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Agronomic evaluation of rice hybrids under agro-climatic conditions of Prayagraj Sangam region

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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 7.1), organic carbon (0.75%), 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 (147.09 cm), number of tillers (15.79), plant dry weight (49.76 g/plant), tillers/m^2 (404.33), filled grains (268.00), grain yield/hill (30.67 g), seed yield (7.24 t/ha), stover yield (13.04 t/ha) and harvest index (35.70%) were recorded significantly higher in hybrid R-610.

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

Introduction
Rice is grown in diverse agroecology in India, and most of these have been confronting biotic and abiotic pressures, such as quantitative and qualitative deterioration of natural resources (that is, land and water), increasing frequency of extreme climatic events (for example, droughts and floods), rising input costs, declining profits, and shrinking farm sizes. India's land frontier appears to have reached its extensive margin of exploitation-for the past three decades the net sown area has been stagnating at around 142 million hectares (India, MoAFW 2018). In Uttar Pradesh 5.9 million ha and production 13.27 million tonnes with an average productivity of 2447 kg/ha and production of 14.63 million tones (Agriculture Statistics, 2016). Rice is the most crucial cereal food crop of India, which occupies about 24% of gross cropped area of the country. The UN/FAO forecasts that global food production will need to increase by over 40% by 2030 and 70% by 2050. For increasing the yield and productivity various strategies includes, conventional hybridization and selection procedures, ideotype breeding, hybrid breeding, wide hybridization and genetic engineering. Among the available genetic options to increase the productivity, adoption of hybrid rice breeding technology is one of the practically feasible and sustainable approaches. Moreover, hybrid rice normally has a yield advantage of 20 - 30% over non hybrid rice cultivars (Lin and Yuan, 1980; Shen, 1980) [9, 10]. 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. Growing of hybrid rice is a complex process and especially agronomic management of hybrid rice differs considerable from that of conventional varieties. Although the technology is still new, many rice-producing countries have expressed their interest in applying it to improve food security. During the year 2010, hybrid rice was planted in an area of 1.7 mha and 1.5 to 2.5 mt was added to rice production in India through this technology. In this current experiment duty on Agronomic characters of 10 Rice hybrid were undertaken.

Materials and Methods
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 7.1), organic carbon (0.75%), 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. 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 R-610 (147.09 cm). However, R-607 (141.51 cm) and R-620 (145.34 cm) were statistically at par with R-610. 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-610 (15.79). However, R-603 (14.80), R-607 (15.65) and R-700 (15.46) were statistically at par with R-610. The significant differences could 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 of Chowdhery *et al.* (1993) [11]. At 100 DAT the highest dry weight was observed in R-610 (49.76 g/plant). However, R-600 (48.46 g/plant), R-700 (48.50 g/plant) and R-605 (47.70 g/plant) were statistically at par with R-610. 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].

B. Yield Attributes

R-610 recorded significantly higher panicle length/hill (29.20 cm). However, R-607 (26.55 cm), R-615 (26.28 cm) and R-700 (27.54) were statistically at par with R- 610. The highest significant number of filled grains/panicle (268.00) was recorded under the hybrid R-610. However, R-605 (247.50) and R-620 (259.17) were statistically at par with R-610. 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 R-610 (30.67 g/hill). However, R-600 (28.72 g/hill), R-607 (28.40 g/hill) and R-700 (29.95 g/hill) were statistically at par with R-610. 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 R-610 (7.24 t/ha). However, R-600 (6.01 t/ha), R-620 (6.36 t/ha) and R-700 (6.64 t/ha) were statistically at par with R-610. 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). Significantly highest straw yield was observed in R-610 (13.04 t/ha). However, R-605 (12.65 t/ha), R-620 (11.81 t/ha) and R-700 (12.01 t/ha) were statistically at par with R-610. 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 R-610 (35.70%). However, R-600 (34.86%), R-615 (35.69%), R-620 (35.00%) and R-700 (35.60%) was statistically at par with R-610. 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.

Economics

The Result showed (Table 3) that maximum Gross return (INR169440), Net return (INR120394), and B:C Ratio (2.45) was recorded in Treatment 5 [Rice Hybrid R610] as compare to other Varieties. From the one Year experiment it can be concluded that Rice Hybrid R610 gave maximum Plant height, Tillers/ hill, Dry weight, Panicle length, Grain yield, Straw yield and Harvest index.

Table 1: Field evaluation of Hybrid Rice on Growth Parameters of Rice hybrid

Hybrids	Plant height (cm)	Number of tillers/hills	Dry weight (g/plant)
R-600	131.38	14.16	48.46
R-603	140.43	14.80	45.41
R-605	130.49	14.05	47.70
R-607	141.51	15.65	42.92
R-610	147.09	15.79	49.76
R-615	136.45	13.53	45.37
R-620	145.34	13.80	47.45
R-624	139.09	14.37	44.29
R-700	138.09	15.46	48.50
R-710	130.76	14.65	44.23
F-test	S	S	S
SEm (±)	1.30	0.41	0.75
CD (p=0.05)	6.26	1.45	2.26

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

Treatments	Panicle length (cm)	Filled grains	Grain yield/hill	Grain Yield (t/ha)	Straw yield (t/ha)	Harvest Index (%)
R-600	25.52	257.50	28.72	6.01	11.23	34.86
R-603	23.87	234.76	24.48	5.28	10.61	33.23
R-605	25.54	230.43	26.77	5.99	12.65	32.14
R-607	26.55	198.87	28.4	4.75	10.81	30.53
R-610	29.2	191.34	30.67	7.24	13.04	35.70
R-615	26.28	207.56	25.69	5.95	10.71	35.69
R-620	22.2	259.17	20.57	6.36	11.81	35.00
R-624	24.32	268.00	22.75	5.15	10.91	32.07
R-700	27.54	179.00	29.95	6.64	12.01	35.60
R-710	23.21	203.33	24.48	4.75	10.54	31.07
F-test	S	S	S	S	S	S
Sem (±)	1.06	9.29	0.80	0.40	0.30	0.8
CD (p=0.05)	3.20	28.23	2.37	1.23	1.43	1.9

Table 3: Field evaluation on different varieties on Economics of Rice hybrids

Hybrids	Cost of cultivation (₹/ha)	Gross returns (₹/ha)	Net returns (₹/ha)	B:C Ratio
R-600	49046	141870	92824	1.89
R-603	49046	126870	77824	1.59
R-605	49046	145770	96724	1.97
R-607	49046	117930	68884	1.40
R-610	49046	169440	120394	2.45
R-615	49046	139230	90184	1.84
R-620	49046	149910	100864	2.06
R-624	49046	125430	76384	1.56
R-700	49046	155550	106504	2.17
R-710	49046	117120	68074	1.39

Conclusion

The concluded experiment showed that hybrid R-610 was found to be best for obtaining higher growth, yield and economic remuneration. Since the finding are based on the research done in one season. Further trials are needed to confirm more precise results.

Reference

1. Bhuiyan HS, Zahan A, Khatun H, Iqbal M, Alam F, Manir R. Yield performance of newly developed test crossed hybrid rice variety. International Journal of Agronomy and Agricultural Research. 2014;5(4):48-54.
2. Bozorgi HR, Faraji A, Danesh RK, Keshovarz A, Azarpour E, Tarighi F. Effect of plant density on yield and yield components of rice. World applied Science journal. 2011;12(11):2053-2057.
3. Deshpande HH, Devasenapathy P. Effect of green manuring and organic manures on yield, quality and economics of rice (*Oryza sativa* L.) under lowland condition. Karnataka Journal of Agricultural Sciences. 2011;23(2):235-238.
4. Haque MD, Pervin E, Biswash MD. Identification of Potential Hybrid Rice Variety in Bangladesh by Evaluating the Yield Potential. World Journal of Agricultural Sciences. 2015;11(1):13-18.
5. Marri PR, Sarla N, Reddy IV, Siddiq FA. Identification and mapping of yield and yield related QTLs from an indian accession of *Oryza rufipogon*, BMC: genetics. 2005;13:33-39.
6. Padmavathi P. Studies on relative performance of conventional hydrid rice varieties under various levels of nitrogen, plant population and planting patterns. Ph.D thesis, Indian agricultural research institute, New Delhi; c1997.
7. Rahman MM, Islam MT, Faruq AN, Akhtar N, Ora N, Uddin MM. Evaluation of Some Cultivated Hybrid Boro Rice Varieties Against BLB, ShB and ALS Diseases Under Natural Epiphytic Conditions Middle-East. Journal of Scientific Research. 2013;15(1):146-151.
8. Singh V, Rachana Mithare P, Kumar S, Mishra JP, Singh SN, Tiwari D, *et al*. 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. 2019;8(9):2970-2982.
9. Lin YH, Narendra K. A new error model for adaptive systems. IEEE Transactions on Automatic Control. 1980 Jun;25(3):585-587.
10. Shen VS, Pollak EW. Fatal pulmonary embolism in cancer patients: is heparin prophylaxis justified?. Southern medical journal. 1980 Jul 1;73(7):841-843.
11. Chowdhery HJ, Pal GD, Giri GS. A new species of Epipogium (Orchidaceae) from Arunachal Pradesh, India. Nordic journal of botany. 1993 Aug;13(4):419-421.