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Performance of Machine Transplanted Rice to Nitrogen Management

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Abstract: *A Field experiment was conducted during rabi, 2015 at Agricultural Research Station, Nellore, Andhra Pradesh on clay loam soil with an objective to study the performance of machine transplanted rice to nitrogen management. The experiment was transplanted with Kubota 6 row transplanter. Nellore Mahshuri (NLR 34449) variety was sown in trays and 18 days aged rice seedlings were transplanted in the field with Kubotra rice transplanter. Three nitrogen levels (120, 160, 200 kg N/ha) as mainplots and split application of nitrogen (3, 4 and 5 splits) as sub plots was tested in split plot design. The results revealed that highest grain yield (6716 kg/ha) was recorded with application of 200 kg N/ha followed by 160 kg N/ha (6219 kg/ha). Highest grain yield (6391 kg/ha) was obtained with 5 splits of nitrogen and was on par with 4 splits of nitrogen application (6379 kg/ha) and the lowest grain yield was obtained with 3 splits of 'N' application (5909 kg/ha). Highest grain yield of 6973 and 6946 kg/ha were recorded with 200 kg N/ha at 4 and 5 splits respectively.*

Keywords: *Rice, Machine transplanting, Nitrogen dose, Split application of nitrogen, Yield attributes, Yield, Harvest index.*

INTRODUCTION

Rice continues to hold the key to sustained food production by contributing 20-25 per cent to agriculture and assures food security for more than half of the total population in India. Rice is traditionally planted as manual transplanting method but in recent years, because of labour scarcity coupled with higher wages during the peak period of farm operations invariably lead to delay in transplanting. This was aggravated by untimely release of water from canals and delayed monsoon showers. This lead to indenting alternate methods of rice cultivation without reduction in yield.

Among them, transplanting using mechanical transplanter gained significance among farmers because of easy adoptability and on par yield with that of conventional transplanting method. Mechanization (both for planting and harvesting) in rice cultivation revolutionized the rice cultivation by decreasing cost of cultivation. In Andhra Pradesh, rice growing has become burden on farmers as the cost of labour increased many fold with similar yields. The use of mechanized transplanter increased rice yields by 3.5 to 4.0 q/ acre and decrease cost by 50 % [1].

Mechanical transplanter saves about 78% labour and 48% of cost of operation compared to manual transplanting with higher grain yield [2]. Mechanical transplanting proved significantly superior to manual transplanting by increasing the grain yields to the tune of 2.22% at ARI, Rajendranagar to 24.91% at Coimbatore with

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reduced cost of cultivation and higher B : C ratio of 3.70. Mechanical transplanting has potential not only to reduce labour input but also more profitable despite of similar yields compared to farmers method of manual transplanting [3].

MATERIALS AND METHODS

A field experiment was conducted at ARS, Nellore during *rabi,* 2015 to study the performance of machine transplanted rice to nitrogen management. The experiment was conducted in clay loam soil with 0.45% O.C, 7.9 pH and 0.69 EC (dsm^{-1}). The available Nitrogen, Phosphorous and Potassium were 140, 300, and 430 kg/ha respectively. The trial was taken up in a Split plot design with three nitrogen doses as main plots and split application of nitrogen as sub plots and replicated four times. Phosphorous and potassium dose was constant and applied in recommended dose.

Main Plots

M_1: 120:60:40 M_2: 160:60:40 and M_3: 200:60:40 kg N: P: K/ha. Sub plots: S_1: 3 split (Basal, 20, 40 DAT), S_2: 4 splits (Basal, 15, 30, 45 DAT) and S_3: 5 splits (Basal, 10, 20, 30, 40 DAT) of nitrogen application. Transplanting was done with 6 row Kubota transplanter with a spacing of 30x16 cm (Gross Plot size of $3.6 \times 4.5\ m^2$) and transplanting was done with 18 days aged seedlings. The variety used was Nellore mahshuri (NLR 34449) which is a short duration variety (125 days). Observations were made on growth and yield parameters and data subjected to statistical analysis with SPSS software.

RESULTS AND DISCUSSION

Effect of Nitrogen Fertilizer on Yield Attributing Characters and Yield

Plant height increased with incremental increase in nitrogen fertilizer from 120 to 200 kg N/ha both at 75 DAS and at harvest. Highest plant height (82.4 cm) was recorded with 200 kg N/ha. No. of tillers/hill was increased markedly with increase in nitrogen level. There was no significant difference in no. of panicles per hill with increase in nitrogen dose. Panicle length did not showed any significant increase with increase in nitrogen dose. Highest no. of filled grains per panicle was observed at 200 kg N/ha and significant increase was observed with increase in nitrogen levels. There was no significant difference in test weight with increase in nitrogen dose. Highest grain yield (6716 kg/ha) was recorded with application of 200 kg N/ha followed by 160 kg N/ha (6219 kg/ha) and the lowest yield was observed at 120 kg N/ha (5744 kg N/ha) and there was an incremental yield increase with increase in nitrogen from 120 to 200 kg N/ha. Straw yield was also shown similar trend with N application. There was no difference in Harvest index with Nitrogen application from 120-200 kg N/ha [4,5]. Under the influence of favourable nitrogen nutrition and wider spacing in machine transplanted rice with transplantation of younger seedlings, the growth of the crop enhanced to produce increased stature of the growth components. These could be attributed to increased growth under favourable N Nutrition. [5]

Effect of Split Application of Nitrogen on Yield Attributing Characters and Yield

Split application of nitrogen had no influence on significant increase in plant height at maturity. Highest number of tillers per hill was recorded with 5 splits of N application and was on par with 4 splits of nitrogen application. With regard to number of panicles per hill, panicle length and test weight there was no significant difference with split application of N fertilizer.

Highest number of filled grains per panicle was recorded with application of nitrogen in 5 splits. With regard to split application of nitrogen, highest grain yield (6391 kg/ha) was obtained with 5 splits of nitrogen (at 10 days interval from the date of transplanting) and was on par with 4 splits of nitrogen application (6379 kg/ha) (at 15 days interval from the date of transplanting) and the lowest grain yield was obtained with 3 splits of 'N' application (5909 kg/ha) (at 20 days interval from the date of transplanting). Highest straw yield was recorded at 4 splits of nitrogen application which was on par with 5 splits of nitrogen application. [6,7]. This increased performance due to more no. of split application of nitrogen might be due to more no. of days available for tillering as the seedlings were transplanted earlier and less nitrogen losses.

Table 1
Performance of rice to different doses of nitrogen and split application of nitrogen in machine Transplanting (*Rabi*, 2015)

	Pl. ht (cm)									
Treatments	*75 DAS*	*At harvest*	*No. of tillers/ hill*	*No. of panicles / hill*	*Panicle Length (cm)*	*Filled Grains/ panicle*	*Test Wt (g)*	*Grain Yield (kg/ha)*	*Straw yield Kg/ha*	*Harvest index*
Nirogen dose kg/ha										
M_1	50.9[b]	77.8[c]	30.7[b]	27.8	19.6	158[c]	16.5	5744[c]	6336[c]	0.48
M_2	53.0[ab]	80.2[b]	34.4[a]	29.7	19.7	168[b]	16.6	6219[b]	6836[b]	0.48
M_3	54.5[a]	82.4[a]	36.0[a]	31.0	19.8	175[a]	16.4	6716[a]	7364[a]	0.48
Sig	*	**	**	NS	NS	*	NS	**	**	
P-value	0.017	0.000	0.001	0.061	0.696	0.005	0.939	0.000	0.000	
No. of nitrogen splits										
S_1	51.5[b]	79.1	31.5[b]	29.6	19.7	164[b]	16.3	5909[b]	6488[b]	0.48
S_2	54.6[a]	81.1	33.9[ab]	30.0	19.7	163[b]	16.5	6379[a]	7137[a]	0.47
S_3	52.1[b]	80.2	35.7[a]	28.9	19.8	176[a]	16.8	6391[a]	6911[ab]	0.48
Sig	*	NS	*	NS	NS	*	NS	*	*	
P-value	0.029	0.059	0.010	0.675	0.873	0.019	0.492	0.03	0.015	
Interaction										
Sig	NS	NS	NS	NS	NS	**	NS	NS	NS	
P-value	0.765	0.153	0.569	0.071	0.308	0.001	0.689	0.842	0.533	

Interaction Effect of Levels of Nitrogen and Split Application of Nitrogen

Interaction effect of levels of nitrogen and split application of nitrogen was not significant in all the yield attributing characters except number of filled grains per panicle. Significantly highest grain yield of 6973 and 6946 kg/ha was recorded with 200 kg N/ha at 4 and 5 splits respectively. [5, 6 and 7]

Table 2
Effect of nitrogen levels and split application of nitrogen on the grain yield of machine transplanted rice

	M_1	M_2	M_3	*Mean*
S_1	5542	5954	6231	5744
S_2	5869	6294	6973	6219
S_3	5820	6408	6946	6716
Mean	5909	6379	6391	
			Sig	*P Value*
Fertilizer doses			**	0.000
Split application of nitrogen			*	0.03
Interaction			NS	0.842

CONCLUSION

Highest grain yield (6716 kg/ha) was recorded with application of 200 kg N/ha followed by 160 kg N/ha (6219 kg/ha) and the lowest yield was observed at 120 kg N/ha (5744 kg N/ha). With regard to split application of nitrogen, highest grain yield (6391 kg/ha) was obtained with 5 splits of nitrogen (at 10 days interval from the date of transplanting) and was on par with 4 splits of nitrogen application (6379 kg/ha) (at 15 days interval from the date of transplanting) and the lowest grain yield was obtained with 3 splits of 'N' application (5909 kg/ha) (at 20 days interval from the date of transplanting). With regard to interaction effect highest grain yield of 6973 and 6946 kg/ha were recorded with 200 kg N/ha at 4 and 5 splits respectively.

References

The Hindu, (2011), The Hindu News paper, November 2, 2011.

International Rice Research Institute (IRRI) (2007), Annual report for 2007 Las Banos, Philippines.

DRR Progress report, (2011), Progress report of DRR, 2011.

Revathi, P., Suneetha Devi, K.B., Gopal Reddy, B., Praveen Rao, V., Padmaja, G. and Shiv Shanker, A. (2014), Influence of Planting Methods and Integrated Nutrient Management on Growth, Yield and Economics of Rice. *Journal of Rice Research*. 7 (1 and 2): 62-75.

Mankotia, B. S and Sekhar, J. (2007), Integrated nutrient supply and seed rate for direct seeded rainfed upland rice in mid hills of Himachal Pradesh, *Indian Journal of Agricultural Sciences*. 77(9): 604-606.

Sahar Yoseftabar, Allahyar Fallah, Jahanfar Daneshian. (2012), Effect of Split Application of Nitrogen Fertilizer On Spad Value In Hybrid Rice (Grh1). *International Journal of Agricultural Crop Sciences*. 4(10): 647-651.

Sathiya, K and Ramesh T. (2009), Effect of split application of nitrogen on growth and yield of aerobic rice. *Asian Journal of Experimental Sciences*. 23(1): 303-306.