

TITLE

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

Article type: *Original Research Article*

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 field was sandy loam in texture, nearly neutral in soil reaction (pH 7.2), low in organic carbon (0.35%), available N (108.0 kg/ha), available P₂O₅ (22.15 kg/ha) and available K₂O (280.0 kg/ha). The experiment was carried out to find the performance of 10 hybrids, which laid out in Randomized Block Design (RBD) with three replications. To find the performance of 10 Rice hybrids. The result of experimentation revealed that the Rice hybrid UR-35 recorded significantly higher growth attributes viz. plant height (120.58 cm), number of tillers/hill (15 no.), plant dry weight/plant (55.91 g), CGR (40.50 g/m²/day), yield attributes viz., effective tillers/m² (387 no.), panicle length (28.41 cm), test weight (26.45 g), and yields viz., grain yield per hill (28.37 g), grain yield (6.90 t/ha), straw yield (12.77 t/ha).

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* and family Gramineae (poaceae). The genus includes 24 species of which 22 are wild and 2 are cultivated i.e. *Oryza sativa* L. and *Oryza glaberrima* 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. (Directorate of Economics and Statistics 2016). In Uttar Pradesh 5.9 million ha with an average productivity of 2447 kg/ha and production of 14.63 million tonnes (Agriculture Statistics

2016). Globally, rice is now cultivated on 159 million hectares with the annual production of around 748 million tonnes and average productivity of 4.68 tonnes/ha (AFO, 2016-2017). Rice contains 80% carbohydrates, 7-8% protein, the amino acid profile shows that it is rich in glutamic acid and aspartic acid, and also rich in lysine (3.8%), 3% fibre, iron 1.0 mg and Zinc 0.5 mg (Juliano *et al.*,1985). Hybrids of rice possessed a prominent role in enhancing the production and quality of rice, which is used for feed and 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. Because the population is growing, there is an urgent need to provide high yielding rice varieties, therefore, rice hybrids breaks yield barriers, yielding 15- 20% more.

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 field 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 experiment was laid out in Randomized Block Design (RBD) and replicated thrice. The experiment comprising of ten hybrids, viz., T₁: UR-31, T₂: UR-32, T₃: UR-33, T₄: UR-34, T₅: UR-35, T₆: UR-36, T₇: UR-37, T₈: UR-38, T₉: UR-39, T₁₀: UR-40 observation regarding growth and yield attributes was recorded during the field experiment.

Result and discussion

Performance on Growth

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

The variations in growth with respect to plant height, number of tillers per hill and plant dry weight among the hybrids may be attributed due 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).

Performance on Yield and yield attributes

The Hybrid UR-35 was recorded with significantly higher yield attributes viz. number of tillers (387.33 tillers/m²), panicle length per hill (28.41 cm), number of filled grains per panicle (No.) (245), number of unfilled grains per panicle (No.) (48), 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 m², panicle length (cm), number of filled grains/panicle, number of unfilled grains/panicle, test weight (g), grain yield per hill (g), grain yield (t/ha), straw yield(t/ha) and harvest index (%) have resulted in an increase in grain yield 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 the rice hybrids, UR-35 rice hybrid was found more adaptive, productive and profitable when compared to other rice hybrids under agro-climatic conditions of Prayagraj, U.P.

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Table 1: Performance on Growth Attributes of Rice Hybrids 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
CD (P=0.05)	5.01	1.29	5.63

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

Hybrids	Effective Tillers/m ²	Panicle Length	Test weight	Grain yield/Hill	Grain (t/ha)	Yield	Straw (t/ha)	Yield	Harvest Index
UR-31	248.33	24.67	21.78	21.83	5.72		9.93		9.93
UR-32	258.33	24.67	22.98	26.42	4.04		10.03		10.03
UR-33	371.00	21.33	24.45	23.18	5.34		9.13		9.13
UR-34	318.67	22.45	22.65	23.47	6.34		12.26		12.26
UR-35	387.33	28.41	26.45	28.37	6.90		12.77		12.77
UR-36	300.00	22.34	25.87	18.27	5.36		10.9		10.9
UR-37	354.67	23.59	20.68	23.39	4.24		9.83		9.83
UR-38	313.00	25.68	18.32	20.45	6.75		11.23		11.23
UR-39	343.67	20.32	20.83	27.10	4.47		10.76		10.76
UR-40	367.67	22.56	22.54	23.76	5.25		10.03		10.03
CD (P=0.05)	57.78	1.34	0.61	1.98	0.51		1.14		2.56