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## Agronomical evaluation of private sector rice (*Oryza sativa* L.) genotypes under agro-climatic zone of Prayagraj U.P.

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### Abstract

A field experiment was conducted at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P) during *Kharif*, 2023. The soil of the experimental plot was sandy loam in texture, nearly neutral in soil reaction (pH 7.2), organic carbon (0.81%), available N (269.96 kg/ha), available P (33.10 kg/ha), and available K (336 kg/ha). The experiment was laid out in Randomized Block Design with 14 hybrids each replicated thrice. Based on the objectives taken maximum plant height (68.81 cm), number of tillers (10.03), plant dry weight (28.54 g/plant), effective tiller/m<sup>2</sup> (386.64), panicle length (28.78 cm), filled grains (121.62), grain yield/hill (29.13 g), seed yield (4.73 t/ha), stover yield (8.92 t/ha) and were recorded significantly higher in hybrid UR-310. Further, the maximum gross returns (₹164465/ha) and net returns (₹110419/ha) and B:C ratio was highest in 2.04 were recorded significantly higher in hybrid UR-310.

**Keywords:** Hybrid rice, varietal response, yield, growth, economics, *kharif*

### Introduction

Rice (*Oryza sativa* L.) is the main staple food in Asia, where about 90% of the world's rice is produced and consumed. China is the world's biggest producer, growing one-third of Asia's total on 29 million ha. India produces nearly a quarter on 43 million ha. (IPI, 2006 and FAO, 2008). In India rice is grown under widely varying conditions of altitude and climate. Rice crop generally needs hot and humid climate. The average temperature requirement throughout the life period of the crop ranges between 21 to 37 °C. Well-drained, loamy and light alluvial soils with pH 5.0 to 6.5 are most suitable for proper growth and productivity. (DMS Rice Training, Jaivikkheti). In Uttar Pradesh 15.27 million tonnes and production 24.59 million tonnes with an average productivity of 2447 kg/ha and production (Survey 2022-23, DoAF&W). Hybrid rice accounts for more than half of the area under the crop and has contributed significantly to yield and output growth even after, relocation of land to other agriculture and non-agriculture uses. The nutrient content of rice are 80% carbohydrates, 7-8% protein. The current global population of 7.55 billion is expected to reach 8.1 billion by 2025 and 9.6 billion by 2050 (Department of Economics and Social Affairs-2017). With the increasing popularity of hybrid among the Indian farmers it is necessary to develop appropriate cultivation practices if the full genetic potential is to be exploited. Growing of hybrid rice is a complex process and especially agronomic management of hybrid rice differs considerable from that of conventional varieties.

### Materials and Methods

A field experiment was conducted at Crop Research Farm, Department of Agronomy, SHUATS, Prayagraj (U.P) during *Kharif*, 2023. The soil of the experimental plot was sandy loam in texture, nearly neutral in soil reaction (pH 7.2), organic carbon (0.48%), available N (108 kg/ha), available P (22.50 kg/ha), and available K (280 kg/ha). The experiment was laid out in Randomized Block Design with 14 hybrids each replicated thrice. The observations were recorded on different growth parameters at harvest *viz.* plant height (cm), plant dry weight, test weight, seed yield, stover yield and harvest index.

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were analyzed statistically to test their significance and the experiment findings have been summarized in the light of scientific reasoning and have been discussed below under the following heading: -

## Results and Discussion

### Growth Attributes

At 100 DAT the significantly tallest plant height was observed in UR-310 (68.81 cm). However, UR-300 (68.71 cm) and UR-235 (67.75 cm) were statistically at par with UR-310. Genetic makeup of the variety is a huge contributing factor which have also been reported by Haque *et al.* (2015) [4]. Increase in plant height may also be due to synchronized availability of all the essential plant nutrients especially nitrogen for a longer period during growth stages (Singh *et al.*, 2019) [8]. The result conformed with Deshpande and Devasenpathy, 2011 [3]. At 100 DAT the highest number of tillers was observed in UR-310 (10.03). However, UR-170 (9.82), UR-195 (9.94) and UR-245 (9.86) were statistically at par with UR-310. The significant differences could be due to the variation in genetic make-up of the high yielding varieties that might be influenced by heredity. It could also be due to good nutrient. This was consistent with findings. At 100 DAT the highest dry weight was observed in UR-310 (28.54 g/plant). However, UR-215 (27.96 g/plant) and UR-235 (28.06 g/plant) were statistically at par with UR-310. The other reason of high dry matter accumulation in might be due to the significant increase in morphological parameters which responsible for the photosynthetic capacity of the plant thereby increasing the straw yield. The result conformed with Bozorgi *et al.* (2011) [2].

### Yield Attributes

UR-310 recorded significantly higher panicle length/hill (28.78 cm). However, UR-225 (28.25 cm) and UR- 215 (27.82 cm) were statistically at par with UR- 310. The highest significant number of filled grains/panicle (121.62) was recorded under the hybrid UR-310. However, UR-300 (113.16) were statistically at par with UR-310. The probable reason might be that hybrid rice produces long roots and broad leaves that enable them to take up more nutrients and produce more grains. It is suited to existing climatic condition of the place especially during the grain-filling stage of the panicle development. Similar results have also been reported by Bhuiyan *et al.* (2014) [1]. The data showed the highest grain yield/hill was observed in UR-310 (29.13 g/hill). However, UR-185 (29.01 g/hill), UR-205 (27.90 g/hill)

and UR-255 (27.81 g/hill) were statistically at par with UR-310. The higher grain yield/hill under variety might be due to the optimum utilization of nutrient. The hybrids of short duration high yielding have the potential to give the maximum grain yield then rest of the varieties. significantly highest grain yield was observed in UR-310 (4.73 t/ha). However, UR-170 (4.62 t/ha) and UR-225 (4.71 t/ha) were statistically at par with UR-310. Grain yield per plant had highly significant positive correlation with tillers/hill, panicle length, harvest index, grain yield per plot, grain yield /meter<sup>2</sup> and with grain yield/hectare. These results confirm the findings of Rahman *et al.* (2013) [7]. Significantly highest straw yield was observed in UR-310 (8.92 t/ha). However, UR-195 (8.72 t/ha) and UR-255 (8.78 t/ha) were statistically at par with UR-310. According to the findings by Padmavathi, 1997 supports that the capability of hybrid rice to utilize more nitrogen through the expression of better growth brought by the beneficial effect on nutrient uptake and physiological growth increase the straw yield. The data showed the harvest index was observed significantly higher in UR-310 (33.99%). However, UR-300 (33.89%) and UR-195 (33.90%) were statistically at par with UR-310. Harvest index reflects the physiological capacity of a crop variety to mobilize and translocate the photosynthates to the sink. (Marri *et al.*, 2005) [5] found that harvest index negatively correlated with plant height, but positively correlated with grain number/panicle, grain number/plant, percentage spikelet fertility and yield/plant in rice.

**Table 1:** Field evaluation of hybrid rice on growth parameters of rice hybrid

Hybrids	Plant Height (cm)	Tillers/hill (No.)	Dry Weight (g)
Rice Hybrid UR-170	63.06	9.82	27.63
Rice Hybrid UR-175	63.09	9.02	26.16
Rice Hybrid UR-185	62.61	9.72	26.53
Rice Hybrid UR-195	60.35	9.94	25.51
Rice Hybrid UR-200	62.32	9.46	26.61
Rice Hybrid UR-205	62.83	8.12	27.47
Rice Hybrid UR-215	62.21	08.66	27.96
Rice Hybrid UR-225	66.57	9.72	27.24
Rice Hybrid UR-235	67.75	9.68	28.06
Rice Hybrid UR-245	62.86	9.86	27.11
Rice Hybrid UR-255	65.12	9.72	27.19
Rice Hybrid UR-300	67.81	9.98	28.31
Rice Hybrid UR-310	68.81	10.03	28.54
Rice Hybrid UR-320	62.97	9.93	27.30
F-test	S	S	S
S.Em±	1.73	0.39	0.74
CD (p=0.05)	5.04	1.81	2.16

**Table 2:** Field evaluation of rice hybrids on yield attributes and yield

Hybrids	Effective Tiller/m <sup>2</sup>	Panicle length (cm)	Filled Grains/panicle (No.)	Grain yield/hill (g/hill)	Grain Yield (t/ha)	Straw Yield (t/ha)	Harvest Index (%)
Rice Hybrid UR-170	301.23	26.62	94.01	22.87	4.62	7.51	30.57
Rice Hybrid UR-175	311.32	27.33	101.92	25.19	4.25	8.06	27.09
Rice Hybrid UR-185	362.67	26.71	101.42	29.01	3.07	7.25	30.281
Rice Hybrid UR-195	367.06	27.94	98.63	21.24	4.39	8.72	33.90
Rice Hybrid UR-200	368.06	26.66	97.14	24.98	4.07	7.92	31.98
Rice Hybrid UR-205	298.06	26.88	97.76	27.90	3.03	8.21	29.49
Rice Hybrid UR-215	357.53	27.82	100.28	22.14	4.26	6.39	30.05
Rice Hybrid UR-225	321.50	28.25	93.11	25.21	4.71	6.78	31.84
Rice Hybrid UR-235	288.33	26.66	99.94	23.59	4.16	8.67	30.54
Rice Hybrid UR-245	368.66	26.62	102.25	27.18	4.21	7.39	31.41
Rice Hybrid UR-255	323.06	27.31	99.52	27.81	3.32	8.78	33.03
Rice Hybrid UR-300	379.66	27.36	113.16	25.23	4.43	7.76	33.89
Rice Hybrid UR-310	386.64	28.78	121.62	29.13	4.73	8.92	33.99
Rice Hybrid UR-320	318.65	25.93	98.48	19.03	4.49	7.61	30.85
F-test	S	S	S	S	S	5.	s
SEm±	6.01	0.91	2.82	1.16	0.38	0.76	0.83
CD (/.0.05)	17.44	2.66	8.22	2.37	1.10	2.36	2.51

### Conclusion

It is concluded that rice hybrid UR-310 recorded higher yield attributes, yield and benefit cost ratio. Since, the findings are based on the research done in one season and further trials are needed to be confirm more precise result.

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