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Performance of local, improved and hybrid rice varieties in district Rewa, (M. P.), India

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Abstract

The field studies were carried out for performance of local, improved and hybrid varieties of rice in rewa region. Study of performance was done from 2007 to 2008. To study the incidence of various pests 16 rice cultivars five were local cultivars namely Dehula, Newari, Bhataphool, Loachai & Lohindi & six were improved varieties viz Pusabasmati, IR-36, IR-64, Vandana, IR-20 & Pusa Sugandha and five were hybrid varieties i.e. PA-6201, KRH-2, PRH-10, JRH-4 & JRH-5. The observations were made regarding the plant height, number of tillers, number of primary and secondary panicle, maturity days and grain yield.

Key-Words: *Oryza sativa*, M. P., India

Introduction

Rice (*Oryza sativa* Linn.) is one of the most important food crops of India. Rice has shaped the culture, diets and economic of thousand of millions of peoples. For more than half of the humanity "rice is life". Major share of rice is cultivated during Kharif season.[1] Madhya Pradesh is an agrarian state with about 74% population of the state depending directly or indirectly on agriculture. Agriculture and its allied services contribute 31% share in the state's economy. In M.P. rice is grown in the area of about 15.59 lakh ha with production of 14.62 lakh tons and productivity 989 kg/ha which is far below than the average national productivity (2010 kg/ha). In Madhya Pradesh around 5000 ha is under hybrid rice particular in under irrigated production system. Rice hybrid produce about 14-18% higher grain yield include a more vigorous and extensive root system.[2,3].The challenge with the agricultural scientists to-day is to achieve comprehensive and sustainable food and nutrition security despite increasing population and declining purchasing power. The food grain requirement for the country was estimated at 220.5 million tonnes for 2001 and 243 million tonnes for 2006-2007 AD.

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There is decline in per capita land holding from 0.5 ha in 1951-52 to 0.14 ha in 1995-96, and is expected to further decline to a level of 0.09 to 0.05 ha by the end of first two decades of the twenty first century. For attaining and maintaining sustained self-sufficiency the production growth rate of rice has to be raised to 2.35 t ha^{-1}. [4]

Though there has been impressive rate of growth in the rice production in the non-traditional rice growing areas, the growth rate has been comparatively poor in the traditional rice growing areas of eastern India where 62% of the total rice lands are located. Due to continuous cereal-cereal cropping sequence in the non-traditional rice growing areas, there is soil degradation and rice cultivation may be phased out in due course of time.[5, 6]

The present investigation was observed local, improved and hybrid rice varieties performances during 2007-2008 in Rewa.

Material and Methods

The present study was done in Kuthulia farm of Agriculture College of District Rewa. The study was conducted in the seasons of 2006-07 and 2007-08. During this time period average temperature was 30.4 ^{0}C (maximum) and 15.61 ^{0}C (minimum). During 2007 the monsoon was received on 16th June whereas in 2008 it was on 12th June. Rainfall was adequate in 2007 (669.5mm) in 41 rainy days but the year 2008 it was comparatively high ranging up to 672.6mm.

In order to study the 16 rice cultivars were tested during years 2007 and 2008. Among the tested cultivars, five were local cultivars namely Dehula, Newari, Bhataphool, Loachai & Lohindi & six were improved varieties viz Pusabasmati, IR-36, IR-64, Vandana, IR-20 & Pusa Sugandha and five were hybrid varieties i.e. PA-6201, KRH-2, PRH-10, JRH-4 & JRH-5. The observations were made regarding the the plant height, number of tillers, number of primary and secondary panicle, maturity days and grain yield. The quantitative method was used to this study.

Results and Discussion

Rice, the staple diet of over half of the world's population, is grown on over 145 million ha in more than 110 countries, and occupies almost one-fifth of the total world cropland under cereals[7]. John (1981) reported that inadequate crop protection in India causes annual losses more than 36 percent by insects alone.[8]

In the present study during both 2007 and 2008 seasons, the performance of 16 experimental rice varieties were observed under the following heads Plant height in cm, Number of Tillers/plant, Number of Tillers per m^2, Number of primary panicle per plant, Number of secondary panicle per plant, Length of panicle in cm, Wt of panicle in grams, Number of filled grains per panicle, Number of chaffy grains per panicle, Days for 50% flowering, Maturity days, Weight in grams of 1000 grains and Grain yield in q/ha (Table 1 and 2).

Plant height cm

The data presented in Table No. 1&2 indicate that the local cultivar Bhantaphool had maximum plant height during the years 2007 and 2008 (145 cm and 145.2 cm) while, Lohandi showed minimum plant height (110.4 cm and 109 cm).

Number of Tillers/ plant

The number of tillers per plant was maximum in IR 64 during the year 2007 and 2008 (145.5 and 14.3) while Dehula showed minimum numbers of tillers /plant (4.3 and 4.7).

Number of Tillers /m^2

The number of tillers /m^2 were maximum in PA -6201 during the years 2007 and 2008 (260 and 260.7) while Lohandi showed minimum number of tillers/m^2 (120 and 120).

Number of primary panicle/plant

Number of primary panicle/plant were maximum in PA6201 during the years 2007 and 2008 (18.6 and 18.9) while Lohandi showed minimum number of primary panicle/plant (6.5 and 6.8).

Number of Secondary Panicle/plant

Number of secondary panicle/plant were maximum in KRH -2 during the year 2007 and 2008 (68.8 and 68.9) while Lohandi showed minimum number of secondary /panicle plant (40.1and 40.3).

Length of panicle in cm:

Panicle length was found to be maximum in JRH –5- during the years 2007 and 2008 (29.6and 29.3 cm) followed by Pusabasmati (29.1and 29.8 cm) while Lohandi showed minimum length of panicle (23.4 and 23.7 cm).

Weight of panicle

The weight of panicle was recorded maximum in PRH 10 during the years 2007 and 2008 (5.7 and 5.8) while Dehula showed minimum weight of panicle (2.8 and 2.9).

Number of Filled grains / panicle

Number of filled grains/panicle where found to be maximum in PRH 10 during the years 2007 and 2008 (292.0and 297.8) while showed minimum number of filled grains/panicle (120.0 and 153.5).

Number of Chaffy grains / panicle

The number of chaffy grains/panicle were maximum in PA 6201 during the years 2007 and 2008 (40.3 and 35.5) while JRH – 5 showed minimum number of chaffy grains/panicle (23 and 17.6).

Days to 50% flowering

Bhantaphool took longer days of flowering period 105 days, while the early flowering period cultivar were Dehula, Lohandi, Vandana and IR -201 (60-65 days).

Maturity days

Dehula took minimum (90 days) for maturing, while Bhantaphool took the longest period i.e. 140 days for maturing.

1000 grain weight (g)

JRH–5 showed maximum 1000 grain weight during the year 2007 and 2008 (27.78 and 27.48gm), where as minimum 1000 grain weight IR-201 (19.6 and 19.9gm).

Grain yield q/ha

Grain yield was recorded highest i.e. 90.5 q/ha and 91.7 q/ha in PA 6201 and lowest in Dehula i.e. 16.5 q/ha and 17.6 q in the years 2007 and 2008 respectively.

Singh *et al* 2013 [9] have studies field performance of rice varieties in south asia. Dattatreyulu, 1994 [10] also worked on performance of rice varieties.

Conclusion

In the present course of investigation, we have to explore the performance of Local, Improved and Hybrid Rice Varieties in the rewa region. Adoption of cultural practices like cultivation of pests and diseases resistant / tolerant varieties, timely planting, judicious use of water and nutrient, optimum plant stand. The agricultural research though made considerable progress in addressing food security, adopted policies

to grow more and more food to support the growing populations in Asian countries ignoring the issues of health and environment which lead to disastrous situation.

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Table1: Performance of rice local, improved and hybrid varieties in the year 2007

Variety	Plant height cm	No. of Tillers/ Plant	No of Tillers/ m2	No. of Primary Panicle/ Plant	No. of Secondary Panicle / Plant	Length of Panicle cm	Weight of Panicle (g)	No. of Filled grains/ Panicle	No. of Chaffy grain/ Panicle	Days to 50% flowering	Maturity days	1000 grain weight (g)	Grain yield q/ha
Dehula	110.5	4.3	125	7.8	45.5	29.1	2.8	120.1	38.5	60	90	20.9	16.5
Newari	112.45	5.8	135	8.5	50.1	26.5	3.7	135.5	30.3	68	100	21.5	20.4
Bhantaphool	145	8.5	145	9.2	51.3	27.4	3.1	149.5	26.4	105	140	20.7	28.4
Lochai	125	6.8	140	10.2	48.4	28.1	3.9	150.4	31.7	85	125	22.4	35.7
Lohnadi	110.4	4.7	120	6.5	40.1	23.4	2.9	130.4	28.4	65	95	23.5	28.7
Pusabasati	120.1	8.1	148	8.3	41.5	29.1	3.4	150.5	38.8	85	126	22.1	35.5
IR-36	118.1	10.5	180.1	11.2	55.6	27.1	3.1	165.1	25.1	82	125	22.4	45.6
IR-64	120.5	14.3	168.5	14.3	58.4	27.5	3.7	185.4	23.5	85	127	22.6	55.3
Vandana	127	6.3	125	7.5	42.4	27.1	3.4	160.5	30.5	62	92	21.5	30.4
IR- 201	120.5	8.5	165	8.5	46.4	26.5	4.1	158.1	30.1	60	95	19.6	35.7
Pusasugandha	115.1	11.5	210	12.4	55.1	26.1	4.7	165.5	28.4	80	115	21.02	60.4
PA- 6201	120.6	13.1	260	18.6	65.7	27.5	4.8	180.3	40.3	90	130	22.3	90.5
KRH-2	138.6	12.8	246	13.6	68.8	28.6	5.2	168.8	30	82	130	24.26	86.6
PRH – 10	120.6	8.6	256	12.4	45.0	28.6	5.7	292.0	25	80	124	22.74	89.0

JRH – 4	126.4	11.4	240	140.0	46.0	27.2	3.2	120.0	33	74	111	26.46	75.0
JRH – 5	133.6	11.8	235	13.2	45.6	29.6	4.4	116.0	23	77	106	27.78	73.4
SEM ±	0.206	0.122	1.626	0.156	0.177	0.190	0.210	2.207	0.882	1.942	2.502	0.175	0.568
CD (0.05)	0.595	0.353	4.696	0.453	0.512	0.550	0.607	6.376	2.547	5.609	7.228	0.505	1.641

Table 2: Performance of rice local, improved and hybrid varieties in the year 2008

Variety	Plant height cm	No. of Tillers/ Plant	No of Tillers/ m2	No. of Primary Panicle/ Plant	No. of Secondary Panicle/ Plant	Length of Panicle cm	Weight of Panicle (g)	No. of Filled grains/ Panicle	No. of Chaffy grain / Panicle	Days to 50% flowering	Maturity days	1000 grain weight (g)	Grain yield q/ha
Dehula	112.5	4.7	125.4	7.7	45.7	23.3	2.9	130.3	32.3	61	90	21.1	17.6
Newari	111.3	5.9	135.2	8.5	50.5	26.7	3.9	150.3	27.7	64	100	21.9	21.1
Bhantaphool	145.2	8.4	145.0	9.7	51.8	27.6	3.3	135.5	21.3	103	140	20.8	29.3
Lochai	125.3	6.9	140.6	10.9	48.5	28.6	3.6	165.4	25.4	83	125	22.9	35.9
Lohnadi	109.9	4.8	120.0	6.8	40.3	23.7	3.7	185.3	24.8	67	95	23.8	29.6
Pusabasmati	119.9	8.7	148.6	8.9	41.5	29.8	2.6	133.2	33.7	87	126	22.7	36.5
IR-36	119.7	10.7	180.6	11.5	55.8	29.3	3.6	180.5	23.1	80	125	22.9	45.8
IR-64	122.5	14.5	168.8	14.7	58.6	27.4	3.4	175.4	19.7	83	127	22.9	56.7
Vandana	128.1	6.9	125.3	7.8	42.5	27.7	3.9	180.5	26.4	64	92	21.8	31.3
IR- 201	119.7	8.7	165.0	8.6	46.7	27.4	4.3	170.7	25.6	61	95	19.9	36.7
Pusasugandha	117.2	11.7	210.5	12.6	55.3	26.8	4.9	178.9	23.7	84	115	21.5	62.0
PA-6201	118.8	13.5	260.7	18.9	65.9	26.3	4.9	190.5	35.5	92	130	22.7	91.7
KRH-2	135.9	12.7	247.0	13.8	68.9	27.5	6.3	178.7	27.2	83	130	24.29	88.6
PRH – 10	122.1	8.8	256.0	12.7	45.4	26.3	5.8	297.8	21.3	77	124	22.79	90.7
JRH – 4	127.7	11.7	241.0	14.1	46.0	27.4	6.3	153.5	27.8	72	11	26.48	77.3
JRH – 5	133.5	11.6	235.0	13.5	45.9	29.3	4.5	185.7	17.6	79	106	27.48	75.4
SEM ±	0.863	0.121	1.138	0.129	1.426	0.205	0.220	1.251	0.708	1.495	2.502	0.461	0.613
CD (0.05)	2.494	0.351	3.286	0.373	4.119	0.594	0.636	3.613	2.047	4.318	7.228	1.332	1.770