Original Research Article

Evaluation of Rice (*Oryza sativa* L.) Hybrids on Growth, and Yield under Agro-climatic Conditions of Prayagraj, U.P.

ABSTRACT

A field experiment was conducted during *kharif* season of 2021 at the Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Prayagraj (U.P.) India. The soil of experimental plot was sandy loamy in texture, nearly neutral in soil reaction (Ph 7.2), low in organic carbon (0.35%), available N (108.0 kg/ha), available P (22.15 kg/ha) and available K (280.0 kg/ha). The experiment was carried out to find the performance of 10 hybrids, which laid out in Randomized Block Design (RBD) & replicated thrice. The experiment finding revealed that the Rice hybrid UR-35 performed better than other treatment *viz.* plant height (120.58 cm), number of tillers/hill (15.07 no.), plant dry weight/plant (55.91 g), CGR (40.50 g/m^2/day**)** was recorded significantly highest in rice hybrid UR-35, effective tillers/ m^2 (387.33 no.), panicle length (28.41 cm), test weight (26.45 g), grain yield (28.37 g/hill), grain yield (6.90 t/ha), straw yield (12.77 t/ha). The minimum days to 50% flowering were recorded in UR-32 and minimum days to maturity were recorded in UR-34. Maximum gross returns (1,76,172.00 /ha) and net returns (1,22,126.00/ha) and B:C (2.25) ratio were recorded in UR-35 Hybrid.

Keywords: *Hybrid rice, varietal response, yield, Oryza sativa* L

Introduction

Rice (*Oryza sativa* L.) is considered as one of the most important staple cereals in the world and it is the main source of carbohydrates for nearly one half of the world population. However, 90% of rice is produced and consumed in Asia. It contributes 43% of gross cropped area of the country, 46% of total cereal production and second in rice production after China. The genetic classification of rice plant belongs to genus *Oryza* of family Gramineae (poaceae). The genus includes 24 species of which 22 are wild and 2 are cultivated species. *Oryza sativa* L. and *Oryza glaberimma* are cultivated. All species are cultivated in Asia, America and Europe continents. India has 44.2 million ha area with average productivity of 2.3 tonnes/ha and production of 118.87 million tonnes. In Uttar

Pradesh 5.9 million ha with an average productivity of 2447 kg/ha and production of 14.63 million tonnes. Globally, rice is now cultivated on 159 million hectares with annual production of around 748 million tonnes and average productivity of 4.68 tonnes/ha.The nutrient contents of rice are 80% carbohydrates, 7-8% protein, the amino acid profile shows that it is rich in Glutamic acid and aspartic acid, highest quality cereal protein being rich in lysine (3.8%), 3% fibre, iron 1.0 mg and Zinc 0.5 mg.Hybrid rice cultivars possessed a prominent role in enhancing the production and quality of rice which is used for feed, industrial purposes. Hybrid rice cultivation is economically viable if management level is above 60%. Hybrids are short duration with resistance to major pests and diseases, non-lodging, they adapt better to stress and different climatic conditions and has longer shelf life Around 3 million hectares out of 43 million hectares under rice cultivation are hybrids. a. Hybrid rice was planted in an area of 1.3 million hectares and additional rice production of 1.5 to 2.5 million tonnes was recorded through this technology. Since the population increasing hence there is a urgent need to provide high yield rice varieties but yield already stagnated hence hybrid rice break the yield barriers which give 15- 20% higher yield.

Materials and Methods

A field experiment was conducted during *kharif* season of 2021 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj, U.P, India. The soil of the experimental plot was sandy loam in texture, nearly neutral in soil reaction (pH 7.8), medium in organic carbon (0.35%), medium in available Nitrogen (243.0 kg/ha), low in available Phosphorous (20.10 kg/ha) and medium in available Potash (105.0 kg/ha). The treatments consist of 10 Rice hybrids *Viz.*, UR-31, UR-32, UR-33, UR-34, UR-35, UR-36, UR-37, UR-38, UR-39, UR-40. The experiment was laid out in Randomized Block Design (RBD) with ten hybrids replicated thrice. The experiment comprising of ten hybrids, *viz.*, T_1: UR-31, T_2: UR-32, T_3: UR-33, T_4: UR-34, T_5: UR-35, T_6: UR-36, T_7: UR-37, T_8: UR-38, T_9: UR-39, T_{10}: UR-40 observation regarding growth and yield attributes was recorded during the field experiment.

Result and discussion

Growth

The recorded and analyses data pertaining to growth parameters indicates that significant higher plant height (120.58 cm), number of tillers per hill (15.07), plant dry weight per hill (55.91) was recorded in rice hybrid UM-35.

The differential growth with respect to plant height, number of tillers per hill and plant dry weight among the hybrids may be attributed to differences in genetic characterization of the individual, including rapid growth rates, tallness or shortness of species. Similar findings were recorded by Chamely *et al.* (2015), Sharma *et al.* (2018), Reddy *et al*. (2018).

Yield and yield attributes

Yield attributes such as Effective tillers per m^2, Panicle length (cm), Number of filled Grains/Panicle (No.), Number of unfilled grains/Panicle (No.), Test weight(g), Grain yield(g/hill), Grain yield (t/ha), and Straw yield(t/ha) are recorded highest in hybrid UR-38. The Hybrid UR-35 was recorded with higher yield attributes *viz*. Number of tillers per m^2 (387.33 tillers/m^2), panicle length per hill (28.41 cm), number of filled grains per panicle (No.) (245.00), number of unfilled grains per panicle (No.) (48.33), test weight per hill (26.45 g), grain yield per hill (28.37 g), grain yield (6.90 t/ha), straw yield (12.77 t/ha) and harvest index (42.49%).

Increases in yield attributes such as Effective tillers per m^2, Panicle length (cm), Number of filled Grains/Panicle (No.), Number of unfilled grains/Panicle (No.), Test weight(g), Grain yield(g/hill), Grain yield (t/ha), Straw yield(t/ha) and Harvest index (%) have resulted in an increase in seed production as a result of different genetic makeup. Similar findings were recorded by Meena *et al*. (2016) and Khan *et al.* (2018).

Conclusion

Based on the findings of this field experiment it is concluded that among all rice hybrids, UR-35 was found the most suitable rice hybrid to be recommended as it was found more adaptive, productive and profitable when compared to others under agroclimatic conditions of Prayagraj, U.P.

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Table 1: Evaluation of Rice Hybrids on Growth Attributes under Agro-climatic Conditions of Prayagraj, Uttar Pradesh

Hybrids	Plant height (cm)	Tillers/hill (No.)	Dry weight (g)
UR-31	116.84	14.20	49.21
UR-32	116.63	13.87	51.43
UR-33	103.60	13.33	48.43
UR-34	110.37	14.07	46.91
UR-35	120.58	11.00	55.91
UR-36	117.84	12.27	51.73
UR-37	112.63	10.33	48.78
UR-38	115.57	15.07	53.33
UR-39	111.68	13.07	49.91
UR-40	114.96	14.40	48.10
F-test	S	S	S
SEm±	1.65	0.43	1.89
CD (P=0.05)	5.01	1.29	5.63

Hybrids	effective	Panicle length	Test weight	Grain yield/hill	Grain Yield (t/ha)	Straw yield (t/ha)	Harvest Index (%)

	tillers/ m^2						
UR-31	248.33	24.67	21.78	21.83	5.72	9.93	39.43
UR-32	258.33	24.67	22.98	26.42	4.04	10.03	36.50
UR-33	371.00	21.33	24.45	23.18	5.34	9.13	38.48
UR-34	318.67	22.45	22.65	23.47	6.34	12.26	40.63
UR-35	387.33	28.41	26.45	28.37	6.90	12.77	42.49
UR-36	300.00	22.34	25.87	18.27	5.36	10.9	38.20
UR-37	354.67	23.59	20.68	23.39	4.24	9.83	37.57
UR-38	313.00	25.68	18.32	20.45	6.75	11.23	39.48
UR-39	343.67	20.32	20.83	27.10	4.47	10.76	36.47
UR-40	367.67	22.56	22.54	23.76	5.25	10.03	36.79
F-test	S	S	S	S	S	S	S
SEm±	19.53	0.44	0.20	0.66	0.17	0.37	0.87
CD (P=0.05)	57.78	1.34	0.61	1.98	0.51	1.14	2.56

Table 2: Evaluation of Rice Hybrids on Yield Attributes under Agro-climatic Conditions of Prayagraj, Uttar Pradesh