Original Research Article

Evaluation of rice (*oryza sativa l.*) hybrids on growth, yield and economics under agro-climatic conditions of Prayagraj, Uttar pradesh.

Abstract

The field experimental trial was carried out during *kharif* season 2021 at CRF SHUATS, Prayagraj, U.P. Experiment was laid out in statistically Randomized Block Design (RBD).
The experimental result revealed that the hybrid UR-16 has performed highest in growth and yield attributes. Significantly highest Plant height (120.57 cm), Number of tillers/hill (15.07), Maximum plant dry weight (55.91 g), Panicle length (28.41 cm), Test weight (26.48 g), Grain yield (28.37 g/hill), Grain yield (6.85 t/ha), Straw yield (12.96 t/ha), and the same hybrid has also obtained maximum gross returns (589860.00 INR/ha), net returns (95174.00 INR/ha), and B:C ratio (1.76).

Keywords*: Hybrid rice, Varietal response, Yield, Kharif, Randomized Block Design*.

Comment [U1]: *The abstract did not clearly state the objectives and research methods which is used*

Introduction

Rice is considered as one of the most important cereal food crop of the world as well as our continent. About 65% of Indian population depends on rice as a staple food. Rice belongs to genus *Oryza* and the family Gramineae (Poaceae). Mainly the genus *Oryza* contains 24 recognized species, out of which 22 are wild species and also there are two cultivated species in it, which are named as *O.sativa* and *O.glaberrima*. An estimated requirement of the food grains by the year 2021 is 310.74 million tons. But an estimated 197 grams of rice was available per person for each day in our country in the year of 2021. Because of these now-a-days scientists doing research on hybrids to meet the requirements of the rice crop. The nutrient contents of this crop are rich in carbohydrates which is of 80% and protein content is of 7-8%. Mainly this crop cultivation in our country extends from 8 to 35^{o}N latitude and from sea level to as high as 3000 meters. The average tolerance when coming to temperature in this crop is 21 to 37^{o}C, and maximum tolerance is 40 to 42^{o}C. Mostly manual transplanting of rice is practiced in south and south-east Asia. Rice production and productivity was positively improved with the introduction and cultivation of semi-dwarf, non-lodging, and fertilizer responsive high yielding varieties in the early seventies which lead to “Green Revolution”. The yield production of high yielding varieties is planting in recent year to meet the demand of increasing population the present production level needs to be elevated up to 140 million tonnes by 2025 which is only possible by increasing the rice production by over 2 million tonnes per year in the coming decade. Hybrid rice technology has provided farmers with higher yields, saved land for agricultural diversification and created more rural employment opportunities.

Comment [U2]: *The introduction section should be more focused on the previous works done on this topic.*

Materials and Methods

Comment [U3]: *The materials and methods section did not clearly explain the research methods and parameters which is used*

A field experiment was carried out during *kharif* season of 2021 at the Crop Research farm, Department of Agronomy, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj. The experiment site lies between 25-27° N latitude, 8.5°E Longitude and 98 meters altitude. The experiment is conducted on 22 different rice hybrids. It was laid out in Randomized Block Design with three replications. The experimental soil is sandy loam in texture with available nitrogen 108 kg/ha, available phosphorous 22.5 kg/ha, available potassium 280 kg/ha and with almost neutral ph. Rice hybrids were sown at a spacing of 20cm×10cm, the hybrids were supplied by UPCAR. The RDF *i.e.*,120 kg/ha Nitrogen, 60

kg/ha phosphorus and 60 kg/ha potassium. The observations on growth parameters were recorded from randomly selected five plants from each plot at various growth stages of crop. Yield parameters were recorded at harvesting stage in net plots. The difference among treatment means was compared by using least significant difference test at 5% probability levels using ANOVA. Economics were also calculated prevailing to market price.

Results and Discussion

Comment [U4]: *The results and discussion just explain the results, did not provide further explanations related to the data which is obtained, or the relationship among the parameters.*

Growth parameters

Growth parameters in rice is measured in terms of plant height (120.57cm), Number of tillers/ plant (15.07), dry weight (56.32 g/plant) and days to 50% flowering (57.00) varied due to different rice hybrids is presented in Table 1. UR-16 has performed better compared to other hybrids it recorded significantly maximum in growth parameters of plant height(cm), Number of (tillers/m^2), dry weight (g/plant), and 50% flowering Genetic makeup of the variety is a huge contributing factor which have also been reported by Haque *et al.* (2015). 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).

Yield parameters

The observations related to yield attributes are *viz.*, significantly highest number of effective tillers/m^2 (387.33), panicle length (28.41cm), test weight (26.48 g), grain yield (28.37 g/hill), grain yield (6.85 t/ha) and straw yield (12.96 t/ha) was recorded in hybrid UR-16. The probable reason for high yielding varieties have high tillering capacity. Similar findings are also reported by Yadav *et al.* (2004). The significant differences in panicle length among the hybrid rice varieties could be attributed to their genetic make-up. The results confirm the findings of Rahman *et al.* (2013). The results show that the adoption of 20 x 10 cm^2 spacing for rice transplanting resulted in heavier filled and healthy grain higher test weight in hybrid. Similar results have been also reported by Haque *et al.* (2015). The higher grain yield/hill under variety might be due to the optimum utilization of nutrient. Ranjitha *et al*. **(2013).** Grain yield per plant had highly significant positive correlation with tillers/hill, panicle length, harvest index, grain yield per plot, grain yield /$meter^2$ and with grain yield/hectare. These results confirm the findings of Rahman *et al.*

(2013). According to the findings by (Padmavathi, 1997) it shows that the capability of

S.NO	Plant height (cm)	Number of tillers/hill (no.)	Plant dry weight/hill (g)	50% flowering
1	102.62	11.33	48.65	80.32

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.

Table 1. Growth parameters of rice hybrids under agroclimatic conditions of Prayagraj U.P.

Comment [U5]: *The data obtained should be presented in graphical form*

2	111.34	10.47	49.38	62.33
3	112.25	13.00	47.67	67.00
4	104.52	10.27	50.21	70.33
5	110.34	13.33	49.63	76.67
6	113.78	12.07	49.36	72.00
7	105.21	12.07	50.76	58.33
8	115.29	10.40	52.74	74.67
9	116.84	14.20	49.21	72.00
10	114.63	13.87	54.43	61.33
11	116.60	13.33	48.43	72.45
12	117.37	14.07	46.91	75.68
13	105.58	11.00	53.33	62.34
14	114.84	12.27	51.73	63.59
15	112.63	10.33	48.78	58.41
16	120.57	15.07	56.32	57.00
17	105.68	13.07	49.91	65.00
18	116.96	14.40	48.10	68.33
19	104.04	13.20	46.67	77.67
20	113.63	10.87	47.83	74.89
21	105.26	11.43	50.87	72.56
22	110.43	13.01	49.61	67.45

Table 2. Yield parameters of rice hybrids under agroclimatic conditions of Prayagraj U.P.

Comment [U6]: *The data obtained should be presented in graphical form*

S.NO	Effective tillers/m^2 (No.)	Panicle length (cm)	Test weight (g)	Grain yield (g/hill)
1	276.33	25.54	26.45	22.11
2	317.67	26.33	19.59	24.43
3	309.67	27.00	25.65	28.25
4	278.67	23.33	25.58	20.48
5	249.67	25.67	19.99	24.22
6	319.00	27.00	24.30	27.14
7	298.33	27.33	20.29	21.38
8	349.67	25.67	22.61	24.45
9	240.33	23.67	20.08	22.83
10	248.33	20.33	22.06	26.42
11	370.00	23.45	24.32	22.18
12	308.67	24.68	22.67	24.47
13	323.00	23.34	18.34	26.10
14	300.00	24.59	25.87	18.27
15	354.67	20.32	20.60	23.39
16	387.33	28.41	26.48	28.37
17	343.67	22.56	20.87	20.45
18	358.67	20.33	22.54	24.76
19	297.33	26.67	20.08	21.54
20	353.00	24.89	22.06	25.34
21	381.43	22.56	18.48	24.67
22	318.67	27.45	22.67	24.83

Economics

Data related to economics was recorded highest by hybrid UR-16 with highest gross returns (589860 INR/ha), net returns (95174 INR/ha), B:C ratio (1.76)

Conclusion

From the above results it may be concluded that hybrid UR-16 is found to be more productive compared to other hybrids under different agroclimatic conditions of Prayagraj, U.P.

Comment [U7]: ***The conclusion section was not specifically answer the research objectives and not clearly state the result.***

References

Comment [U8]: The references should be expanded

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