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Ashok Kumar
Department of Agronomy, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Utter Pradesh, India

Vikram Singh
Department of Agronomy, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Utter Pradesh, India

Correspondence
Ashok Kumar
Department of Agronomy, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Utter Pradesh, India

Effect of different hybrid verities of rice (*Oryza sativa* L.) on yield attributes and yield under agro-climatic condition of Allahabad

Ashok Kumar and Vikram Singh

Abstract
A field experiment was carried out during kharif season of 2015 at the Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Allahabad (U.P.). Field evaluation of rice (*Oryza sativa* L.) hybrid under agro-climatic condition of Allahabad. The experiment was conducted to find out the performance of 22 hybrid varieties comparing with check variety (white line seed-70) laid out in RBD design with tree replications. In an experiment it was revealed that variety KR 15-14 performed better than other varieties i.e. Panicle length (27.20 cm), grain yield (5.627 t ha^{-1}), biological yield (11.46) were found to be significantly higher than other varieties respectively.

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

Introduction
Rice plant (*Oryza sativa* L.) is a member of Gramineae family. The common cultivated rice is an annual which usually grows to a height of half of meter to two meters, but there are certain varieties that grow much taller (6-9 meters). Some deep water rice varieties grow with the gradual rise of the flood water level. Rice is the staple food of about 65% of Indian population. Our rice requirement by the year 2020 is estimated to be around 122 million tons as against the present production of about 100 million tons, thus leaving a gap of about 22 million tons rice. It accounts for about 43% of total food grain production and 46% of total cereal production in the country (FAO 2015) [2]. Low productivity of rice in India is a major concern for food and nutritional security of more than 60% population which is dependent on rice. The high requirement of water for rice cultivation high be due to rice is generally grown under lowland condition. In low land rice fields, seepage and percolation account for 50-80% of the total water outflow from the field (Sharma, 1989) [7]. Irrigated rice requires lot of water. About 3000 to 5000 litre is used to produce one kg of grain (IRRI, 2001) [4].
In order to meet the domestic demand of the increasing population the present day production of 99 million tons (2008) of milled rice has to be increased to 125 million tons by the year 2030. Uphoff *et al.* (2002) Oryza sativa, is being one of the richest sources of starch and food for one third world's population Prasad *et al.* (2010) [5]. Production of rice ranks second among the food grain, and half of the world population subsist on rice by receiving the highest calories (26.2%) intake from it Anonymous (2005).

Materials and Methods
The experiment was carried out during kharif season of 2015 at Crop Research Farm, Department of Agronomy, Naini Agricultural Institute, SHUATS, Allahabad (U.P.) which is located at 250 24' 42" N latitude, 810 50' 56" E longitude and 98 m altitude above the mean sea level. This area is situated on the right side of the river Yamuna by the side of Allahabad Rewa Road about 5 km away from Allahabad city. The soil of the experiment at site was sandy loam with a pH (7.8), available N (153.30 kg ha^{-1}) P_2O_5 (15.50 kg ha^{-1}) and K_2O (246.00 kg ha^{-1}).
The experiment was laid in Randomized block design with three replications the performance of twenty two varieties with check variety. The recommended dose was fertiliser 150:75:70 kg N, P_2O_5 and K_2O ha^{-1} basal dose of fertilizer was applied just before last puddling on, half dose of nitrogen and full dose of phosphorus and potassium followed by two topdressings of 1/4th dose of nitrogen on 22 DAT & 46 DAT.

Number of effective tillers was counted from five random plants per hills of panicle, Panicle length (cm) was observed at the time of harvest randomly from five tagged hills and their averages were recorded. The ten panicles were counted separately which were obtained randomly from five tagged hills and their averages of filled grain were recorded. One thousand grains were randomly counted from panicles obtained from each plot and weighed and recorded as test weight (g) at 14% moisture.

Five plants were selected randomly from each plot to analyse the various yield observations such as number of effective tillers hill^{-1}, number of grains spike^{-1}. Moreover, grains from harvest area (1.0 m^2) were dried in sun, cleaned and weighed separately from each plot for calculating the grain yield in tonnes ha^{-1}. Straw from harvest area (1.0 m^2) was dried in sun, bundled, tagged and weighed separately from each plot for calculating the straw yield in tonnes hectare^{-1}. Economics and systems productivity was calculated the basis of prevailing market prices. The data subjected to be statistical analysis.

Results and Discussions

Yield attributes and yield of rice: During the period of investigation, yield attributes recorded higher values during kharif 2015. The maximum number of effective tillers hill^{-1} (17.40) and panicle length plant^{-1} (27.20 cm) was recorded under variety KR 15-14 (T_{14}). The significant differences in panicle length among the hybrid rice varieties could be attributed to their genetic make-up. The result confirms the findings of Vivek *et al.* (2004) [9].

The significant and highest grain yield plant^{-1} (61.89 g) was found in treatment T_{16}. The hybrids of short duration high yielding have the potential to give the maximum grain yield then rest of the varieties. Further, it could be due to the better growth attribute resulting to produce higher grain yield. Similar findings were reported by Ranjitha *et al.* (2013) [6].

The data showed the maximum test weight (24.50 g) was observed in variety KR 15-02 (T_2). This could be due to the adoption of 20 x 10 cm spacing for rice transplanting resulted in heavier filled and healthy grain in variety (KR15-02). Similar results have been also reported by Haque *et al*. (2015) [3].

The data revealed that the significant and highest grain yield (5.62 t ha^{-1}) and straw yield (11.46 t ha^{-1}) was found in treatment T_{14}. In general biological yield per plant had highly significant positive correlation with plant height, days to maturity, filled grain per panicle and total number of grains per panicle. Grain yield per plant had highly significant positive correlation with plant height, panicle length, 1000-grain weight, harvest index, grain yield per plot, grain yield per square meter and with grain yield ha^{-1}. These results confirm the findings of Tripathi (2013) [8].

Conclusion

It may be concluded that variety KR15-14 was found to be the best for obtaining higher yield attributes, yield (5.62 t ha^{-1}), panicle length (27.20 cm), net return (□75164) and benefit cost ratio (3.84) in hybrid rice. Since the finding is based on the research done in one season further trials are needed to confirm the results.

Table 1: Effect of different hybrid verities on yield attributes and yield of hybrid rice under agro-climatic condition of Allahabad, U.P.

Treatment	Number of effective tillers hill^{-1}	Panicle length (cm)	Test weight (g)	Grain yield plant^{-1} (g)	Grain yield t ha^{-1}	Straw yield t ha^{-1}
T1 KR 15-01	10.93	22.93	22.77	46.00	4.507	11.393
T2 KR 15-02	10.53	22.60	24.50	41.81	1.697	5.533
T3 KR 15-03	8.73	26.20	21.93	49.11	5.507	11.417
T4 KR 15-04	10.27	20.73	24.30	35.66	1.873	4.977
T5 KR 15-05	8.00	23.93	21.70	49.11	4.273	9.803
T6 KR 15-06	8.53	23.27	20.93	31.89	2.867	8.017
T7 KR 15-07	7.53	22.93	23.40	27.66	2.723	7.070
T8 KR 15-08	9.20	23.13	21.20	55.67	2.743	7.697
T9 KR 15-09	10.00	21.13	22.93	49.67	1.823	4.530
T10 KR 15-10	11.73	23.87	22.40	35.11	2.073	5.300
T11 KR 15-11	7.93	25.20	20.53	34.11	4.540	9.963
T12 KR 15-12	8.60	22.87	22.47	39.11	2.050	5.250
T13 KR 15-13	16.27	22.87	22.53	31.00	1.717	6.590
T14 KR 15-14	17.40	27.20	24.10	59.6	5.627	11.460
T15 KR 15-15	9.00	24.13	22.00	47.66	3.367	8.053
T16 KR 15-16	9.27	24.87	18.60	61.89	5.163	10.767
T17 KR 15-17	12.60	24.20	21.80	42.44	3.663	8.556
T18 KR 15-18	8.73	20.53	21.07	47.77	1.690	5.112
T19 KR 15-19	8.27	23.80	22.20	45.11	3.413	8.037
T20 KR 15-20	9.33	25.13	21.60	40.00	5.337	11.303
T21 KR 15-21	10.07	24.53	20.47	47.33	5.297	10.933
T22 WLS 70	10.73	24.93	22.77	43.00	3.417	8.350
F- test	NS	S	NS	S	S	S
SEd (±)	4.205	0.866	1.909	8.045	1.658	0.942
CD (P=0.05%)	-	1.747	-	16.235	3.346	0.666

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