

## Original Research Article

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

Comment [h1]: Re-write the title

#### 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~~ soil of the experimental field was sandy loam in texture, nearly neutral in soil reaction (~~Ph~~-pH 7.2), low in organic carbon (0.35%), available N (108.0 kg/ha), available ~~P~~-P<sub>2</sub>O<sub>5</sub> (22.15 kg/ha) and available ~~K~~K<sub>2</sub>O (280.0 kg/ha). The experiment was carried out ~~in Randomized Block Design (RBD) with three replications~~ to find the performance of 10 ~~Rice~~ hybrids, ~~which laid out in Randomized Block Design (RBD) & replicated thrice.~~ The ~~experiment finding results of experimentation~~ revealed that the Rice hybrid UR-35 ~~performed better than other treatment~~ recorded significantly higher ~~growth attributes 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<sup>2</sup>/day), ~~yield attributes viz.,~~ ~~was recorded significantly highest in rice hybrid UR-35,~~ effective tillers/-m<sup>2</sup> (387.33 no.), panicle length (28.41 cm), test weight (26.45 g), ~~and yields viz.,~~ grain yield ~~per hill~~ (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. ~~The~~ 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.

Formatted: Font: Not Bold

Formatted: Font: Not Bold

Formatted: Font: Not Bold, Italic

Formatted: Font: Italic

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

#### Introduction

Comment [h2]: No one reference added, Add related 5-10 references

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 cereals production and second in rice production after China. The genetic classification of rice plant belongs to genus *Oryza* ~~of~~ and family Gramineae (poaceae). The genus includes 24 species of which 22 are wild and 2 are

cultivated species: *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. 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 the annual production of around 748 million tonnes and average productivity of 4.68 tonnes/ha. The nutrient contents of rice are Rice contains 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 and also rich in lysine (3.8%), 3% fibre, iron 1.0 mg and Zinc 0.5 mg. Hybrids of rice cultivars 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. 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. 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.

**Comment [h3]:** Why you choose this problem, Write properly

### 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 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 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 and replicated thrice. The experiment comprising of ten hybrids, *viz.*, T<sub>1</sub>: UR-31, T<sub>2</sub>: UR-32, T<sub>3</sub>: UR-33, T<sub>4</sub>: UR-34, T<sub>5</sub>: UR-35, T<sub>6</sub>: UR-36, T<sub>7</sub>: UR-37, T<sub>8</sub>: UR-38, T<sub>9</sub>: UR-39, T<sub>10</sub>: UR-40 observation regarding growth and yield attributes was recorded during the field experiment.

## Result and discussion

### Effect 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) was/were recorded in rice hybrid UM-35.

The differential 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).

### Effect on Yield and Yield Attributes

Yield attributes such as Effective tillers per m<sup>2</sup>, 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-35. The Hybrid UR-35 was recorded with significantly higher yield attributes viz. Number of tillers per m<sup>2</sup> (387.33 tillers/m<sup>2</sup>), 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<sup>2</sup>, Panicle length (cm), Number of filled Grains/Panicle (No.), Number of unfilled grains/Panicle (No.), Test weight(g), Grain yield per hill (g/hill), Grain yield (t/ha), Straw yield (t/ha) and Harvest index (%) have resulted in an increase in seed grain yield 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 the 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 other rice hybrids under agro-climatic conditions of Prayagraj, U.P.

## References

Abade, H., Abdala, J. A., Bokosi, J. M., Mwangwela, A. M. and Mzengeza, T. R. 2016. Characterization and evaluation of rice genotypes under rainfed ecosystems in Malawi and Mozambique. *African Journal of Agricultural Research* **11**(17): 1559-1568.

Haque M.D., Elora P. M. D. and Romel B. 2015. Identification of Potential Hybrid Rice Variety in Bangladesh by Evaluating the Yield Potential *World Journal of Agricultural Sciences* **11**(1): 13-18.

Barma, P., Sarkar, S., Sarkar, R. K., Moktan, M. W., Ali, S., Rahaman, F. H. and Burman, R. R. 2018. An on-farm trial to evaluate the performance of improved rice varieties in Darjeeling district of west Bengal. *Journal of Entomology and Zoology Studies* **6**(6): 78-81.

Chendge, P. D., Chavan, S. A., Patil, S. and Kumar, S. 2017. Effect of sowing times on yield and economics of different rice genotypes under climatic condition of Konkan. *Journal of Pharmacognosy and Phytochemistry* **6**(5): 2462-2466.

Dangi, K., Singh, S.K., Malviya, D.K., Gautam, D., Kanapuriya, N. And Kumar, B. 2017. Effect of Rice Varieties on Growth, Yield and Economics at Varying Levels of Nitrogen under Direct Seeded Upland Condition Rewa Region. *International Journal of Current Microbiology and Applied Sciences* **6**(9): 2313-2318. doi: <https://doi.org/10.20546/ijcmas.2017.609.283>.

Jabeen, Z., Irshad, F., Shah, S. M. A. and Hussian, N. 2018. Genotypic Evaluation of Different Rice Varieties for Yield and Yield Related Traits. *Journal of Rice Research open access* **6**(4):2375-4338.

**Comment [h4]:** Follow journal format and all the references should be in a same format

**Formatted:** Justified, Line spacing: 1.5 lines

**Formatted:** Body Text, Justified, Indent: Left: -0", Hanging: 0.4", Right: 0.07", Line spacing: 1.5 lines

**Formatted:** Body Text, Justified, Indent: Left: 0", Hanging: 0.59", Right: -0.03", Line spacing: 1.5 lines

**Formatted:** Justified, Indent: Left: 0.49", Hanging: 0.05", Right: 0.07", Space Before: 6.95 pt, Line spacing: 1.5 lines

**Formatted:** Body Text, Justified, Indent: Left: 0.15", Hanging: 0.4", Right: -0.03", Space Before: 6.05 pt, Line spacing: 1.5 lines

**Formatted:** Body Text, Justified, Indent: Left: 0.15", Hanging: 0.4", Right: -0.03", Space Before: 6.1 pt, Line spacing: 1.5 lines

**Formatted:** Justified, Indent: Left: 0.15", Hanging: 0.5", Right: -0.03", Line spacing: Multiple 1.51 li

Kumar, S. N. 2016. Evaluate the establishment techniques on growth and yield of rice, *Agricultural Research Communication Centre, Agriculture Science Digest* **36 (2)**: 110- 113.

Meena, H. S., Dinesh Kumar, Srivastava, T. K. and Prasad, S. R. 2016. Stability of Popular Rice Hybrids for Important Grain Yield Parameters. *Indian Journal of Plant Genetics Resources* **29(2)**: 144-150.

Nath, S., Kumar, S. and Kannaujiya S. K. 2016. Performance of Various Hybrids and Fertility Levels on Yield Attributes, Yield and Economics of Hybrid Rice. *Indian Journal of Krishi Vigyan* **4(2)**:76-79.

Sarkar, S. C., Akter, M., Islam, M. R. and Haque, M. Md. 2016. Performance of Five Selected Hybrid Rice Varieties in Aman Season. *Journal of Plant Sciences* **4(2)**: 72-79.

Singh, V., Rachana, Mithare, P., Kumar, S., Mishra, J. P., Singh, S. N., Tiwari D. and Sanodiya, L. K. 2019. Performance of Hybrid Rice Cultivar (*Oryza sativa* L.) on Growth and Yield Attributes under Agro-climatic Conditions of Prayagraj Uttar Pradesh in Aman Season of Planting. *International Journal of Current Microbiology and Applied Sciences* **8(9)**: 2970-2982.

Vishwakarma A. 2016. Effect of date of transplanting and age of seedling on growth, yield and quality of rice (*Oryza sativa* L.) hybrids under System of Rice Intensification. *Indian Journal of Agricultural Sciences* **86 (5)**: 679–85.

Formatted: Justified, Indent: Left: 0.15", Hanging: 0.4", Right: -0.03", Space Before: 0.2 pt, Line spacing: 1.5 lines

Formatted: Body Text, Justified, Indent: Left: 0.15", Hanging: 0.4", Right: -0.03", Space Before: 5.95 pt, Line spacing: 1.5 lines

Formatted: Body Text, Justified, Indent: Left: 0.15", Hanging: 0.4", Right: -0.03", Space Before: 6.05 pt, Line spacing: 1.5 lines

Formatted: Justified, Indent: Left: 0.15", Hanging: 0.4", Right: 0.07", Space Before: 6 pt, Line spacing: 1.5 lines

**Table 1: Evaluation Effect of Rice Hybrids 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
<b>F-test</b>	<b>S</b>	<b>S</b>	<b>S</b>
<b>SEm±</b>	<b>1.65</b>	<b>0.43</b>	<b>1.89</b>

**Comment [h5]:** No need to write F test

**Comment [h6]:** No need to write SEm±

CD (P=0.05)

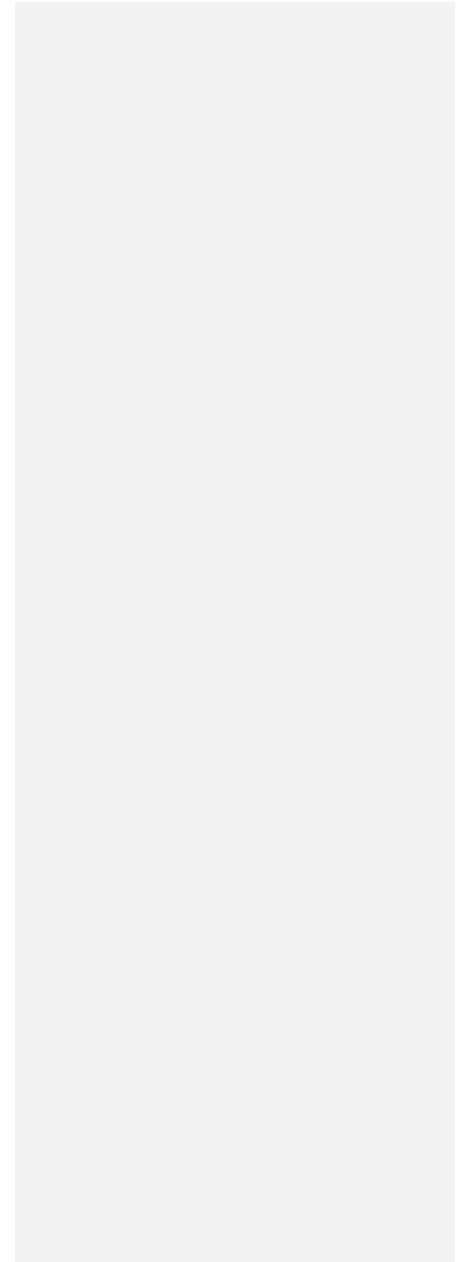
5.01

1.29

5.63

---

UNDER PEER REVIEW



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

UNDER PEER REVIEW

		tillers/ m <sup>2</sup>						
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	

Comment [h7]: No need to write f-test

Comment [h8]: No need to write SEm±

Comment [h9]: Set the table in suitable format

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

UNDER PEER REVIEW

