findings and recommendation committee meeting at DR.PDKV, Akola on date 9th May 2017.

Materials and Methods

The field and laboratory experiments were conducted during the year 2012, 2013 and 2014 at 11 locations over Maharashtra. The standard package of practices were followed by all centers. In Vidarbha as per soil fertility status recommended dose of fertilizer was applied as 100: 50:50 NPK kg /ha. The new genotype PDKV Akshad (SYE-705-17-12) was tested with different checks i.e. PKV HMT (Vidarbha Check) and RTN 24 (State Check). The yield and yield contributing parameters tested on field condition at different locations at Vidarbha region. The grain quality characters viz., Milling %, Head Rice Recovery %, Kernel Length, amylose content, gel consistency (Webb 1985). Head Rice recoverability is an inherited trait, although environmental factors are known to influence grain breakage during milling (Bhattacharya 1980) of PDKV Akshad (SYE-705-17-12) was tested at RARS, Karjat, Dist- Raigad after harvesting in the year 2012, 2013 and 2014. The various rice genotypes including local and state check were arranged in RBD design with three replications in advanced varietal trial with 21 days old seedlings @2-3 seedlings per hill in tractor puddled soil by

adopting 20 x 15 cm spacing in plot size of 5 x 3 m(15 sq.m.)

Result and Discussion

The different genotype were tested in Advanced Varietal Trial 14-18 g with different duration and yield parameters was recorded (Table 1). The ANOVA showed that, genotype

PDKV Akshad (SYE-705-17-12) having significantly superior over PKV HMT (Local Check) i.e. 28.16 % increase in average of six years. Whereas, over state check RTN 24, it recorded 38.11 % higher yield in university level trials.

The same genotype were also tested at Maharashtra level trials with state check RTN 24 during 2012 to 2014. it recorded significantly 17.28 % higher yield over RTN 24 (Table 3).

PDKV Akshad (SYE-705-17-12) is midlate duration with 101 days to 50 % flowering, dwarf stature having plant height 90 cm, 236 average panicles/m² and 231 spikelets / panicle in university level trials (Table 2). Whereas in Maharashtra trials PDKV Akshad (SYE-705-17-12) recorded 102 days for 50 % flowering, 87 cm plant height, 245 panicles/m² and 214 spikelets / panicle with test weight 14.43 g and short slender grain type (Table 4).

The genotype recorded higher milling % i.e. 67.68 to 80.39 % with HRR 64.99 to 72.04 % as compared to Local check PKV HMT state check RTN-24. The amylose content 22.18% which is most acceptable in market (Table 5).

SALIENT FEATURES OF PDKV Akshad (SYE-705-17-12)

1. Duration : 130-135 Days to seed Maturity (Midlate Duration)
2. Fine grain type (Short Slender) having- Test weight- 14.43 g
3. In university level trials it recorded 28.16 % and 38.11 % higher yield over PKV HMT and RTN 24
4. In state level trials it recorded 20.84 %, 14.55 % and 16.46 % higher yield over state check RTN 24.
5. Good cooking quality and intermediate Amylase content (22.18 %) and high milling recovery (74.80%)

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References

Anonymous, 2014. Food and Agriculture Organization, Rome, Italy
 Anonymous, 2015. Food and Agriculture Organization, Rome, Italy
 Webb, B.D. 1985: Criteria of rice quality in U.S. In: Rice Chemistry and Technology: 403-442
 Bhattacharya, K.R. 1980: Breakage of rice during milling: ARice Review. Tropical Science, Vol 22: 255-76
 Govindswamy, S. 1985: Post harvest technology. I. Quality features of rice (in). Rice Research in India. Indian Council of Agricultural Research, New Delhi.

Table 1 : Grain Yield – (Kg/ha) - Summary performance of PDKV Akshad (SYE-705-17-12) in University AVT Trials (2010-2016)

Name of the trial	Year	SYE-705-17-12 (PDKV Akshad)	PKV HMT (Ch)	RTN-24(S.Ch)
Station trial	2010	3853	2465	2446
% increase over check			58.31	57.52
AVT	2011	3801	3143	2030
% increase over check			20.93	87.24
AVT	2012	3034	2705	1900
% increase over check			12.16	59.68
AVT	2013	3393	2983	2229
% increase over check			13.74	52.22
AVT	2014	2661	2251	2388
% increase over check			18.21	11.43
AVT	2015	3617	3012	3365
% increase over check			20.08	7.48
AVT	2016	4400	3868	3569
% increase over check			13.75	23.28
Mean % Increase	2010-16		28.16	38.11

Table 2 : Mean ancillary characters of PDKV Akshad (SYE-705-17-12) in University trial conducted during *Kharif* 2010-2016

Trial / Year	Designation	Days to 50% flowering	Plant height (cm)	No. of Panicles per sq.m.	Spikelet / Panicle	Test weight	Grain type
Station trial 2010	SYE 705-17-12	104	89	187	224	15.0	SS
	PKV-HMT	112	89	232	209	14.6	SS
	RTN 24 (S.Ch)	91	93	205	131	15.2	SS
AVT-SS 2011	SYE 705-17-12	98	104	315	307	15.8	SS
	PKV-HMT	102	93	315	228	13.0	SS
	RTN 24 (S.Ch)	85	103	264	223	17.40	SS
AVT-SS 2012	SYE 705-17-12	103	83	202	179	16.6	SS
	PKV-HMT	110	78	243	149	13.4	SS
	RTN 24 (S.Ch)	102	106	224	135	14.8	MS
AVT-SS 2013	SYE 705-17-12	99	88	252	224	13.9	SS
	PKV-HMT	109	88	249	167	14.50	SS
	RTN 24 (S.Ch)	92	87	254	167	14.9	SS
AVT-SS 2014	SYE 705-17-12	92	89	185	244	13.6	SS
	PKV-HMT	95	83	144	123	12.4	SS
	RTN 24 (S.Ch)	84	111	189	199	14.0	SS
AVT-SS 2015	SYE 705-17-12	103	88	263	167	15.5	SS
	PKV-HMT	103	84	240	166	13.6	SS
	RTN 24 (S.Ch)	101	107	256	152	15.1	SS
AVT-SS 2016	SYE 705-17-12	105	91	245	272	15.4	SS
	PKV-HMT	111	86	274	192	14.5	SS
	RTN 24 (S.Ch)	105	121	315	159	17.3	SS
Average	SYE 705-17-12	101	90	236	231	15.11	SS
	PKV-HMT (C)	106	86	242	176	13.71	SS
	RTN 24 (S.Ch)	94	104	244	167	15.53	SS

Table 3 : Grain Yield (Kg/ha) performance of PDKV Akshad (SYE-705-17-12) in (AVT-Quality) State Co-ordinated Trial at different zones of Maharashtra state during 2012 to 2015

Year of Testing	Designation	Yield performance (Kg/ha & % increase)				% increase
		KN	WM	V	Mean over locations	
2012	SYE -705-17-12	3723	4233	4020	3965	20.84
	RTN 24 (S.Ch)	3384	4058	2367	3281	
2013	SYE -705-17-12	4185	5127		4588	14.55
	RTN 24 (S.Ch)	3780	4306		4005	
2014	SYE -705-17-12	3757	4249	3437	3757	16.46
	RTN 24 (S.Ch)	3318	4034	2293	3226	
Average	SYE -705-17-12	4312	4572	3379	4231	17.28
	RTN 24 (S.Ch)	3494	4133	2330	3504	

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Table 4: Mean ancillary characters of PDKV Akshad (SYE-705-17-12) in MSCRIP trials conducted during *Kharif* 2012-2014

Trial / Year	Designation	Days to 50% flowering	Plant height (cm)	No. of Panicles per sq.m.	Spikelet / Panicle	Test weight	Grain type	White Belly
AVT-SS 2012	SYE 705-17-12	101	85	221	200	14.96	SS	A
	RTN 24 (S.Ch)	91	96.2	236	172	15.22	SS	A
AVT-SS 2013	SYE 705-17-12	102	89.3	246	195	15.10	SS	A
	RTN 24 (S.Ch)	94	96.4	237	171	13.18	SS	A
AVT-SS 2014	SYE 705-17-12	102	86.4	268	246	13.22	SS	A
	RTN 24 (S.Ch)	94	97.7	255	182	15.34	SS	A
Average	SYE 705-17-12	102	87	245	214	14.43	SS	A
	RTN 24 (S.Ch)	93	96.7	242.6	175	14.58	SS	A

Reference : Progress Report of MSCRIP *Kharif* 2012 P.74, *Kharif* 2013 P.91 and *Kharif* 2014 P.83

Table 5: Grain quality characteristics of PDKV Akshad (SYE-705-17-12) in MSCRIP Advance Variety Trial (M) Short Slender *Kharif* 2012-14

Entry	Year	Mill	HRR	KL	Grain	Grain	WU	KLAC	VER	ER	ASV	AC	GC	GT (°C)
		(%)	(%)	(mm)	type	Chalk	(ml)	(mm)				(%)	(mm)	
SYE 705-17-12	2012	80.39	-	5.27	SS	A	300	9	3.6	1.7	3	20.2	35	High Intermediate
	2013	76.33	72.04	5.16	SS	A	360	9	4.25	1.74	3	23.42	37	High Intermediate
	2014	67.68	64.99	5.33	SS	A	180	9	4.38	1.69	3	22.93	35	Intermediate
Mean		74.80	68.52	5.25			280	9.00	4.08	1.71	3.00	22.18	35.67	
RTN 24 (S. Ch.)	2012	78.82	-	5.28	SS	A	260	11	5.66	2.08	5.3	26.96	35	Intermediate
	2013	76.53	73.4	5.65	SS	A	340	12	3.78	2.12	5	21.67	34	Intermediate
	2014	62.24	55.69	5.66	SS	A	330	9.5	5.83	1.68	5	25.1	89	Intermediate
Mean		72.53	64.55	5.53			310	10.83	5.09	1.96	5.10	24.58	52.67	
PKV-HMT	2012	76.11	-	5.22	SS	A	340	9	5.41	1.72	3.5	20.09	36	High, Intermediate
	2013	72.66	68.67	5.39	SS	A	320	10	4.86	1.86	3	24.99	83	High, Intermediate
	2014	64.75	59.29	5.63	SS	A	230	9.5	5	1.69	3.5	25.86	93	High, Intermediate
Mean		71.17	63.98	5.41			297	9.50	5.09	1.76	3.33	23.65	70.67	

Mill–Milling (%); **HRR**–Head rice recovery (%); **KL**–Kemel length (mm); **WU**–Water uptake (ml); **KLAC**–Kernel length after cooking (mm); **VER**–Volume expansion ratio; **ER**–Elongation ratio; **ASV**–Alkali spreading value; **AC**–Amylose content (%); **GC**–Gel consistency (mm) & **GT**–Gelatinized temperature (Reference: Progress Report of MSCRIP 2012 p.p.-151, 2013 p.p.-203, 2014 p.p.-177

