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Effect of age of seedlings and split application of nitrogen on yield of rice (*Oryza sativa* L.)

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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 2019-2020. The experiment consisted of randomized block design having factorial arrangement in three replications. In this experiment, 12 treatment combinations including four different age of seedlings D1-12 days, D2-18 days, D3-24 days and D4-30 days old seedlings, while three levels of nitrogen viz., N1-100% RDN as basal, N2-50% RDN as basal + 50% RDN at tillering stage and N3-50% RDN as basal + 25% RDN at tillering stage + 25% at panicle initiation, it was found that age of seedlings and nitrogen levels significantly affected number of grains/panicle, thousand grain weight, grain and Stover yield of rice. Higher number of grains per panicle of rice was recorded under the treatment combination consisting of transplanting of 12- days old seedling with application of nitrogen in three split doses with the respective values of 187.93. It was concluded from highest grain yield per hectare of rice was recorded under the treatment combination consisting of transplanting of 12- days old seedling with application of nitrogen in three split doses with the respective values of 64.61 q/ha.

Keywords: Rice, nitrogen, seedling, grains/panicle, grain weight, Stover yield

Introduction

Rice (*Oryza sativa* L.) is the most important and widely cultivated crop of the world. Rice crop belongs to family Gramineae. Rice is cultivated in about 157.8 m ha which produce about 749.1 mt of rice grain (FAO, 2015). Rice is cultivated in almost all states of India. In M.P. rice is grown in the area of about 15.59 lakh ha with production of 14.62 lakh tons and productivity 989 kg/ha. (GOI, 2017).

Age of seedlings is the most important factor for yield maximization of rice. The success of transplanted rice cultivation depends upon the age and healthy seedlings. Performance of a variety entirely depends upon the time of planting. Seedling age at transplanting is an important factor for uniform stand of rice and regulating its yield. Younger seedlings can relieve the transplanting stress in a shorter period of time compared to that of older seedling due to increased N-content in the former (Yamamoto *et al.*, 1998) [8].

Rice is a poor use of nitrogen with nitrogen use efficiency (NUE) ranging from 30-50%. In lowland rice ecosystem, nitrogen use efficiency can be increased by adding a nitrification inhibitor (NI) with the nitrogenous fertilizers split application of nitrogenous fertilizers is one of the strategies for efficient use of nitrogen throughout the growing period by synchronizing with plant demand, reducing de-nitrification losses and improved nitrogen uptake (Hirzel *et al.*, 2011) [3]. Keeping this aspect in mind, the present investigation is planned with the objectives to study the age of seedlings and nitrogen levels on optimizing the crop growth and grain yield.

Materials and Methods

Experiment was carried out at the Instructional Farm, Faculty of Agriculture, AKS University, Sherganj, Satna (M.P.) during Kharif season 2019-2020. The experiment was conducted in randomized block design with factorial concept with three replications. Different age of seedlings and split application of nitrogen allocated as per treatments, combinations including four age of seedlings (D1) 12 days, (D2) 18 days, (D3) 24 days and (D4) 30 days old seedlings, while three levels of nitrogen viz., N1- 100% RDN as basal, N2-50% RDN as basal + 50% RDN at

Tillering stage and N3- 50% RDN as basal + 25% RDN at tillering stage + 25% at panicle initiation. The gross and net plot size was 5 m x 3 m, respectively. The experimental plots were fertilizers as per treatments.

Results and Discussion

The result shows that number of grains/panicle, thousand grain weight, grain and Stover yield was influenced significantly due to different concentrations of age of seedlings and nitrogen levels.

Data regarding (Table-1) age of seedling to transplanting and recommended dose of nitrogen in three splits were found to significantly improve test weight. The significantly highest test weight of rice was recorded under the treatment combination consisting of transplanting of 12- days old seedling with application of nitrogen in three split doses with the respective values of 23.01 g.

The age of seedling to transplanting and recommended dose of nitrogen in three splits were found to significantly improve grain yield per hectare. The significantly highest grain yield per hectare of rice was recorded under the treatment combination consisting of transplanting of 12- days old seedling with

application of nitrogen in three split doses with the respective values of 64.61 q/ha.

The age of seedling to transplanting and recommended dose of nitrogen in three splits were found to significantly improve straw yield per hectare. The significantly highest straw yield per hectare of rice was recorded under the treatment combination consisting of transplanting of 12- days old seedling with application of nitrogen in three split doses with the respective values of 82.33 q/ha.

The higher straw yield obtained with 12- days old seedlings was mainly attributed to more plant height, higher number of leaves, higher number of tillers and dry matter production compared to other three age of seedlings. These findings confirm some earlier studies on younger seedlings with the findings of Ajit Kumar *et al.*, 2002. ^[1]

Summary and Conclusion

Based upon this experiment it is concluded that the treatment combination consisting of transplanting of 12- days old seedling with application of nitrogen in three split doses recorded the maximum seed yield 64.61 q/ha.

TABLE 1: Influence of age of seedlings and split application of nitrogen on yield of rice

Treatment	Test weight (g)	Grain Yield (q/ha)	Stover yield (q/ha)
Effect of age of seedlings			
D ₁	22.15	56.79	73.99
D ₂	21.56	46.69	62.37
D ₃	20.92	36.18	49.66
D ₄	20.16	30.43	43.43
SEm±	0.09	0.63	0.85
CD	0.27	1.84	2.48
Effect of nitrogen levels			
N ₁	20.83	38.52	53.08
N ₂	21.14	43.30	58.27
N ₃	21.62	45.74	60.73
SEm±	0.08	0.54	0.73
CD	0.24	1.59	2.15
Interaction effect of age of seedlings and nitrogen levels			
D ₁ N ₁	21.46	47.56	63.24
D ₂ N ₁	21.29	43.62	59.32
D ₃ N ₁	20.74	35.37	48.56
D ₄ N ₁	19.83	27.55	41.19
D ₁ N ₂	21.99	58.21	76.40
D ₂ N ₂	21.56	47.79	63.43
D ₃ N ₂	20.92	36.07	49.52
D ₄ N ₂	20.11	31.15	43.75
D ₁ N ₃	23.01	64.61	82.33
D ₂ N ₃	21.85	48.67	64.37
D ₃ N ₃	21.10	37.11	50.89
D ₄ N ₃	20.53	32.59	45.35
SEm±	0.16	1.09	1.46
CD	0.47	3.18	4.29

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