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Ratnagiri 7 - Red Kernel, Semi Dwarf and High Yielding Rice Variety for Konkan Region of Maharashtra State in India

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A B S T R A C T

The rice variety Ratnagiri 7 (Red rice; RTNRR-4) was evolved through the mutant selection from MO17. The above variety is midlate in duration (122-125 days), Semi-dwarf (100-110 cm plant height), short bold grain type. The variety showed 46.50, 21.40, 50.96 and 59.41 per cent higher yield over the respective checks in station, state, agronomical and adaptive trials, respectively. Ratnagiri 7 (RTN RR-4) recorded 23.88%, 18.69% and 39.40% higher grain yield over IR-64, BPT-5204 and Kalanamak respectively in AICRIP trials. RTN RR-4 consists of 28.50% (17.35 ppm) and 32.7% (7.9 ppm) high iron content over the check Bela (13.5 and 5.95 ppm) in brown and polished rice respectively. Ratnagiri 7 (RTN RR-4) consists of 42.82% (28.35 ppm) and 43.0% (24.25 ppm) high zinc content over the check Bela (19.85 and 16.95 ppm) in brown and polished rice respectively. It also having low glycemic index (53). RTNRR-4 having high milling (64.17%) and head rice recovery percentage (60.65%) with good cooking quality. It recorded average yield of 4.5 to 5.0 t/ha. It showed resistant reaction to stem borer, leaf folder and gall midge and moderately resistant to leaf blast, bacterial leaf blight. Therefore the rice variety Ratnagiri 7 recommended for release for commercial cultivation in Konkan region of Maharashtra in the year 2017.

Introduction

Rice is a staple food for above 60 per cent world's population. It is wholesome and nutritious cereal and source of complete carbohydrate. The world's capacity to sustain a favourable food production/population balance has again come under the spotlight in view of continued population increase and a drastic slowdown in growth of cereal production. According to United Nations estimates, the world population will grow to 8 billion in 2025 requiring about 40% more rice production to cater demand of the burgeoning global population. India is the foremost country of the world in area of rice cultivation and second to China in rice production. The total area under rice cultivation in India is about 44.11 million ha with a rough rice production of 105.48 million tons (Anonymous, 2017).

In Maharashtra, rice is the second most important food grain crop of the people, which

grown over an area of 15.57 lakh hectares with an annual rough rice and milled rice production of 52.95 lakh tones and 26.54 lakh tones, respectively. The average productivity rough rice and rice of the state is 3.4 t/ha and 2.35 t/ha. The average productivity of the state is stable, which is low as compared to other rice producing states like Punjab (3.84 t/ha), Tamil Nadu (3.19 t/ha), Telangana (3.14 t/ha), Haryana (3.11 t/ha), Andhra Pradesh (3.02t/ha), West Bengal (2.73 t/ha), Karnataka (2.67 t/ha), Gujarat (2.33 t/ha) and national productivity (2.39 t/ha) (Anonymous, 2017).

Konkan region is a major rice producing area of Maharashtra. Nearly 3.69 lakh ha area of Konkan is under rice crop with rough rice production of 15.70 lakh tones. The average rough rice productivity of the Konkan region is 4.25 t/ha. Konkan region contributes 23.70% in area under rice crop and produces 29.65% rough rice at state level (Anonymous, 2017).

In some areas of India, red rice are considered highly nutritive and medicinal. The rice is eaten as whole grain; Red gunja is preferred for making bread and chapati (Rani and Krishnaiah, 2001). Glutinous rice is used in making puttu in South India. In Himachal Pradesh, Jatu red rice is prized for its aroma and taste. Matali and Laldhan of Himachal Pradesh are used for curing blood pressure and fever. Kafalya, from the hills of Himachal Pradesh and Uttar Pradesh, is used for treating leucorrhea and abortion complications. Karikagga and Atikaya of Karnataka are used for coolness and as tonic, while Neelamsamba is used for lactating mothers in Tamil Nadu (Arumugasamy *et al.*, 2001).

In addition of being nutritive and having medicinal value, red rice possesses many other special features. It is common experience that red and black husked rice is comparatively more resistant to storage insect pests than brown husked rice. The Patni rice of Maharashtra and the Jatu of Himachal Pradesh are well known for such hardiness and resistance. In addition to storage capability, red rice varieties suitable for various agroclimatic conditions and adverse situations are also commonly cultivated in certain regions. Agronomically, or from the cultivation point of view, such rices possess resistance to drought, flood, submergence, alkalinity, salinity, and resistance to pests and diseases (Chaudhary and Tran, 2001).

In Maharashtra, particularly in Sindhudurg, Ratnagiri, Raigad and Thane districts, local red kernel types are grown since ancient years. These varieties are Patni, Munga, Bela, Valai, Halga Red, Kala Rata, Bura Rata, Jaddu, Varangal etc. These local red rices are mainly having bold grain type, tall and grassy stature, seed dormancy, sparse plant type, lodging and low yields. However, these varieties are having low amylose, high zinc, iron, riboflavin and antioxidant properties. Their nutritional and physico-chemical properties are used for making soup; locally known as Pej and served to children, women and patients for their daily breakfast. Considering these attributes, red rice could once again find favour with health conscious consumers. It is high time that people in India took a fresh look at similar properties in the vast pool of indigenous red rice. So there is a need for revival of red rice in India and new cultivars should be released. There is also a dire need for clinical validation of the medicinal value of red rice reported in ancient literature, and for research on food preparations from red rice. Hence, the efforts being made to develop Zn and Iron rich rice with modern plant stature. Ratnagiri 7 (RTN RR-4) is semi dwarf (100-110 cm), midlate in duration (122-125 days), high Iron and Zinc content, resistant to stem borer, leaf folder, gall midge and moderately resistant to leaf blast and bacterial leaf blight. Short bold grain, non-lodging,

non-shattering with average yield 4.5 to 5.0 t/ha. Therefore, the release proposal of RTNRR-4 rice variety is submitted for recommendation in the Konkan, Western Maharashtra and Vidarbha region.

Materials and Methods

RTNRR-4 is a mutant selection from MO-17. The selections were made for high zinc and iron content with high grain yield. Among the several selections in mutant populations, a fixed mutant line RTNRR-4 was selected from MO17. The fixed line, RTNRR4 was further tested in various trials viz., station trials, state coordinated trials and national coordinated trials at various locations in the state and country. This culture also tested in agronomical trial at Agricultural Research Station, Shirgaon, Ratnagiri, MS during Kharif 2016. The 15 adoptive trials were conducted during Kharif 2016 in five districts of Konkan region of Maharashtra state. The culture was screened for resistance to various insect pests and diseases at endemic sites. The physical and biochemical quality parameters were analyzed at Regional Agricultural Research Station, Karjat. Zinc and iron analysis was done ICAR- IIRR., Rajendranagar, Hyderabad -30 and Hi Tech. Lab., Sangli. The yield data of various trials were statistically analysed according to Panse and Sukhatme (1967). Based on yield data of various trials, superior grain quality, resistance for disease and insect pest reactions and consistent yield performance at various test locations, Ratnagiri 7 (RTN RR-4) rice variety was recommended to release for Konkan region of state of Maharashtra for commercial cultivation during the year 2017.

Results and Discussion

The yield performance of Ratnagiri 7 (Red rice) (IET-25448) rice variety in various trials conducted during 2011 to 2016, is presented in Table 1. In station trials conducted during *Kharif* 2012, 2013, 2014 and 2015, RTN RR-4 has recorded 66.34%, 15.86%, 54.43% and 42.87% higher grain yield over the check Bela respectively. Ratnagiri 7 (RTNRR-4) rice variety recorded 66.34% higher grain yield (6414 kg/ha) over check Bela (3856) kg/ha in Initial Varietal Trial (Station) conducted during *Kharif* 2012, similarly, during *Kharif* 2013 in IVT (Station) it has recorded 3506 kg/ha of grain yield which was 15.86% higher than the check Bela. Ratnagiri 7 (RTNRR-4) rice variety recorded 54.43% higher grain yield (5660 kg/ha) over check Bela (3665) kg/ha in Advance Varietal Trial (Station) conducted during *Kharif* 2014, similarly, during *Kharif* 2015 in AVT (Station) it has recorded 5072 kg/ha of grain yield which was 42.87% higher than the check Bela. On the basis of overall four years performance of RTN RR-4, it was found 46.50% higher in grain yield (5163 kg/ha) against the check Bela (3524 kg/ha) (Table 1) (Anonymous, 2017).

Ratnagiri 7 (RTN RR-4) has recorded 11.02% (4504 kg/ha), 23.36% (4227 kg/ha) and 28.2% (5536 kg/ha) higher grain yield over the check Bela (4057 kg/ha, 3427 kg/ha & 4318 kg/ha) in Maharashtra state coordinated trials viz., Initial varietal Trial, Advance Varietal Trial-I and Advance Varietal Trial-II conducted during Kharif 2013, Kharif 2014, and Kharif 2016 respectively (Table 1). On the basis of overall three years performance of RTN RR-4 in state coordinated trials conducted at nine locations in Maharashtra state, it was found superior by 21.40% (4744 kg/ha) than the check Bela (3908 kg/ha) (Table 1).

Ratnagiri 7 was evaluated in IVT-(MS) All India Coordinated Trials under as RTN RR-4 (IET-25448) testing code at 22 locations during Kharif- 2015 in the country. It recorded 23.88% higher grain yield over national check IR-64 (Medium) (3593 kg/ha), 18.69% higher grain yield over BPT-5204 (Late) (3750 kg/ha) and 39.40% higher grain yield over

Kalanamak (Quality) (3193 kg/ha). In AICRIP Trial IVT-(M) conducted during *Kharif*-2015 season indicating it's wider adaptability in varied agro-ecological situations in the country (Anonymous, 2017).

The rice culture, Ratnagiri 7 (RTNRR-4) (4890 kg/ha) has recorded 59.41% increase in grain yield over check Bela (3067 kg/ha) in 15 adaptive trials conducted during *Kharif* 2016 on farmers' fields (Table 2).

The experiment was conducted at ARS, Shirgaon (Ratnagiri) to study the effect of spacing and nitrogen levels along with common dose of phosphorus and potash on red rice genotype RTN R-R 4. The response of red rice genotype RTN R-R 4 had significant effect on grain yield. The red rice genotype RTN R-R 4 produced higher varietal response (41.20 Q/ha) over check i.e. Bela cultivar (23.79 Q/ha) and its increment was to the tune of 42.26%. The response of red rice genotype RTN R-R 4 to nitrogen levels was statistically significant. The level of nitrogen 120 kg N/ha (35.39 Q/ha) and 150 kg N/ha (32.55 Q/ha) produced significantly higher grain yield over 100 kg N/ha. Red rice genotype RTN R-R 4 grown at closer spacing of 15 x 15 cm recorded significantly higher grain yield (35.54 Q/ha) over 20 x 15 cm and 20 x 20 cm spacing (Table 3).

Individual interactions between genotypes/variety x spacing, genotypes/variety x nitrogen levels and spacing x nitrogen levels were found to be statistically significant. Red rice genotype RTN R-R 4 grown at closer spacing 15 x 15 cm produced significantly higher grain yield (46.54 Q/ha) over rest of combinations and that increment was to the tune of 47.25% when rice cultivar Bela was grown at same spacing. Red rice genotype RTN R-R 4 fertilized with 120 kg N/ha noticed significantly highest grain yield (45.51 Q/ha) and it was to the magnitude of 44.48%, when rice cultivar Bela was grown with same nitrogen level. Moreover, 15 x 15 cm plant spacing and 120 kg N/ha produced significantly higher grain yield (40.15 Q/ha) over all other treatment combination (Table 3).

From this results of this experiment, it is concluded that, the rice genotype, RTN R-R 4 produced higher grain yield 53.87 q/ha by adopting 15 x 15 cm spacing and 120 kg N + 50 kg P_2O_5 + 50 kg K_2O/ha as fertilizer dose, which was 50.96% higher over cultivar Bela by adopting same package of practice during *kharif* season (Table 3).

Ratnagiri 7 (Red rice) rice variety is midlate in duration (122-125 days duration in Kharif and 130-135 days duration in rabi/hot weather seasons), Semi dwarf (100-110 cm plant height), Medium slender kernel type (M.S.), average 1000 kernel weight of 25.8 g with an average grain yield of 4.5 to 5.0 t/ha. The variety is non-lodging and non-shattering type. The details of salient features and characterization as per DUS guideline of Ratnagiri 7 (IET-25448) are presented in Table 4 and 5.

RTN RR-4 is red kernel variety consists of 28.50% (17.35 ppm) and 32.77% (7.90 ppm) high iron content over the check Bela (13.50 and 5.95 ppm) in brown and polished rice respectively in two years testing. It consists of 42.82% (28.35 ppm) and 43.00% (24.25 ppm) high zinc content over the check Bela (19.85 and 16.95 ppm) in brown and polished rice respectively in two years testing. It also content low glycemic Index (53) (Anonymous 2017). The milling and cooking qualities of Ratnagiri 7 (Red rice) rice variety was estimated at Regional Agricultural Research Station, Karjat during 2015. It showed excellent kernel quality features.

Table.1 Yield performance of Ratnagiri 7 (IET-25448) in different trials and demonstrations

Particulars	**Year**	**Average grain yield (kg/ha)**		**Name of the check**	**Per cent increase over check**
		Ratnagiri 7 (Red rice)	**Check Bela**		
Initial Station trial	2012	6414**	3856	Bela	66.34
Initial Station trial	2013	3506*	3026	Bela	15.86
Advance Station trial	2014	5660**	3665	Bela	54.43
Advance Station trial	2015	5072**	3550	Bela	42.87
Initial State Coordinated trial (9 locations)	2013	4504*	4057	Bela	11.02
Advance State Coordinated trial (AVT-I) (9 locations)	2014	4227*	3427	Bela	23.34
Advance State Coordinated trial (AVT-II) (9 locations)	2015	5536*	4318	Bela	28.21
AICRIP trial- SG (22 locations)	2015	4451**	3193	Kalanamak	39.40
Adaptive trial (15 locations)	2016	4890**	3067	Bela	59.44
Agronomical trial	2016	5387**	2642	Bela	103.89
Average		4964.7	3480.1	-	42.66

(Anonymous, 2017)

*, ** Significant at 5 % and 1 % respectively

Table.2 Yield performance of Ratnagiri 7 (Red rice) (RTNRR-4) under adaptive trials conducted on farmers' field in five districts of Konkan region during *Kharif* 2016

Sr. No.	**Districts**	**No. of Adaptive trials**	**Grain Yield (kg/ha)**		**% increase over check**
			RTN RR-4	**CH. Bela**	
1	Sindhudurg	03	4850	3140	**54.46**
2	Ratnagiri	03	5140	3380	**52.07**
3	Raigad	03	5325	3012	**76.79**
4	Thane	03	4822	2950	**63.46**
5	Palghar	03	4312	2855	**51.03**
Total/Average		**15**	**4890**	**3067**	**59.41**

(Anonymous, 2017)

Table.3 Effect of different levels of nitrogen on grain yield (q/ha) of rice genotype Ratnagiri 7 (Red rice) (RTNRR-4) during *Kharif* 2016

Genotypes	**Spacing**	**Nitrogen levels**			
		N_1 (100 kg N/ha)	**N_2** (120 kg N/ha)	**N_3** (150 kg N/ha)	**Mean**
V_1 (RTN R-R 4)	S_1 (15 x 15 cm)	38.33	**53.87**	47.42	**46.54**
	S_2 (20 x 15 cm)	35.69	44.34	39.11	**39.71**
	S_3 (20 x 20 cm)	36.05	38.32	37.65	**37.34**
V_2 (Bela)	S_1 (15 x 15 cm)	22.59	26.42	24.63	**24.55**
	S_2 (20 x 15 cm)	23.24	25.52	23.49	**24.08**
	S_3 (20 x 20 cm)	21.33	23.85	23.02	**22.73**
	Mean	**29.54**	**35.39**	**32.55**	**32.49**

Parameters	Variety	Spacing	Nitrogen levels	Interaction (Variety X Spacing X Nitrogen)
S.E. ±	0.917	0.764	0.655	1.605
CD (0.05)	5.579	2.492	1.912	NS

(Anonymous, 2017)

Table.4 Characterization of Ratnagiri 7 (RTNRR-4) as per DUS guidelines

Sr. No	Characteristics	Particulars	Sr. No	Characteristics	Particulars
1.	Coleoptile: Colour	Green (2)	19.	Culm: attitude	Erect (1)
2.	Basal leaf: Sheath colour	Green (1)	20.	Time of heading (50% of plants with panicles)	Early (3)
3.	Leaf: Intensity of green colour	Medium (5)	21.	Flag leaf: Attitude of blade (early observation)	Erect (1)
4.	Leaf: Anthocyanin colouration	Absent (1)	22.	Spikelet: Density of pubescence of lemma	Weak (3)
5.	Leaf: Distribution of anthocyanin colouration	NA	23.	Male sterility	Absent (1)
6.	Leaf Sheath: anthocyanin Colouration	Absent (1)	24.	Lemma: Anthocyanin colouration of keel	Absent (1)
7.	Leaf sheath: Intensity of Anthocyanin colouration	NA	25.	Lemma: Anthocyanin colouration of area below apex	Absent (1)
8.	Leaf: Pubescence of blade surface	Weak (3)	26.	Lemma: Anthocyanin colouration of apex	Absent (1)
9.	Leaf: Auricles	Present (9)	27.	Spikelet: Colour of stigma	White (1)
10.	Leaf: Anthocyanin colouration of auricles	Colourless (1)	28.	Stem: Thickness	Medium (5)
11.	Leaf: Collar	Present (9)	29.	Stem: Length (excluding panicle; excluding floating rice)	Very Short (1)
12.	Leaf: Anthocyanin colouration of collar	Absent (1)	30.	Stem: Anthocyanin colouration of nodes	Absent (1)
13.	Leaf: Ligule	Present (9)	31.	Stem: Intensity of thiocyanin coloration of nodes	NA
14.	Leaf: Shape of ligule	Split (3)	32.	Stem: Anthocyanin colouration of internodes	Absent (1)
15.	Leaf: Colour of ligule	White (1)	33.	Panicle: Length of main axis	Medium (21-25 cm) (5)
16.	Leaf: Length of blade	Short (3)	34.	Flag leaf: Attitude of blade (late observation)	Semi erect (3)
17.	Leaf: Width of blade	Medium (5)	35.	Panicle: Curvature of main axis	Semi straight (3)
18.	Culm: Attitude (for floating rice only)	NA	36.	Panicle: Number per plant	Medium (5)

37.	Spikelet: Colour of tip of lemma	Straw (1)	50.	Grain: Weight of 1000 fully developed grains	High (7)
38.	Lemma and Palea: Colour	Absent (1)	51.	Grain: Length	Short (3)
39.	Panicle: Awns	NA	52.	Grain: Width	Narrow (3)
40.	Panicle: Colour of awns (late observation)	NA	53.	Grain: Phenol reaction of lemma	Absent (1)
41.	Panicle: Length of longest awn	NA	54.	Decorticated grain: Length	Short (5.39 mm) (1)
42.	Panicle: Distribution of awns	Absent (1)	55.	Decorticated grain: Width	Medium (2.19) (5)
43.	Panicle : Presence of secondary branching	NA	56.	Decorticated grain: Shape (in lateral view)	Short bold (2)
44.	Panicle: Secondary branching	Erect (1)	57.	Decorticated grain: Colour	Red (6)
45.	Panicle: Attitude of branches	Well exerted (7)	58.	Endosperm: Presence of amylose	Present (9)
46.	Panicle: Exertion	Medium (5)	59.	Endosperm: Content of amylose	Medium (5)
47.	Time maturity (days)	Medium (5)	60.	Varieties with endosperm of amylose absent only Polished grain: Expression of white core	NA
48.	Leaf: Senescence	Straw (1)	61.	Gelatinization temperature through alkali spreading value	Medium (3) (4.0)
49.	Sterile lemma: Colour	Straw (1)	62.	Decorticated grain: Aroma	Absent (1)

Table.5 Salient features of the rice variety Ratnagiri 7 (RTNRR-4)

Character	Particulars
Duration (days)	122-125 days (Kharif) 130-136 (Rabi-hot weather season)
Plant height (cm)	100-110
Lodging	Non-lodging
Panicle length (cm)	22.8
Spikelets / panicle (nos)	176-190
Test weight (1000 kernel weight)	25.8 g
Plant type	Compact
Awns	Absent
Panicle threshability	Easy
Shattering	Non-shattering
Scent	Absent
Average grain yield (t/ha)	4.5-5.0
Potential yields (t/ha)	8.0-9.0
Hulling (%)	71.10
Milling (%)	64.17
Head Rice Recovery (%)	60.65
Kernel Length (mm)	5.39
Kernel Breath (mm)	2.19
Length and Breath ratio	2.46
Kernel chalkiness	Very occasionally present
Grain type	Short Bold
Kernel elongation after cooking (mm)	9.50
Alkali spreading value	3.33
Amylose content (%)	20.57
Gel consistency (mm)	89.0
Reaction to disease and Insect pests	
Bacterial leaf blight	Moderately Resistant
Leaf blast	Moderately Resistant
Neck blast	Moderately resistant
Brown plant hopper	Resistant
Stem borer	Resistant
Leaf folder	Resistant
Gall midge	Resistant

Table.6 Physical and chemical parameters of RTN RR-4 rice culture analyzed at RARS, Karjat during *Kharif* 2015 on pooled basis

Entry / IET No.	GT	Mill (%)	HRR (%)	KL (mm)	Grain Chalk	Aroma	WU (ml)	KLAC (mm)
RTN RR-4	SB	64.17	60.65	5.71	OC	NS	245	9.50
Bela (Ch)	SB	63.67	56.69	5.89	OC	NS	175	9.00

Continued…

Entry / IET No.	VER	ER	ASV	AC* (%)	GC	GT(^{0}C)
RTN RR-4	3.78	1.66	3.33	20.57	89.0	High- Intermediate
Bela (Ch)	4.86	1.52	3.00	18.29	82.0	High- Intermediate

(Anonymous, 2017)

Hull: Hulling (%); Mill: Milling (%); HRR: Head rice recovery (%); KL: Kernel length (mm); KB: Kernel breadth (mm); L/B: Length and breadth ratio; Grain Chalk: Grain Chalkiness; VOC: Very occasionally present; A: Absent; MS: Medium Slender; ASV: Alkali spreading value; AC: Amylose content (%); GC: Gel consistency; NS: Non scented

Table.7 Pooled data of iron and zinc analysis at IIRR, Hyderabad

Parameter	Culture	2014		2016		Average		% Increased over check	
		Brown (ppm)	Polished (ppm)	Brown (ppm)	Polished (ppm)	Brown (ppm)	Polished (ppm)	Brown (ppm)	Polished (ppm)
Iron	RTN RR-4	19.3	6.1	15.4	9.7	**17.35**	**7.90**	**28.50**	**32.77**
	Bela (CH)	15.7	5.8	11.3	6.1	**13.50**	**5.95**		
Zinc	RTN RR-4	26.7	20.2	30.0	28.3	**28.35**	**24.25**	**42.82**	**43.00**
	Bela (CH)	22.3	19.7	17.4	14.2	**19.85**	**16.95**		

(Anonymous, 2017)

Table.8 Nutritional values of RTN RR-4 at Hi Tech Labs and Consultancy, Sangli (MS)

Sr. No.	Entry / IET No.	Total Carbohydrates (g per 100 g sample)	Glycemic Index	Dietary fibers (g per 100 g sample)	Potassium (ppm)	Calcium (ppm)	Riboflavin (ppm)
1	RTN RR-4	82.29	53	2.10	1120	1302	0.045
2	Bela (Ch)	84.11	55	2.30	1834	1740	0.049

(Anonymous, 2017)

Table.9 Performance of RTN RR-4 to Bacterial leaf blight and Leaf blast in Maharashtra Screening Nursery-1 (MSN-1) on pooled basis

Sr. No.	Name of entry	Scale Mean (SI)			Pooled Mean (SI)	Reaction
		Kh-2013	*Kh*-2014	*Kh*-2015		
	Bacterial Leaf blight	**(4 Loc)**	**(3 Loc)**	**(2 loc)**	**(9 Loc)**	**-**
1	RTN RR-4	3.5	**3.33**	**3.00**	**3.33**	**MR**
2	Bela (CH)	SNR	**4.67**	**1.00**	**3.20**	**MR**
	Leaf Blast	**(5 Loc)**	**(4 Loc)**	**(3 Loc)**	**(12 Loc)**	**-**
1	RTN RR-4	1.8	**3.00**	**5.33**	**3.08**	**MR**
2	Bela (CH)	SNR	**2.75**	**4.67**	**3.57**	**MS**

(Anonymous, 2017)

Table.10 Performance of RTN RR-4 for major insect pests in Maharashtra Screening Nursery-1 (MSN-1) on pooled basis

Sr. No.	Name of entry	Stem Borer (Scale)				Gall Midge (Scale)				Brown Plant Hopper (Scale)				Leaf folder (Scale)	
		Tillering stage DH		Panicle emergence WE		Silver shoot				Tillering Stage		Panicle emergence		MNC	
		50 DAT % DH		% WE		30 DAT		50 DAT		50 DAT		70 DAT		50DT	
		Mean	Reaction	Mean	Reaction	Mean	Reaction	Mean	Reaction	Scale	Reaction	Scale	Reaction	%DL	scale
1	RTN RR-4	0.3	HR	2.0	R	2.3	R	4.3	MS	1	R	1	R	6.6	MR
2	Bela (CH)	1.0	HR	5.0	MS	1.5	HR	3.0	MR	1	R	1	R	19.9	MR

(Anonymous, 2017)

Scale	Code	Reaction		Scale	Code	Reaction
0	HR	Highly Resistant		4-6	MS	Moderately Susceptible
1	HR	Highly Resistant		7	S	Susceptible
2	R	Resistant		8-9	HS	Highly Susceptible
3	MR	Moderately Resistant				

The variety Ratnagiri 7 showed higher milling (64.17 %) and head rice recovery (60.65 %). The kernel length (5.39 mm), kernel breadth (2.19 mm), length : breadth ratio (2.46) and translucent kernel observed to be an inherited traits in this rice variety which contribute to higher milling and head rice recovery in Ratnagiri 7 (Red rice) rice variety (Table 6) (Bhattacharya, 1980).

Ratnagiri 7 (Red rice) rice variety recorded an intermediate amylose content (20.57 %) indicating better cooking qualities of kernels (Anonymous, 2017).

The variety showed medium gel consistency (23 mm) and Alkali spreading value was 3.33. Amylose content between 20-25 % is intermediate and good for cooking, 61-100 mm gel consistency is soft and alkali spreading value ranged 3-5 is high to intermediate good for cooking (Shobha Rani, 2003).

The above observation indicates that the new variety Ratnagiri 7 meets the requirements of millers and consumers for higher monitory returns to farmers.

The rice variety Ratnagiri 7 (Red rice) was screened for reaction to various diseases and insect pests at endemic locations in the state. The variety showed moderately resistant to Moderately resistant to leaf blast, bacterial leaf blight (Table 8).

While, it was also recorded resistance reaction to neck stem borer, leaf folder and gall midge under endemic test locations (Table 9) (Anonymous, 2017).

In view of higher yields, superior grain quality and field tolerance to major insect pests and diseases, the rice variety Ratnagiri 7 (Red rice) (IET-25448) recommended to release for commercial cultivation in Konkan region of Maharashtra during the year 2017. It will meet the requirement of farmers and consumers in the state.

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