**Research Article**

**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 randomize 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 the 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).

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).

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 randomize 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 23.01g.

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.

**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.

**Aknowledgment**

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**References**

1. Ajit Kumar, Mishra, BN, Mishra PK (2002) Influence of age of seedling and plant density on yield and nutrient uptake by rice hybrids. Annals of Agricultural Research 23: 680-4.

2. G. O. I. (Government of India, Ministry of Agriculture and Farmer’s Welfare) (2017). Annual Report 2016-2017. Government of India, Ministry of Agriculture and Framer’s Welfare, Krishibhavan, New Delhi Pp.194.

3. Hirzel J, Pedreros A, Cordero K (2011) Effect of nitrogen rates and split nitrogen fertilization on grain yield and its components of flooded rice. Chilean J. Agric 71: 437-44.

4. Reddy YR, Sultan T, Hussain S, Singh SS (2008) Effect of age and number of seedlings per hill on growth and yield of rice grown under system of rice intensification and traditional methods. Environment and Ecology 26: 859-61.

5. Sathiya K, Ramesh T (2009) Effect of split application of nitrogen on growth and yield of aerobic rice. Asian Journal of Experimental Sciences 23: 303-6.

6. Shivay YS, Kumar D, Prasad R (2005) Iron pyrites for reducing ammonia volatilization losses from fertilizer urea applied to a sandy clay loam soil. Curr 89: 742-43.

7. Shukla VK, Tiwari RK, Malviya DK, Singh SK, Ram US (2015) The performance of rice varieties in relation to nitrogen levels under irrigated condition. African J. Agric 10: 517-20.

8. Yamamoto Y, Ikejiri A, Nitta Y (1998) Characteristics of taking root of rice nursery seedling in relation to the changes of some inorganic and organic constituents after transplanting. Japanese Journal of Crop 67: 20-5.

**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** |
| **D1** | 22.15 | 56.79 | 73.99 |
| **D2** | 21.56 | 46.69 | 62.37 |
| **D3** | 20.92 | 36.18 | 49.66 |
| **D4** | 20.16 | 30.43 | 43.43 |
| **SEm±** | **0.09** | **0.63** | **0.85** |
| **CD** | **0.27** | **1.84** | **2.48** |
|  | **Effect of nitrogen levels** |
| **N1** | 20.83 | 38.52 | 53.08 |
| **N2** | 21.14 | 43.30 | 58.27 |
| **N3** | 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** |
| **D1N1** | 21.46 | 47.56 | 63.24 |
| **D2N1** | 21.29 | 43.62 | 59.32 |
| **D3N1** | 20.74 | 35.37 | 48.56 |
| **D4N1** | 19.83 | 27.55 | 41.19 |
| **D1N2** | 21.99 | 58.21 | 76.40 |
| **D2N2** | 21.56 | 47.79 | 63.43 |
| **D3N2** | 20.92 | 36.07 | 49.52 |
| **D4N2** | 20.11 | 31.15 | 43.75 |
| **D1N3** | 23.01 | 64.61 | 82.33 |
| **D2N3** | 21.85 | 48.67 | 64.37 |
| **D3N3** | 21.10 | 37.11 | 50.89 |
| **D4N3** | 20.53 | 32.59 | 45.35 |
| **SEm±** | **0.16** | **1.09** | **1.46** |
| **CD** | **0.47** | **3.18** | **4.29** |