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Effect of Age of Seedling, Level and Time of Nitrogen Application on Yield and Quality of Rice under Mid-Western Plain Zone of UP

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Abstract

A field experiment was conducted during *kharif* of 2006 and 2007 to study effect of 3 age of seedling, 3 levels and 4 time of application of N on yield attributes, yield and quality of rice. Transplanting of 23-day old seedling significantly improved yield, yield attributes and protein production over other treatments Application of nitrogen at 150 kg/ha produced highest grain though it was at par with 120 kg N/ha. Application of N in three splits—1/2 basal, 1/4 at tillering and 1/4 at panicle initiation produced significantly higher yield, yield attributing traits and protein production.

Key words : Age of seedling, Nitrogen, Levels of N, Rice.

Yield of rice depends on its genetic potential, agro-climatic condition and various management practices. Appropriate age of seedling is one of the important non-monetary input which is essential for obtaining uniform crop stand. Younger seedlings perform better than older seedlings. Since, grain yield and its components depends on age of seedling used in transplanting (1). Nitrogen is most crucial nutrient limiting crop yield. Efficiency of utilization of applied nitrogen by rice has been estimated to be about 20—40% (2). Splitting of nitrogen is most common approach for increasing the nitrogen use efficiency in rice. Keeping these in view an attempt was made to study effect of seedling age, nitrogen levels and its time of application on rice

Methods

The experiment was conducted during *kharif* of 2006 and 2007 at Zonal Research Station, Nagina. The soil of experimental plots was sandy loam in nature having organic carbon, av P, av K and pH 0.37, 9 kg/ha, 245 kg/ha and 7.5, respectively. The experiment was laid out in split-split plot keeping nine combinations of ages of seedlings and level of nitrogen in main plots and time of N application in sub-plots with three replications. Rice variety Pusa sugandha-4 was transplanted on 10 July during both the years with a spacing of 20 × 10 cm. A common dose of 60 kg P_2O_5 and 40 kg K_2O/ha was applied to all the plots. Panicle characteristics were recorded at harvest on the basis of 10 randomly selected panicles from each plot. Nitrogen content in grain and straw was determined colorimetrically, following Nesseler's reagent method. N content (%) in grain and straw was multiplied by 5.95 to calculate the protein content in grain and straw (3).

Results and Discussion

Yield and yield attributes were affected significantly by age of seedling. Transplanting of 23 days old seedling recorded significantly higher grain and straw yield during both the years. The yield was reduced by 8.51 and 11.76% due to planting of 33 and 43 days old seedling, respectively. The higher yield with 23 days old seedling could be attributed to significant improvement in various yield attributing traits. These results are close conformity with those of Kumari et al. (4). Application of nitrogen at 150 kg N/ha gave highest grain yield which was at par with 120 kg N/ha and was significantly superior over rest of the treatment. The magnitude of increase in yield at 150 kg N/ha was 28.75 and 3.32% higher over 90 and 120 kg N/ha. Significant increase in yield and yield attributes with N application was also reported by Singh et al. (5) and Singh and Sharma (3). Application of nitrogen in three splits significantly improved all yield component than application in two splits. Application in three splits maintained continuous sup-

Table 1. Yield components and yield of rice as influenced by age of seedling, time and level of nitrogen (pooled data of 2 years).

Treatments	Panicles/ m^2	Panicle length (cm)	Grain yield (q/ha)	Straw yield (q/ha)	Protein production (kg/ha) Grain	Straw
Seedling Age (days)						
23	418.5	22.1	49.3	67.4	423.5	248.3
33	345.6	20.1	45.1	65.3	353.4	183.1
43	305.00	19.0	43.5	61.8	299.8	160.9
CD at 5%	7.3	4.0	1.6	1.3	16.9	5.2
N (kg/ha)						
90	324.1	19.6	38.6	54.4	296.0	163.8
120	359.6	20.5	48.1	67.5	375.0	202.5
150	386.3	20.9	49.7	72.3	404.6	226.7
CD at 5%	7.3	0.6	1.7	1.2	16.7	5.2
Splitting of Nitrogen						
1/2 basal + 1/2 tillering	346.4	19.7	44.3	63.0	345.0	187.1
1/2 basal + 1/2 panicle initiation	342.3	19.1	43.4	61.8	326.4	183.0
1/2 basal + 1/4 tillering + 1/4 panicle initiation	376.2	22.1	49.1	68.0	393.7	216.7
1/3 basal + 1/3 tillering + 1/3 panicle initiation	362.4	20.7	47.0	65.8	370.5	204.0
CD at 5%	8.0	0.6	1.4	1.2	1.3	7.7

ply of nutrient which might have favored the crop for good health, yield attributes and finally yield of rice. Protein production by crop was reduced with increase in age of seedling. The highest value of protein production with young seedling was mainly due to higher grain and straw yield. Similar result was also reported by Prasad et al. (6). Crop receiving 150 kg N/ha resulted significantly higher protein content in grain and straw than 90 and 120 kg N/ha. Application of N in three splits resulted in maximum protein content and protein production by grain and straw.

It is concluded from the investigation that rice should be transplanted with 23 days old seedling and fertilized with 120 kg N/ha in three splits 1/2 at basal, 1/4 at tillering and 1/4 at panicle initation to get maximum yield and monetary advantage under MWPZ of UP.

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