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Research Article

Response of Transplanted Rice (*Oryza sativa* L.) to Foliar Feeding of Nitrogen at Different Stages of Plant Growth

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ABSTRACT

An experiment was conducted at Instructional Farm, Department of Agronomy, Faculty of Agriculture, AKS University, Sherganj, Satna (M.P.) during Kharif season of 2020-2021. The experiment consisted of randomize block design having Factorial arrangement in three replications. In this experiment, 12 treatment combinations including foliar spray of nitrogen through urea viz., N0- 0.0% (control), N1- 2.0%, N2- 3.0% and N3- 4.0% while three crop growth stages viz; S1- Seedling stage, S2- Tillering stage and S3- Panicle initial stage, it was found that foliar feeding of nitrogen at different stages of rice significantly affected plant height, number of tillers per plant, length of Panicle, number of grains/Panicle, thousand grain weight, grain and Stover yield of rice. The significantly higher plant height of rice was recorded under the treatment combination consisting of application of foliar spray of nitrogen through urea @ 4.0 % at tillering stage with the respective values of 55.46, 71.46 and 99.09 cm at growth stage of 30, 60 and 90 DAT, respectively. proved significantly superior to rest of the treatments. Similarly, resulted in significantly highest grain yield per hectare of rice was recorded under the treatment combination consisting of application of foliar spray of nitrogen through urea @ 4.0 % at tillering stage with the respective values of 48.47 q/ha. proved significantly superior to rest of the treatments.

Keywords: *Rice, Panicle, Plant, Grains/Panicle, Grain weight, Stover yield.*

INTRODUCTION

Rice (*Oryza sativa* L.) belongs to the family poaceae is the stable food for nearly three billion people all over the world. In India, rice is the most important and extensively grown food crop, occupying about 40 million tons of rough rice.

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It is life for more than half of humanity and about 90 % of the world's rice is produced as well as consumed in Asia. About 90% of the all rice grown in the world is produced and consumed in the Asian region. India is the world's second largest rice producer and consumer next to China. To sustain present food self-sufficiency and to meet future food requirements, India has to increase its rice productivity by 3 per cent per annum but the possibility of expanding the area under rice in near future is limited.

Nitrogen supply must be available according to the needs of the plant for optimal yield (Fageria & Baligar, 2005). So, managing application time and rate of nitrogen fertilizer is very important. Combining foliar nitrogen fertilization with reduced rates of soil nitrogen during the growing season can reduce the total nitrogen inputs and the amount of nitrogen runoff during production. Reduced rates of soil nitrogen can lessen excessive vegetative growth, resulting in reduced water requirement, lesser disease insect infestation and hardy plants. Reduced nitrogen in the growing medium during the growing season can also increase root growth relative to shoot growth. Foliar nitrogen fertilization can reduce plant dependence on frequent soil nitrogen application. In many growing regions, fertilizers applied in soil are inefficiently taken up due to low temperatures and high rainfall. Combining foliar nitrogen fertilization with defoliants can increase stored nitrogen and improve plant quality.

MATERIALS AND METHODS

Experiment was carried out at the Instructional Farm, Faculty of Agriculture, AKS University, Sherganj, Satna (M.P.) during *Kharif* season 2020-2021. The experiment was conducted in randomize block design with Factorial concept with three replications. In this experiment, 12 treatment combinations including foliar spray of nitrogen through urea viz., N0- 0.0% (control), N1- 2.0%, N2- 3.0% and N3- 4.0% while three crop growth stages viz; S1- Seedling stage, S2- Tillering stage and S3- Panicle initial stage, The experimental plots were fertilizers as per recommended dose.

RESULTS AND DISCUSSION

The result shows that plant height, number of leaves per plant, number of grains/Panicle thousand grains weight, grain and Stover yield was influenced significantly due to foliar spray of nitrogen and three crop growth stages.

Data regarding plant height and number of leaves per plant are reported in (Table-1). Statistical analysis of the data reveal that the plant height, number of tillers/m2 and number of leaves were found to differ significantly amongst the foliar spray of nitrogen, plant height, tillers count/m2 and leaves/hill were increased with the increase in the foliar spray of nitrogen up to 4.0% urea. Thus, the maximum nitrogen level (4.0% urea) recorded maximum plant height (95.02 cm), tillers (20.91/hill) and leaves (56.04/plant). On the other hand, the corresponding values in case of without application of nitrogen were almost significantly lowest (71.21 cm height, 14.51 tillers and 45.20leaves/plant at 90 DAT.

The maximum growth parameter under maximum nitrogen level may be owing to the immediate availability of nitrogen in the requisite amount from the foliar spray @ 4.0%. The increase height, tillering and leaves might be due to role of N in rapid multiplication of tissues and increase in amount of growth substances such as normally occurring phyto-homones and increase in auxin supply with higher level. Prakash et al. (2013).

The highest nitrogen level for foliar spray of urea (@ 4.0 %) resulted in significantly higher above-mentioned yield attributes over the lower nitrogen levels (0.0%, 2.0% and 3.0%). The panicle length

23.73 cm, total number of grains per panicle were 125.02, number of filled grains/panicle were 110.00, number of chaffy grains per panicle were 15.02 and 1000-grains weight 24.36 g due to highest nitrogen level for foliar spray of urea (@ 4.0 %). This might be attributed to the maximum increase in growth parameter due to applied foliar nitrogen @ 4.0%. Increased photosynthetic surface (leaves) brought about increased production of photosynthates and thereby increased translocation of photosynthates from source to the sink. It is further mentioned that the improvement in yield components might have resulted from favorable influence of fertilizers on the growth attributes and efficient and greater partitioning of metabolites and adequate translocation of photosynthates and nutrients to developing reproductive structures. These results confirm the findings of Ghosh et al. (2020)

The highest nitrogen level for foliar spray of urea proved significantly superior to the lower nitrogen levels with respect to grain yields of rice. The highest nitrogen level (@ 4.0 %) resulted in highest grain and straw yield i.e.39.39 and 82.94 q/ha, respectively, being higher by 13.44 and 19.94 q/ha, respectively over control. Usman et al. (2014) found highest yield with 200 kg/ha nitrogen. The highest yield parameters due to highest nitrogen level might be owing to the highest yield-attributing parameters.

Table 1: Response of Transplanted Rice (*Oryza sativa* L.) to Foliar Feeding of Nitrogen at Different Stages of Plant Growth

Treatment	Plant height (cm)	Number of tillers/ Hills	Number of grains/ Panicle	Test weight (g)	Grain yield (q/ha)	Stover yield (q/ha)
	Foliar feeding of nitrogen					
N0	71.21	14.51	89.33	21.90	25.95	63.00
N1	88.40	18.53	115.00	23.40	33.55	77.25
N2	93.21	19.44	119.76	23.65	37.64	81.83
N3	95.02	20.91	125.02	24.36	39.39	82.94
SEm±	1.14	0.43	3.54	0.22	3.01	4.82
CD	3.33	1.25	10.38	0.67	8.82	14.14
	Growth stages of crop					
S1	86.04	18.37	110.72	22.64	32.17	76.79
S2	92.25	20.50	123.28	24.33	39.60	84.51
S3	82.59	16.18	102.83	22.40	30.63	67.46
SEm±	0.98	0.37	4.09	0.20	3.47	5.57
CD	2.88	1.08	11.98	0.58	10.19	16.33
	Interactive effect of Foliar feeding of nitrogen and Growth stages of crop					
N0S1	64.67	13.87	84.20	19.88	23.45	61.86
N0S2	77.81	15.27	98.47	22.18	29.36	64.58
N0S3	71.14	14.40	85.33	21.20	25.05	62.56
N1S1	91.28	19.13	116.47	23.29	34.64	78.83
N1S2	93.82	20.73	125.67	24.33	36.25	84.83
N1S3	80.11	15.73	102.87	22.57	29.75	68.08
N2S1	92.56	20.33	118.40	23.55	34.94	83.00
N2S2	98.27	21.13	130.27	24.61	44.21	93.63
N2S3	88.82	16.87	110.60	22.79	33.67	68.86
N3S1	95.67	20.13	123.80	22.85	35.64	83.48
N3S2	99.09	24.87	138.73	26.21	48.47	95.01
N3S3	90.31	17.73	112.53	23.03	34.05	70.32
SEm±	1.97	0.74	2.04	0.40	1.74	2.78
CD	5.77	2.16	4.24	1.16	3.60	5.77

SUMMARY AND CONCLUSION

Based upon this experiment it is concluded that the treatment combination consisting of application of foliar spray of nitrogen through urea @ 4.0 % at tillering stage recorded the maximum grain yield 48.47 q/ha with total cost of cultivation of Rs. 30076.00. The treatment combination consisting, application of foliar spray of nitrogen through urea @ 4.0 % at tillering stage recorded the maximum and significantly higher net monetary returns (Rs 83256.00/ha) and B:C ratio (2.45:1) can be used as an remunerative strategies.

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