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Comparative Performance of Different Varieties of Rice in Muktsar District of Punjab

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ABSTRACT

A field experiment was conducted during *kharif* 2013, 20 and 20 at Krishi Vigyan Kendra, Sri Muktsar Sahib (Punjab), to find out the best suitable variety of rice for the area. PR 111, PR 114, PR 121, PR 122, PR 123 and PR 124 were the six different varieties tested under this experiment. Fifty Per cent flowering was earlier in variety PR 124 as compared to PR 111, PR 121 and PR 123 and was statistically at par with PR 114 and PR 122. However, among days taken to maturity, variety PR 111 matured earlier (139) and statistically differ from PR 121 (141), PR 124 (141.5) and PR 123 (143.7), PR 114 (145) and PR 122 (146.3). Variety PR 121 produced higher number of effective tiller (447.3/m^2), which was statistically at par with PR 122 (441.7/m^2) and PR 114 (435.3/m^2) but significantly superior from PR 111 (414/m^2), PR 123 (413.3/m^2) and PR 124 (412.5/m^2). Higher grain yield was recorded with variety PR 121 (79.3 q/ha), which was statistically at par with PR 124 (78.5 q/ha), PR 122 (77.3 q/ha) and PR 123 (77 q/ha) but was significantly superior from PR 111(68.5 q/ha), PR 114(71.5 q/ha). The varieties PR 121 and PR 124 produced higher yield and also matured in less time. So these two varieties are best suitable for the area.

Key Words: Short duration, Tillers, Rice, Variety, Yield,

INTRODUCTION

Rice (*Oryza sativa*) belongs to family gramineae and is a well-known cereal, because it is staple food for more than half of world population (Jamal *et al* 2009). It is grown in almost all continents of the world due to its wide adaptability to diverse agro-climatic conditions but mainly grown in tropical and sub-tropical regions of world. To feed that increasing population, 35 per cent more rice production will be required than present rice production (Kaur and Dhaliwal, 2014; The major rice production countries are China, India, Indonesia, Thailand, Bangladesh, Vietnam, Brazil, Philippine, Japan, Myanmar, U.S.A and Pakistan. Rice is the main food crop of India and contributing about 45 per cent of the total production and hence sustain sufficiency food in the country (Sharma *et al* 2011). It is the major *kharif* crop of India and ranks second after wheat in terms of area, production and productivity in Punjab state. In Punjab, rice currently occupies an area of 28.51 lakh hectare with production of 112.67 lakh tonnes with an average yield of 5.93 t ha^{-1} (Anonymous, 2015). District Sri Muktsar Sahib is also a major rice growing district of Punjab. Agricultural production is decreasing these days due to biotic and abiotic stresses. The major abiotic stresses are high salinity, drought, submergence and cold (Thakur *et al* 2010; Mantri *et al* 2012). Among all abiotic stresses, salinity is the major factor of restricting productivity of rice worldwide (Munns and Tester, 2008). Lot of water logged area is present in Sri Muktsar Sahib district of Punjab and salt stress is increasing due to certain factors like climate change, excess canal water for irrigation without proper drainage. To avoid this problem development of rice varieties, which are high yielding and resistant to biotic and abiotic stresses must be included. Punjab Agricultural University recommended a number of high yielding rice varieties for cultivation in whole of Punjab state. These varieties gave different yield at different places. The soil and irrigation water of Sri Muktsar Sahib is totally different from whole

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the Punjab state. The district contains high salinity and water logged area. Hence, the objective of present study was to evaluate the performance of short duration and high yielding varieties of rice in Sri Muktsar Sahib district of Punjab.

MATERIALS AND METHODS

A field experiment was conducted during *kharif seasons of* 2013, 2014 and 2015 at Krishi Vigyan Kendra, Sri Muktsar Sahib (Punjab), to find out the best suitable variety for the area. The experimental site is situated at 30°26′788″ North latitude and 74°30′523″ East longitude during *kharif* 2013, 30°26′778″ North latitude and 74°30′508 during kharif 2014 and at 30°26′722″ North latitude and 74°30′501″ East longitude″ during kharif 2015. The area is characterized by semi-arid type of climate with hot and dry early summers from April-June followed by hot and humid period during July-September and cold winters during December-January. The mean maximum and minimum temperatures show considerable fluctuations during different parts of the year. Summer temperature exceeds 38˚C and may go up as high as 45˚C with dry summer spells. The annual rainfall of the area is 430.7 mm, most of which is received during July to September (Anonymous 2011). The soil properties of the experimental fileds are given in Table 3. Wheat was grown as the previous *rabi* crop in these experimental plot during all the three years. PR 111, PR 114, PR 121, PR 122, PR 123 and PR 124 were the six different varieties tested under this experiment. PR 124 tested for two years but all other five varieties were tested for all the three years of the study. All the varieties were transplanted in the second fortnight of June and were harvested in the month of October according to the maturity of the variety during all the study period of three years. All the other agronomic practices were as recommended by PAU, Ludhiana. Nitrogen was applied in three equal splits, one third as basal, one third at 21 days after transplanting and remaining one third at 42 days after transplanting. Irrigations were applied according to the requirement of the crop. The data on number of effective tillers per square meter, plant height, number of grains per panicle, 1000 grain weight and grain yield were collected through field observations. Collected data were further analyzed by using randomize block design.

RESULTS AND DISCUSSION

Due to increasing the depth of water table of Punjab state, duration of rice cultivar is very important factor. In the pooled average of the three years the variety PR 124 produced earlier 50 per cent flowering (97.5), which was statistically at par with PR 111 (98), PR 121 (99) and PR 123 (99.7) but significantly earlier from PR 114 (103) and PR 122 (103.3). However, among days taken to maturity, the variety PR 111 matured earlier (139) as compared to other varieties (Table 2), which statistically differed from PR 121 (141), PR 124 (141.5) and PR 123 (143.7). Higher days taken for maturity were observed in PR 114 (145) and PR 122 (146.3). The plant height of different varieties differed non significantly (Table 2).

During *kharif* 2013, the number of effective tillers/m^2 was higher in PR 121 (435/m^2) followed by PR 122 (421/m^2), and lower effective tillers were obtained in PR 114(412/m^2) PR 111(410/m^2) and PR 123 (402/m^2), whereas, in *kharif* 2014, PR 114 (460/m^2) and PR 122 (460/m^2) produced higher effective tillers followed by PR 121 (452/m^2) and PR 123 (422/m^2). Lower effective tillers were obtained with PR 124 (412/m^2) and PR 111 (412/m^2) variety (Table 2). However, during *kharif* 2015, higher number of effective tillers were obtained with PR 121 (455/m^2) followed by PR 122 (444/m^2) PR 114 (434/m^2) and PR 123 (426/m^2). Lower effective tillers were obtained with PR 124 (413/m^2) and PR 111 (422/m^2) variety. In the pooled data the higher number of effective tillers per square meter were obtained in the variety PR 121 (447.3/m^2), which was statistically at par with PR122 (441.7/m^2) and PR 114 (435.3/m^2) but significantly superior from PR 111(414/m^2), PR 123(413.3/m^2) and PR 124(412.5/m^2). All the different varieties failed to

Table 1 Effect of different varieties on duration, plant height and effective tillers.

Variety	Days taken to 50 % flowering				Days taken to maturity				Plant height (cm)				Effective tillers/m²			
	2013	2014	2015	Average	2013	2014	2015	Average	2013	2014	2015	Average	2013	2014	2015	Average
PR 111	98	97	99	98.0	140	139	138	139.0	103.6	101	99.7	101.4	410	412	422	414.0
PR 114	105	100	104	103.0	145	145	145	145.0	98.8	103.7	105.3	102.6	412	460	434	435.3
PR 121	101	96	100	99.0	143	140	140	141.0	102.2	99.3	101.3	100.9	435	452	455	447.3
PR 122	103	99	108	103.3	147	146	146	146.3	103.2	106	111.7	107.0	421	460	444	441.7
PR 123	100	99	100	99.7	144	143	144	143.7	101.8	105.3	104	103.7	402	422	426	413.3
PR 124	-	96	99	97.5	-	142	141	141.5	-	100.3	112	106.2	-	412	413	412.5
CD (p=0.05)				3.03				1.4				NS				18.6

Table 2 Effect of different varieties on grain yield and yield contributing characters.

Variety	No of grains /panicle				1000 grain wt (g)				Grain yield (q/ha)			
	2013	2014	2015	Average	2013	2014	2015	Average	2013	2014	2015	Average
PR 111	133	125	153	137	24.2	23.4	24.1	23.9	65.0	76.5	64.0	68.5
PR 114	142	114	158	138	24.6	24.8	24.5	24.6	70.6	72.0	72.0	71.5
PR 121	140	137	140	139	25.5	24.6	24.6	24.9	76.0	85.5	76.0	79.3
PR 122	146	115	150	137	26.1	24.4	23.8	24.8	75.5	83.3	73.3	77.3
PR 123	147	128	146	140	24.7	23.8	25.1	24.5	78.0	75.8	77.3	77.0
PR 124	-	113	154	133	-	24.6	25.2	24.9	-	78.8	78.3	78.5
CD (p=0.05)				NS				NS				6.2

Table 3 Soil characteristics of different experimental sites.

Parameter	*Kharif* 2013	*Kharif* 2014	*Kharif* 2015
pH (1:2)	8.1	7.95	8.2
EC (dS m^{-1})	0.932	0.938	0.912
OC (%)	0.20	0.24	0.22
P (kg/ha)	15.2	17	14.0
K (kg/ha)	626.0	710	640
Soil texture	Sandy loam	Sandy loam	Sandy loam

produce any significant effect on the number of grains per ear and 1000 grain weight (Table 3).

During *kharif* 2013, the grain yield was higher in variety PR 123 (78 q/ha) followed by PR 121(76 q/ha), PR 122 (75.5 q/ha), whereas in *kharif* 2014, PR 121 (85.5 q/ha) gave higher grain yield followed by PR 122 (83.3 q/ha), PR 124 (78.8 q/ha) and PR 111 (76.5 q/ha) but lower grain yield was obtained with PR 114 (72.0 q/ha). Similar results were obtained in *kharif* 2015, where higher grain yield was obtained with PR 124 followed by PR 121 and PR 122 and lower grain yield was obtained with PR 111 variety (Table 3). In the pooled data the higher grain yield was recorded with variety PR 121 (79.3 q/ha), which was statistically at par with PR 124 (78.5 q/ha), PR 122 (77.3 q/ha) and PR 123 (77 q/ha) but significantly superior than grain yield from PR 111(68.5 q/ha) and PR 114(71.5 q/ha).

CONCLUSION

The varieties PR 121 and PR 124 produced higher grain yield and also matured in less time. Hence, these two varieties are most suitable for Muktsar district of Punjab.

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