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Quality 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*, 2022. 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 10 hybrids each replicated thrice. Based on the objectives taken maximum plant height (67.81 cm), number of tillers (9.98), plant dry weight (28.31 g/plant), Crop Growth Rate at 60-80 DAS (35.44 g/m²/day), relative growth rate (0.087 g/g/day), tillers/m² (379.66), panicle length (27.74 cm), filled grains (111.94), grain yield/hill (29.18 g), seed yield (5.04 t/ha), stover yield (09.77 t/ha) and were recorded significantly higher in hybrid UR-300. Further, the maximum gross returns (₹154313/ha) and net returns (₹100267/ha) and B:C ratio was highest in 1.85 were recorded significantly higher in hybrid UR-300.

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

Introduction

Rice (*Oryza sativa* L.) is the most widely produced cereal crop in the world and accounts for 45-70% of the total calorie intake in many rice consuming countries. It is essential to enhance rice production in order to fulfil rising food needs and ensure a sufficient supply of food for the growing population (Seed Science and Technology, BCKV). Rice generally grown in different agro-climatic situations in every continent although its productivity is generally affected by numerous abiotic and biotic stresses (Plant Pathology, BCKV). India is one of the leading producers of this crop. Rice is the basic food crop and being a tropical plant, it flourishes comfortably in a hot and humid climate. Rice is mainly grown in rain-fed areas that receive heavy annual rainfall. That is why it is fundamentally a kharif crop in India. It demands a temperature of around 25 degrees Celsius and above, and rainfall of more than 100 cm (39 in). Rice is unquestionably a superior source of energy among the cereals. The protein quality of rice (66%) ranks only below that of oats (68%) and surpasses that of whole wheat (53%) and of corn (49%). (Dunna et.al., IARI). In Asia the yield of HYVs in most of the production system has either been plateaued or declined, most of the cultivable land suitable for rice production has already reached its frontier. Burgeoning population (8.5 billion till 2030) and changing climatic scenario has made it challenging to meet world food demand (about 40% more rice by 2030). In view of above challenges, the adoption of hybrid rice technology which is more remunerative in yield found practically feasible and readily adoptable options to enhance productivity to a substantial height (NRRI, ICAR).

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 10 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. 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

A. Growth Attributes

At 100 DAT the significantly tallest plant height was observed in UR-300 (67.81 cm). However, UR-225 (66.57 cm) and UR-235 (67.75 cm) were statistically at par with UR-300. Genetic make-up 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-300 (9.98). However, UR-195 (9.94) and UR-245 (9.86) were statistically at par with UR-300. 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-300 (28.31 g/plant). However, UR-215 (27.96 g/plant) and UR-235 (28.06 g/plant) were statistically at par with UR-300. 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].

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-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	8.66	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
F-test	S	S	S
S.Em±	1.87	0.42	0.77
CD (p=0.05)	5.57	1.26	2.31

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

Hybrids	Effective Tillers/m ²	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-185	362.67	27.66	101.42	22.87	4.07	5.69	30.28
Rice Hybrid UR-195	367.06	24.28	97.37	25.19	4.39	9.41	33.52
Rice Hybrid UR-200	368.06	27.28	97.13	29.01	4.13	6.19	29.98
Rice Hybrid UR-205	298.06	27.41	97.06	21.24	3.03	7.91	29.49
Rice Hybrid UR-215	357.53	27.47	100.54	24.98	4.26	6.17	30.05
Rice Hybrid UR-225	321.50	27.63	94.68	27.90	3.73	8.24	31.84
Rice Hybrid UR-235	288.33	26.11	100.04	22.14	4.16	7.38	30.54
Rice Hybrid UR-245	368.66	26.61	102.21	25.21	4.21	8.29	31.41
Rice Hybrid UR-255	323.06	25.61	101.53	23.59	4.32	7.85	33.03
Rice Hybrid UR-300	379.66	27.74	111.94	29.18	5.04	9.77	33.89
F-test	S	S	S	S	S	S	S
S.Em±	5.9	0.78	2.98	1.01	0.39	0.67	0.83
CD (p=0.05)	17.61	2.34	8.8	3.05	1.73	2.06	2.51

B. Yield Attributes

UR-300 recorded significantly higher panicle length/hill (27.74 cm). However, UR-185 (27.66 cm) and UR-200 (27.28 cm) were statistically at par with UR-300. The highest significant number of filled grains/panicle (111.94) was recorded under the hybrid UR-300. However, UR-245 (102.21) and UR-255 (101.53) were statistically at par with UR-300. 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-300 (29.18 g/hill). However, UR-200 (29.01 g/hill) and UR-225 (28.90 g/hill) were statistically at

par with UR-300. 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-300 (5.04 t/ha). However, UR-195 (4.39 t/ha), UR-215 (4.26 t/ha) and UR-255 (4.32 t/ha) were statistically at par with UR-300. Grain yield per plant had highly significant positive correlation with tillers/hill, panicle length, harvest index, grain yield per plot, grain yield /meter² and with grain yield/hectare. These results confirm the findings of Rahman *et al.* (2013) [7]. Significantly highest straw yield was observed in UR-300 (9.77 t/ha). However, UR-195 (9.41 t/ha) and UR-225 (8.24 t/ha) were statistically at par with UR-300. According to the findings by Padmavathi, 1997 [6] 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-300 (33.99%). However, UR-195 (33.90%) and UR-255 (33.03%) were statistically at par with UR-300. 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.

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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