Original Research Article

Effect of Different Age of Seedlings and Nitrogen Levels on Growth and Yield of Rice (*Oryza sativa* L.)

ABSTRACT

A field experiment was conducted during the *kharif* season (2021) at Crop Research Farm, Department of Agronomy, SHUATS, Allahabad (U.P.). The soil of experimental plot was sandy loam in texture. The treatment consisted of T_1- 14 Days age seedlings + Nitrogen 100 kg/ha, T_2- 14 Days age seedlings +Nitrogen 110 kg/ha, T_3-14 days age seedlings + Nitrogen 120 kg/ha, T_4- 21 Days age seedlings + Nitrogen 100 kg/ha, T_5- 21 Days age seedlings +Nitrogen 110 kg/ha, T_6-21 days age seedlings + Nitrogen 120 kg/ha, T_7- 28 Days age seedlings + Nitrogen 100 kg/ha, T_8- 28 Days age seedlings +Nitrogen 110 kg/ha, T_9-28 days age seedlings + Nitrogen 120 kg/ha. The experiment was laid out in Randomized Block Design, with 9 treatments replicated thrice. Results revealed that maximum plant height(100.40cm), number of tillers per hill (14.80), plant dry weight(53.06g/plant), panicle length(32.30cm), panicle per m^2(320), no of panicle per hill (10.70), no of filled grains per panicle (165), test weight(26.40g), grain yield(4.16t/ha), stover yield(6.24t/ha), gross return (INR 1,11,904.00), net return (INR 78,275.400), B:C ratio (2.33) was recorded and significantly influenced with the treatment 21 days age seedlings +Nitrogen 120 kg/ha (T6).

Key words: *Rice, age of seedlings, nitrogen levels, yield attributes, kharif*

UNDER PEER REVIEW

INTRODUCTION

Rice (*Oryza sativa* L.) is the second largest cereal crop and is the staple fond of nearly one-half of the world's population. Rice is one of the most important cereal crops of the world. Presently more than 90% of total rice production and consumption in Asia. In India, area under cultivation of rice is around 44 m ha and production of 109.70 million tonnes during 2016-2017 (Anonymous. 2018). World's rice demand is projected to increase by 25 percent from 2001 to 2025 to keep pace the population growth and therefore, meeting ever-increasing rice demand in the sustainable way with shrinking natural resources are a great challenge **(Singh *et al.*, 2016).** Time of planting is the most important factor in influencing the yield of the crop. Performance of a genotype entirely depends upon the time of planting. Delay in planting generally results in yield reduction which cannot be compensated by any other means. Paddy has relatively higher degree of thermo sensitivity during flowering and grain filling stages as compared to high yielding varieties. Too high or too temperature may cause damage un flowering and prevent pollen shedding leading to increased infertility and production of chaffy grains. In order to ensure normal flowering, fertilization and avoid damage due to high or low temperature, it is necessary to properly organize the date of nursery sowing and transplanting of paddy.

MATERIALS AND METHODS:

The experiment was conducted during *kharif* season of 2021-2022. The experiment was conducted in Randomized Block Design consisting of nine treatment combinations with three replications and was laid out with the different treatments allocated randomly in each replication. The soil of the experimental field was sandy loam in texture, slightly alkaline reaction (pH 7.1) with low level of organic carbon (0.28%), available N (225 Kg/ha), P (19.50 kg/ha) and higher level of K (92.00 kg/ha). The treatment combinations are T_1 -14 days age of seedling + Nitrogen 100 kg/ha, T_2 - 14 days age of seedling + Nitrogen 110 kg/ha, T_3 - 14 days age of seedling + Nitrogen 120 kg/ha, T_4 - 21 days age of seedling + Nitrogen 100 kg/ha, T_5 - 21 days age of seedling + Nitrogen 110 kg/ha, T_6 - 21 days age of seedling + Nitrogen 120 kg/ha, T_7 - 28 days age of seedling + Nitrogen 100 kg/ha, T_8 - 28 days age of seedling + Nitrogen 110 kg/ha, T_9 - 28 days age of seedling + Nitrogen 120 kg/ha. The observations were recorded on different growth parameters at harvest *viz*. plant height(cm), number of tillers and grain yield(t/ha).

UNDER PEER REVIEW

RESULT AND DISCUSSION

A. Growth Attributes:

At harvest, maximum plant height (100.40 cm) was recorded with application of 21 days age of seedling + Nitrogen 120 kg/ha which was significantly superior over all the treatments and statistically at par with application of 21 days age of seedling + Nitrogen 110 kg/ha (98.00 cm). At harvest observed that maximum number of tillers per plant was recorded with application of 21 days age of seedling + Nitrogen 120 kg/ha (14.80) which were significantly superior over all except with treatment of application of 21 days age of seedling + Nitrogen 110 kg/ha (14.27) which were statistically at par each other. At harvest maximum plant dry weight (53.06 g) recorded with treatment of application of 21 days age of seedling + Nitrogen 120 kg/ha which was significantly superior over all other treatments except with treatment of application of 21 days age of seedling + Nitrogen 110 kg/ha (50.50 g) which were statistically at par with treatment of application of 21 days age of seedling + Nitrogen 120 kg/ha.

Yield Attributes

The yield attributes of basmati rice were significantly influenced by rate of N application and varieties (Table 2). Treatment with 21days age of seedling + Nitrogen 120 kg/ha was recorded maximum number of panicle/m^2 (320) which was significantly superior over all other treatments. However, the treatment 21days age of seedling + Nitrogen 110 kg/ha (310) which was statistically at par with 21days age of seedling + Nitrogen 120 kg/ha. Highest panicle length (32.30 cm) was significantly recorded in the the treatment with 21 days age of seedling + Nitrogen 120 kg/ha and the treatment with 21 days age of seedling + Nitrogen 110 kg/ha (31.80cm) which was statistically at par with the treatment with application of 21 days age of seedling + Nitrogen 120 kg/ha. The number of panicle/hill (10.70) was recorded significantly highest in the treatment with 21 days age of seedling + Nitrogen 120 kg/ha and the treatment with 21 days age of seedling + Nitrogen 110 kg/ha (10.20) which where statistically at par with the treatment with application of 21 days age of seedling + Nitrogen 120 kg/ha. The number of filled grains per panicle (165.00) was recorded significantly highest in the treatment with 21 days age of seedling + Nitrogen 120 kg/ha and the treatment with 21 days age of seedling + Nitrogen 110 kg/ha (159.00) which where statistically at par with the treatment with 21 days age of seedling + Nitrogen 120 kg/ha. The number of un filled grains per panicle (20.00) was recorded significantly highest in the

UNDER PEER REVIEW

treatment with 14 days age of seedling + Nitrogen 100 kg/ha and the treatment with 14 days age of seedling + Nitrogen 110 kg/ha (18.3) which where statistically at par with the treatment with 14 days age of seedling + Nitrogen 100 kg/ha. Treatment with 21 days age of seedling + Nitrogen 120 kg/ha was recorded significantly highest test weight (26.40 g) and the treatment with 21 days age of seedling + Nitrogen 110 kg/ha (25.72 g) which were statistically at par with treatment with application of 21 days age of seedling + Nitrogen 120 kg/ha.

YIELD

The grain yield of rice was significantly influenced by rate of N application and different age of seedling (Table 3). The treatment with 21 days age of seedling + Nitrogen 120 kg/ha recorded significantly higher grain yield (4.16 t/ha). However, the treatment with 21 days age of seedling + Nitrogen 110 kg/ha (3.95 t/ha) which was statistically at par with the treatment 21 days age of seedling + Nitrogen 120 kg/ha. The treatment with 21 days age of seedling + Nitrogen 120 kg/ha had recorded significantly higher straw yield (6.24 t/ha). However, the treatment with 21 days age of seedling + Nitrogen 110 kg/ha (6.13 t/ha) which was statistically at par with the treatment 21 days age of seedling + Nitrogen 120 kg/ha. The maximum harvest index was observed in the treatment with 21 days age of seedling + Nitrogen 120 kg/ha (40.01 %) and minimum in treatment with 14 days age of seedling + Nitrogen 100 kg/ha (34.98 %).

CONCLUSION

On the basis of one season, it was concluded that 21 days age of seedling along with Nitrogen at 120 kg/ha was found more productive. The finding was based on the research done in one season it may be repeated further for confirmation and recommendation.

UNDER PEER REVIEW

UNDER PEER REVIEW

TABLE-1 EFFECT OF DIFFERENT AGE OF SEEDLINGS AND NITROGEN LEVELS ON GROWTH ATTRIBUTES OF RICE

Treatments	Plant height (cm) At Harvest	Number of tillers At Harvest	Plant dry weight (g/hill) At Harvest
14 days age of seedling + Nitrogen 100 kg/ha	86.20	12.47	41.04
14 days age of seedling + Nitrogen 110 kg/ha	87.20	12.80	41.33
14 days age of seedling + Nitrogen 120 kg/ha	87.60	12.93	43.97
21 days age of seedling+ Nitrogen 100 kg/ha	89.20	13.13	44.53
21 days age of seedling + Nitrogen 110 kg/ha	98.00	14.27	50.50
21 days age of seedling + Nitrogen 120 kg/ha	100.40	14.80	53.06
28 days age of seedling + Nitrogen 100 kg/ha	90.10	13.27	44.80
28 days age of seedling + Nitrogen 110 kg/ha	89.90	13.60	47.03
28 days age of seedling + Nitrogen 120 kg/ha	90.20	13.93	48.73
F TEST	S	S	S
SEm(±)	2.99	0.18	0.91
CD (p=0.05)	8.97	0.55	2.73

UNDER PEER REVIEW

TABLE-2 YIELD ATTRIBUTES OF RICE INFLUENCED BY DIFFERENT AGE OF SEEDLING AND NITROGEN LEVELS.

Treatments	Panicle length (cm)	Panicle per meter square	No of panicle per hill	No of filled grains per panicle	No of un filled grains per panicle	Test weight(g)
14 days age of seedling + Nitrogen 100 kg/ha	29.00	272.0	9.00	103.30	20.0	22.03
14 days age of seedling + Nitrogen 110 kg/ha	29.40	280.0	9.20	111.30	18.3	23.09
14 days age of seedling + Nitrogen 120 kg/ha	29.50	286.0	9.30	120.30	16.7	23.30
21 days age of seedling+ Nitrogen 100 kg/ha	30.10	286.0	9.60	129.00	15.3	23.31
21 days age of seedling + Nitrogen 110 kg/ha	31.80	310.0	10.20	159.00	13.0	25.72
21 days age of seedling + Nitrogen 120 kg/ha	32.30	320.0	10.70	165.00	10.3	26.40
28 days age of seedling + Nitrogen 100 kg/ha	30.30	292.0	9.70	136.30	15.0	23.93
28 days age of seedling + Nitrogen 110 kg/ha	30.90	292.0	9.70	134.70	14.7	24.52
28 days age of seedling + Nitrogen 120 kg/ha	31.40	292.0	9.80	148.30	13.3	24.80
F TEST	S	S	S	S	S	S
SEm (±)	0.22	3.55	0.17	4.95	0.65	0.43
CD (5%)	0.66	10.64	0.50	14.83	1.94	1.28

UNDER PEER REVIEW

TABLE-3 YIELD OF RICE INFLUENCED BY DIFFERENT AGE OF SEEDLING AND NITROGEN LEVELS.

UNDER PEER REVIEW

Treatments	Grain yield (t/ha)	Straw yield (t/ha)	Harvest index (%)
14 days age of seedling + Nitrogen 100 kg/ha	2.61	4.85	34.98
14 days age of seedling + Nitrogen 110 kg/ha	2.72	4.96	35.42
14 days age of seedling + Nitrogen 120 kg/ha	3.03	5.07	37.44
21 days age of seedling+ Nitrogen 100 kg/ha	2.86	5.17	35.54
21 days age of seedling + Nitrogen 110 kg/ha	3.95	6.13	39.21
21 days age of seedling + Nitrogen 120 kg/ha	4.16	6.24	40.01
28 days age of seedling + Nitrogen 100 kg/ha	3.09	5.32	37.04
28 days age of seedling + Nitrogen 110 kg/ha	3.37	5.48	38.07
28 days age of seedling + Nitrogen 120 kg/ha	3.50	5.68	38.11
F TEST	S	S	NS
SEm (±)	0.10	0.18	1.09
CD (5%)	0.29	0.54	-

UNDER PEER REVIEW

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UNDER PEER REVIEW