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On Farm Testing of Rice Variety NDLR-7 as an Alternative to Traditionally Grown BPT-5204 in Kurnool District of Andhra Pradesh

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ABSTRACT

Background: Rice (*Oryza sativa* L.) is major crop in Andhra Pradesh being cultivated in 22.11 lakh ha average productivity of 3350Kg/ha Local BPT-5204 (samba mashuri) is high susceptibility to blast, sheath blight and gall midge. Since this is consumers' preference both in the rural and urban markets, farmers are cultivating BPT-5204 though this variety is susceptibility to blast and BPH leads to high cost of cultivation. As an alternative to this NDLR-7 variety developed by Regional Agricultural Research Station (RARS), Nandyal, ANGRAU NDLR-7 was tolerant to blast, BPH, sheath blight, leaf folders and gall midge.

Methods: NDLR-7 was introduced by KVK, Banavasi through on farm trail during 2016-17 and this trial was continued for three years as an alternative to traditionally grown BPT-5204.

Result: The data from the three years of on farm trail reveals that the cost of cultivation has drastically reduced from Rs. 66050/ha to 50,538/ha due to reduced use of pesticides. The yield in demonstration plot (NDLR-7) was 7437.5 Kg/ha compared to control (5812 Kg/ha).

Key words: Percent disease Incidence, Productive tillers, Rice, Yield.

INTRODUCTION

Rice is the one of the most cultivated cereal crop India with regard to human nutrition and caloric intake providing more than one fifth calories consumed worldwide by humans. Andhra Pradesh is an agriculturally developed state, with nearly 23.9% of the GSDP coming from the agriculture sector employing about 62.17% in this sector. The agricultural sector employs around 60% of the main work force of the state and 76% of the marginal work force, thus proving to be the largest employment generating sector. InAndhra Pradesh rice is cultivated in an area of 22.11 lakh ha with the production of 71.15 lakh tonnes. Andhra Pradesh has been historically called as the "Rice Bowl of India" and continues to be the largest producer of rice in the country**.** Rice growing seasons of Andhra Pradesh are of three types Autumn (*Kharif*) /Saarva/Aabi/ Vanakaru, Winter (*Rabi*) / Dalva/Tabi/Endakaru and Summer/ Vesavi/Kathera/ Mokkadugu/Edagaru. In Kurnool district, rice is the major crop which is cultivated nearly in 75,000 ha during sambaseason. The local BPT-5204 (samba mashuri), is high susceptibility to blast, sheath blight and gall midge which increases plant protection cost leads to reduction in yield and income. NDLR-7 was developed by Regional Agricultural Research Station (RARS), Nandyal, ANGRAU. NDLR-7 variety tolerant to blast, sheath blight, leaf folders and gall midge. Also suitable for cultivation in *Rabi* and late planting conditions. Cooking quality of NDLR-7 is reported on par with samba mashuri.

As part of on farm testing and providing solution to the problem in locally grown BPT-5204, Krishi Vigyan Kendra Banavasi was introduced NDLR -7 in farmers field. In addition to that new improved package of practices like seed treatment, alleyways formation, weedicide application, STBF (Soil testbased Fertilizer Application) and real time pest & disease management practices were suggested and implemented.

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MATERIALS AND METHODS

On farm trails were conducted at Kammladinne, Puttapasam and Venkatapuram blocks (western Part) of Kurnool district. The trial was conducted at five locations during kharif season of three consecutive years (2016-17, 2017-18 and 2018-19). The size of each OFT plot was in 0.2 ha. The assessment was conducted to study the performance in terms of yield potential and benefit cost ratio. Two technological options were imposed for thison farm trail and critical inputs of rice varieties NDLR-7 and BPT-5204 distributed to the farmers. Apart from on farm trail, trainings also conducted to the farmers on improved variety and good agricultural practices. During three years of assessment the

observations like percent disease incidence (Blast), percent pest incidence (BPH), panicle length (cm), number of grains per panicle, productive tillers (number), Yield (Kg/ha), net returns and benefit cost ratio were recorded.

Statistical analysis

Collected data during three years is analyzed using appropriate statistical tools *viz*. mean, standard deviation, and the results were concluded at the respective levels of significances. The mean values of panicles length, no.of grains per panicle, no.of productive tillers and yield were calculated from the pooled data of three years 2016, 2017 and 2018. The mean population of brown plant hopper/hill and percentage incidences of blast were calculated for three years (Table 3 and 4).

RESULTS AND DISCUSSION

In this present study, Technology option 1(TO1) considered as farmers practice, most of the farmers from western part of Kurnool were grown BPT-5204 variety, while Technology option 2 (TO2) includes improved variety released from ANGRAU (Table 1). The characteristics of both TO1 and TO2 were given in Table 2.

The results from Table 3 and 4 showed that the mean population of brown plant hopper on NDLR-7 (9.96/hill) variety was observed lower than BPT-5204 variety (17.26/ hill). Overall the BPH scenario was high during november month in all three years. Similarly, the percentage incidence of blast also minimum in NDLR-7 (7.18) compared to BPT 5204 (15.68). This study showed that the expenditure on plant protection chemicals was saved in TO1 (NDLR7) as it has tolerance against biotic stress like BPH and blast.

Table 5 and 6 shows that growth parameters like panicle length and number of grains per panicle were significantly highest in NDLR-7 as compare to BPT-5204 in all the three years. Similarly, from Table 7, the number of productive tillers were recorded highest when compare to BPT-5204. Since the p-value from Table 8 (=0.000) is less than 0.01 in all the three years, hence it can be concluded that there is significant difference between two practices with regard to yield in which improved practice significantly more yield, than that of farmers' practice. These results also supported by Ganesh Kumar P. *et al.* (2019).

Table 9 reveals that the average net returns for three years were Rs.1,45,657 /-ha in recommended variety, which is Rs.86652/- higher than farmers practice. These benefits can be attributed owing to its tolerance to BPH and blast incidence, fine grain, cooking quality and higher market price in the market and technological interventions provided during on farm trials. The benefit cost ratio of NDLR-7 was higher (3.21) than traditional variety (1.88). Similar findings were reported by Ganesh Kumar P. *et al* (2019). Thus, favorable net returns and higher market price and tolerance to BPH of the assessed variety convinced many farmers in real time farming condition. Overall findings of the assessment study clearly stating that convincing of farmer in real time condition would result in faster adoption of technology. At present the variety is grown in 2500 ha of area in scarce rain fall zone of Andhra Pradesh through horizontal spread. Seed spread of newly identified varieties through participatory approach has earlier been reported by Najeeb *et al.,* 2018 and Witcombe and Virk 2001.

Table 1: Technological options.

Technology Option	Variety	Source of technology
TO1	BPT-5204	Farmers Practice
TO2	NDLR-7	ANGRAU

Table 2: Characteristics of rice varieties selected for on farm trial.

Name of the variety	Characters of the variety
Rice BPT-5204 (TO1)	Fine grain variety
Rice NDLR-7 (TO2)	This variety is moderately tolerant to BPH and tolerant to blast. Fine grain, no shattering and fertilizer responsive.

Table 3: Year wise incidence of BPH between NDLR-7 and BPT 5204 varieties.

Year	Month	BPH population /hill	
		NDLR-7	BPT-5204
2016-17	August	4.25	6.5
	September	6.5	11.25
	October	14.0	25.0
	November	11.75	29.25
2017-18	August	4.5	6.25
	September	8.25	16.0
	October	9.5	20.5
	November	10.5	19.25
2018-19	August	5.5	7.0
	September	6.5	8.5
	October	23.3	34.5
	November	15.0	23.2

Table 4: Year wise incidence of blast between NDLR-7 and BPT 5204 varieties.

Year	Month	Percentage of Blast	
		NDLR-7	BPT-5204
2016-17	August	3.5	8.0
	September	4.5	12.5
	October	5.25	25.0
	November	7.0	29.25
2017-18	August	4.5	6.25
	September	8.25	16.0
	October	9.5	20.5
	November	10.5	19.25
2018-19	August	5.5	7.0
	September	6.5	8.5
	October	14.0	20.25
	November	15.5	25.75

Performance rice varieties on growth, yield and yield attributes.

Table 5: Performance rice varieties on Panicle Length (cm).

	2016-17				2017-18				2018-19				pooled			
Technology Option	Mean	SD	t-value	P value	Mean	SD	t-value	P value	Mean	SD	t-value	P value	Mean	SD	t-value	P value
NDLR-7	22.8	1.47	2.30	0.002*	22.38	0.88	2.32	0.000*	22.1	0.82	2.30	0.000	22.4	1.06	2.04	0.000*
BPT-5204	19.28	1.12			19.18	0.77			18.9	0.89			19.1	0.88		

*Significant at 0.05% level of probability.

Table 6: Performance Rice varieties on no. of grains/panicle.

	2016-17				2017-18				2018-19				pooled			
Technology Option	Mean	SD	t-value	P value	Mean	SD	t-value	P value	Mean	SD	t-value	P value	Mean	SD	t-value	P value
NDLR-7	167.4	1.81	2.30	0.000*	166.8	3.2	2.30	0.000*	164	2.3	2.30	0.000*	165.8	2.5	2.30	0.001*
BPT-5204	155.2	4.08			155.2	4.5			153	2.0			154.4	3.6		

*Significant at 0.05% level of probability.

Table 7: Performance Rice varieties on no. of productive tillers/sq.m.

	2016-17				2017-18				2018-19				pooled			
Technology Option	Mean	SD	t-value	P value	Mean	SD	t-value	P value	Mean	SD	t-value	P value	Mean	SD	t-value	P value
NDLR-7	24.2	1.58	2.32	0.002*	23	1.41	2.30	0.003*	24	1.58	2.30	0.002*	23.8	1.32	2.04	0.000*
BPT-5204	19	2.58			18.8	2.16			18.2	2.58			18.6	2.28		

*Significant at 0.05% level of probability.

Table 8: Performance rice varieties on yield Kg/ha.

	2016-17				2017-18				2018-19				pooled			
Technology Option	Mean	SD	t-value	P value	Mean	SD	t-value	P value	Mean	SD	t-value	P value	Mean	SD	t-value	P value
NDLR-7	7750	30.6.1	2.30	0.000*	7760	303.4	2.30	0.000*	7700	234.5	2.30	0.000*	7736	263	2.30	0.000*
BPT-5204	5895	178.1			6080	137.2			5890	179.9			5955	187		

*Significant at 0.05% level of probability.

Table 9: Year wise economic evaluation of rice varieties NDLR-7 and BPT-5204.

Year	Net Income Rs/ha		B:C Ratio	
	NDLR-7	BPT-5204	NDLR-7	BPT-5204
2016-17	112312	57745	3.22	1.87
2017-18	162960	61630	3.23	1.93
2018-19	161700	57640	3.20	1.84
Avg	**145657**	**59005**	**3.21**	**1.88**

CONCLUSION

Rice variety NDLR-7 recorded more number of productive tillers which is the most important yield contributing parameter, lowest percent disease incidence which reduced the plant protection cost, higher yield and higher BC ratio. Hence, Farmers were satisfied with NDLR-7cultivation. Moreover, it matures in 135-140 days which is 7-10 d earlier than BPT 5204.Since the grain is of very fine quality; it has more commercial value and high marketable price. Hence, it is concluded that NDLR-7 is the suitable rice variety alternate to BPT 5204 rice cultivating area of Scarce Rain fall Zone of Andhra Pradesh.

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