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Response of nitrogen levels under different varieties of hybrid rice on growth, yield and yield attributes (*Oryza sativa* L.) in eastern Uttar Pradesh

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Abstract

The present investigation entitled “Response of nitrogen levels under different varieties of hybrid rice on growth, yield and yield attributes (*Oryza sativa* L.) in eastern Uttar Pradesh.” was carried out during *Kharif* season of 2020 at Agronomy Research Farm of the A.N.D. University of Agriculture and Technology, Kumarganj, Ayodhya (U.P.). The 16 treatment combinations having four hybrid rice varieties *viz.* Arize 6444 gold, Ankur 7576, 27P31 and Shahi Dawat was investigated with four levels of nitrogen *viz.* control plots, 50% RDN, 75% RDN and 100% RDN was kept in different plots. The experiment in F-RBD and replicated in three times. The all growth, yield attributes, yield were increased significantly with Arize 6444 gold except plant height at 30 DAT, LAI at 30,90 DAT, no. of shoots hill⁻¹ at 30 DAT, dry matter accumulation (g m⁻²) at 30 DAT and days taken to maturity, length of panicle (cm) and harvest index. The 100% RDN (150 kg N/ha) produced significantly higher growth, yield attributes and yield at all stages except plant height at 30 DAT and test weight (g). The highest net return and B: C ratio were computed under V₁N₄ (Arize 6444 gold at 100% RDN). On the basis of overall observations hybrid rice variety Arize 6444 gold at 100% RDN (150 kg N/ha) was found to be best suitable for obtaining the higher yield of rice.

Keywords: Rice, growth parameter and yield

Introduction

Paddy (*Oryza sativa* L.) belongs to Poaceae family with chromosome number *i.e.*, 2n = 24. It is one of the important food crop in the world. Rice is a principle source of nourishment which is a high energy and high caloric food contains around 78.2% carbohydrate, 6.8% protein, 0.5% fat and 0.6% mineral. In world leading cereal crops paddy has very important place and it is grow successfully under hot and humid climatic regions of the world. Asia has the 90% of world area, production and consumption of rice, while paddy was grown an about 150 million ha in the entire world. It was also reported that Asia has produced the 685 million metric tonnes out of total world rice production. In India rice contributes to 15% of annual GDP and is used as a staple food for more than 60% of the total production of the country and contributes about 42% of countries food grains production.

India has first ranks in paddy area and second in production after China. India having area of paddy cultivation is nearly 44.0 million ha which is highest among all paddy cultivating countries, annual production is about 106.5 million tones with productivity of 2.4 tonne per hectare (Anonymous, 2015)^[19].

In India hybrid rice area is regarding 1100000 ha (1.1 million ha), which is nearly 2.5% of the total area under rice. Uttar Pradesh is a second largest rice growing state after W.B., but it is low in productivity. In Uttar Pradesh 5.75 million hectare rice growing area with a production of 15.5 million tones and productivity is about 2.70 tonnes per hectare. Paddy is grown in 70 dist. of U.P. in which seven dist. in high, twenty- nine dist. in medium, twenty-six dist. in medium low, five dist. in low and three districts in very low productivity groups (Anonymous, 2019)^[1].

Hybrid varieties of paddy is the most practicable and easily adoptable approaches to fulfillment the household demand. The hybrid paddy produced 20-30% higher yield over the conventional variety. The high production efficient hybrid rice varieties is planting in current year to overcome the requirements of rising population density and by sustaining these own capability the current production potential requires to be improve up to 140.0 milli. ton. by 2025 these be able to achieve simply via incrementing the paddy production at above two mill. ton. year⁻¹ in arriving decade.

At present times world is facing the problem of shortage of primary nutrients fertilizer specially nitrogen fertilizer. The continuous nitrogen fertilization both in minimum or maximum amount than the desired amounts has negative impact on quality and quantity of hybrid paddy produce. Paddy requires heavy N fertilizer which is generally 1/3rd of the whole nitrogen uptake in the world. So nitrogen is the most crucial nutrient that affect paddy yield and for improving paddy yield and yield attributes it is necessary to supply more nitrogen to the crop. The farmers has affinity to apply expensive nitrogen fertilizer in excess amount to obtain advantageous yield, but imbalance use of N fertilizer causes damage to the crop and decreases yield parameters.

Material and Methods

The experiment was conducted during *Kharif* season in 2020 at Agronomy Research Farm of Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya (U.P.) situated at subtropical zone in Indo Gangetic Plain having alluvial calcareous soil and lies between 24.40^o-26.56^o North latitude and 82.12-83.98^o East longitude with an elevation of about 113 meter from mean sea level.

The soil of the experimental field was silty loam in texture having slightly alkaline in reaction (pH 8.13), low in organic carbon (0.35%) and available nitrogen (145.83 kg ha⁻¹), but medium in available phosphorus (13.78 kg ha⁻¹) and available potassium (247.25 kg ha⁻¹) during the experimental year. The experiment was laid out in factorial randomized block design with three replications. The experiment consists of four hybrid rice varieties (V₁- Arize 6444 Gold, V₂- Ankur 7576, V₃- 27P71 and V₄-Shahi Dawat) and four nitrogen levels (N₁-control plots, N₂- 50% RDN, N₃- 75% RDN and N₄- 100% RDN) having 16 treatment combinations. The sowing of healthy rice seeds in nursery at 16/06/2020. The sprouted seeds were taken and sown to the nursery bed. A mixture of soil and FYM (2:1) was used on top of the beds for growing healthy seedlings. The seed rate of hybrid rice varieties are 15 kg ha⁻¹ were used for getting sufficient number of seedlings based on the germination percentage of the seeds. After twenty-five days old seedlings were removed carefully from nursery bed for transplanting in the experimental plots. Two seedlings were transplanted in each hill with plant geometry of 25×10 cm. The overall rainfall received during the cropping period (June-November) was 853.8 mm. Recommended dose of N, P and K @ 150: 75: 75 kg ha⁻¹ (full doses of P₂O₅ and K₂O were applied at the time of sowing along with 50% of N and rest 25% of N at active tillering stage and 25% of at panicle initiation stage as top dressing). The nutrients N, P and K were supplied through the chemical fertilizer urea, single super phosphate and murate of potash, respectively. Water maintained near saturation to a thin film

maintained from three days after transplanting to active tillering stage. However, sufficient standing water was ensured from panicle initiation to heading stages.

Results and Discussion

Growth characters

Plant height (cm)

The data of plant height recorded at 30, 60, and 90 days after transplanting and at harvest as affected by several treatments are presenting in table. Plant height was influenced significantly due to rice varieties and nitrogen levels at all the stage of crop growth except 30 DAT.

Among hybrid rice varieties Arize 6444 gold have significant higher plant height over rest all the varieties, while Arize 6444 gold has maximum and Shahi Dawat has minimum plant height at all the rest stages of crop growth.

Application of 100% RDN have significantly higher plant height over all rest nitrogen levels except 75% RDN which was at par with that. Maximum plant height was found with application of 100% RDN and minimum was in control. More or less similar effect of hybrid rice varieties and nitrogen levels in accelerating the height of rice plant have also been reported by Mishra *et al.* (2014)^[4] and Kant *et al.* (2018)^[4].

Leaf Area Index

The data pertaining to leaf area index recorded at 30, 60 and 90 days after transplanting as influenced by different varieties of hybrid rice and nitrogen levels are presented in table. The leaf Area Index was influenced significantly due to rice varieties only at 60 DAT and found non-significant at all the rest stages of crop growth.

Application of 100% RDN have significantly more leaf area index with control plots and at par with all rest nitrogen levels at 30 DAT and 90 DAT. At 60 DAT 100% RDN was at par with 75% RDN and significantly superior over all the rest nitrogen levels.

The more or less similar results of hybrid rice varieties and nitrogen levels on leaf area index have also been reported by Mishra *et al.* (2014)^[4] and Kant *et al.* (2018)^[4].

No. of shoots hill⁻¹

The data pertaining to no. of shoots hill⁻¹ recorded at 30, 60, and 90 days after transplanting and at harvest as influenced by different varieties of hybrid rice and nitrogen levels are presented in table. The no. of shoots hill⁻¹ was influenced significantly due to rice varieties over all the growth stages except at 30 DAT. At 60 DAT and at harvest produce significantly more no. of shoots per hill over all at 90 DAT Arize 6444 gold produce significant more no. of shoots per hill over all.

Table 1: Response of nitrogen levels under different varieties of hybrid rice on growth

Treatments	Plant height (cm)				Leaf Area Index			No. of shoots hill ⁻¹			
	30 DAT	60 DAT	90 DAT	At harvest	30 DAT	60 DAT	90 DAT	30 DAT	60 DAT	90 DAT	At harvest
Varieties											
Arize 6444 gold	42.95	81.78	96.20	98.05	2.81	4.88	4.89	3.33	7.25	7.43	7.33
Ankur 7576	42.50	76.63	90.10	91.85	2.79	4.59	4.81	3.35	6.88	7.00	6.88
27P31	42.28	75.50	88.83	90.55	2.74	4.53	4.76	3.28	6.70	6.80	6.70
Shahi Dawat	42.45	74.15	87.18	88.90	2.76	4.44	4.67	3.33	6.55	6.70	6.55
SEm±	0.86	1.62	1.73	1.93	0.05	0.07	0.10	0.06	0.14	0.12	0.17
CD at 5%	NS	4.68	5.01	5.57	NS	0.22	NS	NS	0.40	0.37	0.50
Nitrogen levels											
Control	41.00	65.60	77.20	78.80	2.55	3.90	4.09	3.03	4.78	4.88	4.73

50% RDN	42.28	77.33	90.95	92.70	2.77	4.63	4.86	3.33	6.95	7.08	6.98
75% RDN	43.23	81.08	95.40	97.25	2.87	4.86	5.13	3.43	7.73	7.88	7.73
100%RDN	43.68	84.05	98.75	100.60	2.91	5.04	5.05	3.50	7.93	8.10	8.03
SEm±	0.86	1.62	1.73	1.93	0.05	0.07	0.10	0.06	0.14	0.12	0.17
CD at 5%	NS	4.68	5.01	5.57	0.15	0.22	0.29	0.19	0.40	0.37	0.50

Varieties but at par with Ankur 7576 while at 90 DAT Arize 6444 gold produce significant more no. of shoots per hill over all Varieties. Application of 100% RDN have significantly more no. of shoots hill⁻¹ with control plots and at par with 50% RDN and 75% RDN at 30 DAT and 60, 90 DAT and at harvest was at par with 75% RDN and significantly superior over all the rest nitrogen levels. This result was also agreed with the findings of Kant *et al.* (2018)^[4].

Dry Matter Accumulation (g m⁻²)

The data pertaining to dry matter accumulation (g m⁻²) recorded at 30,60, and 90 days after transplanting and at harvest as influenced by different varieties of hybrid rice and nitrogen levels are presented in table. The dry matter accumulation (g m⁻²) was influenced significantly due to rice varieties over all the growth stages except at 30 DAT.

Application of 100% RDN have significantly more no. of shoots hill⁻¹ with control plots at all the growth stages of hybrid rice and at par with 50% RDN and 75% RDN at 30 DAT. This results are close conformity to the findings of Mishra *et al.* (2014)^[5] and Reddy *et al.* (2018)^[7].

Yield attributes

Days taken to 75% flowering

The data pertaining to days taken to 75% flowering have been presented in table -2. Among varieties Arize 6444 gold taken significant more no. of days to 75% flowering was found at par with Ankur 7576 and significant over all rest varieties. 100% RDN takes significantly more no. of days to 75% flowering with all the nitrogen levels except 75% RDN which was at par with that. These results are in close conformity with the findings of Mishra *et al.* (2014)^[5] and Reddy *et al.* (2018)^[7].

Days taken to maturity

The data pertaining to days taken to maturity have been presented in table. All the hybrid rice varieties have non-significant effect on days taken to maturity. In nitrogen levels 100% RDN has taken significant more days to maturity with control plots and at par with all rest nitrogen levels. The similar results was also observed by Mishra *et al.* (2014)^[5] and Reddy *et al.* (2018)^[7].

Number of effective tillers m⁻²

The data pertaining to number of effective tillers m⁻² was influenced by varieties of hybrid rice and nitrogen levels are presented in table.

Among hybrid rice varieties Arize 6444 gold has produced more no. of effective tillers m⁻² over all varieties except Ankur 7576 which was at par with Arize 6444 gold. In nitrogen levels 100% RDN has produced more no. of

effective tillers m⁻² over all nitrogen levels. The more or less similar results of hybrid rice varieties and nitrogen levels on number of effective tillers per m⁻² have also been reported by Banerjee and Pal. (2011)^[3] and Reddy *et al.* (2018)^[7].

Length of panicle (cm)

The data pertaining to length of panicle (cm) was influenced by varieties of hybrid rice and nitrogen levels are presented in table. In this investigation all the hybrid rice varieties have non-significant effect on length of panicle (cm). In all the levels of nitrogen 100% RDN has taken significant more length of panicle (cm) over all the nitrogen levels except 75% RDN which was at par with that. The results of present investigation in respect of these yield attributes are in close conformity with the findings of Tripathi and Jaishwal. (2006)^[8]; Kant *et al.* (2018)^[4]; Mishra *et al.* (2014)^[5] and Reddy *et al.* (2018)^[7].

Yield

Number of grains panicle⁻¹

The data pertaining to no. of grains per panicle was influenced by varieties of hybrid rice and nitrogen levels are presented in table.

Among rice varieties Arize 6444 gold produces significantly more no. of grains per panicle which was significant over all the rest varieties. 100% RDN produces significantly more no. of grains per panicle with all nitrogen levels except 75% RDN which was at par with that. The results are close conformity to findings of Kant *et al.* (2018)^[4]; Mishra *et al.* (2014)^[5]; Banerjee and Pal (2011)^[3] and Reddy *et al.* (2018)^[7].

Grain Yield (q/ha)

The data pertaining to grain yield (q/ha) was influenced by varieties of hybrid rice and nitrogen levels are presented in table. Among rice varieties Arize 6444 gold produces significantly more grain yield (q/ha) over all varieties. The 100% RDN has produced more grain yield over all nitrogen levels. The more or less related results was reported by Kant *et al.* (2018)^[4]; Mishra *et al.* (2014)^[5]; Banerjee and Pal (2011)^[3] and Reddy *et al.* (2018)^[7].

Harvest Index

The data pertaining to harvest index was influenced by varieties of hybrid rice and nitrogen levels are presented in table. All hybrid rice varieties have non-significant effect on harvest index. Among nitrogen levels 100% RDN has significant more harvest index with control plots and at par with all the rest of nitrogen levels. This results was also supported by Mishra *et al.* (2015)^[6]; Banerjee and Pal (2011) and Reddy *et al.* (2018)^[7].

Table 2: Response of nitrogen levels under different varieties of hybrid rice on yield attributes

Treatments	Dry matter accumulation (g m ⁻²)				Days taken to 75% flowering	Days taken to maturity	No. of Effective tillers m ⁻²	Length of Panicle (cm)	No. of grain panicle ⁻²	Grain yield (q/ha)	Harvest index
	30 DAT	60 DAT	90 DAT	At harvest							
Varieties											
Arize 6444 gold	143.43	741.40	1140.62	1341.90	72.75	107.75	256.25	23.63	138.86	59.28	43.82
Ankur 7576	142.40	675.14	1038.68	1221.98	70.00	105.00	250.00	23.18	131.10	53.73	43.60
27P31	139.50	657.02	1010.80	1189.18	67.50	102.50	246.00	23.05	126.79	52.03	43.38
Shahi Dawat	140.60	616.58	948.58	1115.98	65.25	100.25	242.00	22.80	122.76	48.60	43.18
SEm±	2.77	10.30	23.70	27.89	1.47	2.04	3.35	0.45	2.05	1.24	0.92
CD at 5%	NS	29.77	68.47	80.55	4.26	NS	9.69	NS	5.93	3.58	NS
Nitrogen levels											
Control	130.03	397.99	612.30	720.35	63.75	98.75	224.75	19.80	84.24	29.48	40.90
50% RDN	141.00	681.29	1048.14	1233.10	67.75	102.75	240.75	22.75	140.30	54.48	44.16
75% RDN	146.50	772.42	1188.34	1398.05	70.50	105.50	257.25	24.80	145.76	61.88	44.24
100%RDN	148.40	838.43	1289.90	1517.53	73.50	108.50	271.50	25.30	149.21	67.80	44.66
SEm±	2.77	10.30	23.70	27.89	1.47	2.04	3.35	0.45	2.05	1.24	0.92
CD at 5%	8.02	29.77	68.47	80.55	4.26	5.90	9.69	1.30	5.93	3.58	2.68

References

1. Anonymous. Agricultural statistics Division Directorate of Economics and statistics, Department of Agriculture and Co-operation, Ministry of Agriculture, Government of India New Delhi 2019, 4.
2. Anonymous. Annual Progress Report, Directorate of Economic Survey, Govt. of India 2015, 54-29.
3. Banerjee H, Pal S. Effect of planting geometry and different levels of nitrogen on hybrid rice. *Oryza* 2011;48(3):274-275.
4. Kant K, Bora PK, Telkar SG, Gogoi M. Performance of various rice cultivars under variable nitrogen levels. *Journal of Pharmacognosy and Phytochemistry* 2018;7(5):1378-1382.
5. Mishra D, Sharma JD, Pandey AK, Mishra RK, Shukla UN, Kumar J. Growth, phenology and yield attributes of hybrid rice (*Oryza sativa* L.) as influenced by different levels of nitrogen. *Biochemical and Cellular Archives-Connect Journals* 2014;14(2):0972-5075.
6. Mishra D, Sharma JD, Pandey AK, Mishra RK, Shukla UN, Kumar J. Effect of nitrogen levels on yield, quality and economics of rice (*Oryza sativa* L.) varieties. *International Journal of Agricultural and Statistical Sciences* 2015;11(1):0973-1903.
7. Reddy S, Singh V, Mithare P. Evaluation of rice (*Oryza sativa* L.) hybrids on growth and yield under agroclimatic conditions of Allahabad Uttar Pradesh in Kharif season. *Journal of Pharmacognosy and Phytochemistry* 2018;7(3):805-810.
8. Thripathi HP, Jaiswal LM. Effect of nitrogen on yield and yield attributes of rice hybrids under irrigated conditions. *Crop production, Oryza* 2006;43(3):249-250.