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EFFECT OF SPLIT DOSES AND TIME OF NITROGEN APPLICATION ON GROWTH, YIELD ATTRIBUTES AND YIELD OF DIRECT SOWN RICE IN PUDDLED SOIL

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For efficient utilisation of fertiliser nitrogen, skipping the basal application till maximum tillering or panicle initiation has been recommended (Shastri, 1974). The experiment under report was conducted with the objective of studying the effect of skipping basal application of nitrogen on the growth and yield of short duration high yielding rice variety *Triveni*. The data on growth characters, yield attributes and yield are presented in this paper.

Materials and methods

The experiment was laid out during December—April 1975—'76 in the farm attached to the College of Agriculture, Vellayani. *Triveni* a high yielding short duration variety (100 days) was used. The soil belongs to the textural class "sandy clay" and had an initial total nitrogen content of 0.115 per cent. Super phosphate and Muriate of potash were used to supply P_2O_5 and K_2O at a uniform rate of 35 kg/ha. The treatments consisted of two levels of nitrogen given as urea (50 and 70 kg/ha) four rates of split doses (0, 1/4, 1/2 and 3/4) and three times of application (basal, active tillering and panicle initiation), fitted in a randomised block design with 3 replications and 12 treatments (Vide Table 1.) The plot size used was 4.5 X 4.5 M. A seed rate of 100 kg/ha was used. A 25 x 25 cm wire frame was used to 1ix the observational unit in 3 locations selected at random in each plot.

Results and discussion

The data on plant height at harvest, yield attributes and yield are presented in Table 1. Table 2 shows the effect of interaction between levels and split doses and time on grain yield.

Height of plants. From the result it is evident that there was no significant difference in height at harvest. This may be due to the fact that in plants which did not receive nitrogen at earlier stages the height could be made up by supplying nitrogen at panicle initiation stage.

Number of panicles. From the result it can be seen that the treatment T_2 (0—1/2—1/2) recorded the maximum panicles which evidently shows that

Table 1 Effect of split doses and time and levels of nitrogen application on growth, yield attributes and yield of rice

Treatments	Height at harvest cm	Panicle/m²	Grains panicle	Weight of panicle g.	1000 grain weight	Grain yield kg/ha	Straw yield kg/ha
Levels of nitrogen (Kg/ha)							
$L_1 = 50$	61.9	687	48	1.19	24.79	3367	5063
$L_2 = 70$	62.9	696	51	1.50	25.24	4150	5975
F. test	NS	NS	NS	Sig.	Sig.	Sig.	Sig.
C. D. at 5%	—	—	—	0.191	0.533	177.3	356.9
Split doses and time							
T_1 (0-1/4-3/4)	59.1	706	49	1.34	25.47	4061	5532
T_2 (0-1/2-1/2)	62.2	805	47	2.02	26.80	4874	5731
T_3 (0-3/4-1/4)	64.5	696	58	1.34	25.13	3974	5473
T_4 (1/4-0-3/4)	63.1	618	52	1.06	24.62	3732	5909
T_5 (1/4—1/4—1/2)	61.4	738	51	1.62	25.83	4209	5631
T_6 (1/4-1/2-1/4)	63.4	656	49	1.84	26.13	4475	5453
T_7 (1/4-3/4-0)	65.3	704	47	1.04	24.50	3723	5671
T_8 (1/2—0—1/2)	60.7	733	52	1.13	24.97	3877	5155
T_9 (1/2—1/4—1/4)	59.8	597	45	1.14	24.83	3811	5512
T_{10} (1/2-1/2-0)	56.9	752	52	1.18	25.18	3911	5413
T_{11} (3/4-0-1/4)	61.0	701	45	1.22	24.73	3869	5354
T_{12} (3/4-1/4-0)	61.5	597	48	0.91	23.77	3586	5393
F. test	N S	Sig.	N S	Sig.	Sig.	Sig.	N S
C. D. at 5%	—	117.6	—	0.463	1.302	438.4	—

nitrogen at later stages is more important in panicle production. The treatment T12 (3/4—1/4—0) gave the lowest panicle production which emphasises that the basal dose is not necessarily to be given for enabling the crop to produce more panicles. Hall and Tackett (1962), Matsushima (1966) and Kumar and George (1972) stressed the importance of nitrogen application at active tillering stage to ensure sufficient number of panicle bearing tillers.

Weight of panicle. The treatment T2 (0—1/2—1/2) recorded the highest panicle weight. This reveals that applying half the nitrogen at active tillering stage

and the other half at panicle initiation is the best practice for obtaining maximum panicle weight. The fact that T12 (3/4—1/4—0) recorded the lowest weight shows the importance of fertiliser application at panicle initiation stage. The higher level L_2 was significantly superior to L_1 in increasing the panicle weight.

Table 2 Effect of interaction levels and split doses and time on grain yield

Levels	Split doses and time												Mean
	T_1	T_2	T_3	T_4	T_5	T_6	T_7	T_8	T_9	T_{10}	T_{11}	T_{12}	
L_1	3986	4743	3714	3688	3996	4269	3688	3813	3581	3831	3569	3523	386T
L_2	4136	5005	4234	3776	4422	4680	3758	3940	4041	3990	4168	3648	4150
Mean	4061	4874	3974	3732	4209	4475	3723	3877	3811	3911	3869	3586	—

C. D. (0.05) Split doses and time — 438.4 C. D. (0.05) Levels — 177.3
C. D. (0.05) Interaction - 620.5 N. S.

1000 grain weight. The treatment T2 (0—1/2—1/2) recorded the maximum weight but was on par with T6 (1/4—1/2—1/4) and T5 (1/4—1/4—1/2). T2 was also significantly superior to T9 (1/2—1/4—1/4) the recommended practice.

Similar studies with rice variety *Jaya* direct sown in puddled soil revealed that nitrogen application at active tillering and panicle initiation stages after skipping the basal dose gave maximum grain yields due to increased panicle number and 1000 grain weight (CRRI, 1971).

Grain yield. The mean values are presented in Table 1. From the data it is seen that the treatment T2 (0—1/2—1/2) recorded the highest grain yield of 4874 kg/ha. The second highest grain yield was recorded by the treatment T6 (1/4—1/2—1/4) although T2 and T6 were on par.

This shows that skipping basal application of nitrogen and applying half the nitrogen at active tillering and the other half at panicle initiation stage is the best practice for maximum grain production. The increase in grain production may be attributed to the increases in panicles/m^2, weight of panicle and 1000 grain weight as observed from Table 1. Similar results were reported from the studies at CRRI, Cuttack for direct sown rice in puddled

soil during *rabi* (dry) seasons (CRRI 1970, 1971). With regard to levels of nitrogen it could be seen that 70 kg is superior to 50 kg in grain yield because of its superiority in panicle weight and 1000 grain weight. The table 2 shows that the combination L, T_2 was on par with L_2 T_2. This reveals that the lower level (50 kg N/ha) has almost the same yield as that of higher level (70 kg N/ha) when nitrogen is applied half at active tillering and the other half at panicle initiation stage.

Straw yield. The levels of nitrogen were highly significant in the yield of staw. The higer level L_2 (70 kg N/ha) had given 5975 kg/ha whereas the lower level L_1 (50 kg N/ha) had given 5063 kg/ha.

Summary

The result showed that at harvest there was no significant difference between treatments suggesting that the plant height was made up by the nitrogen supplied at larer stages. The treatment receiving half nitrogen at active tillering and the other half at panicle initiation stage recorded the maximum panicles/m^2. Nitrogen application at later stages especially giving half at panicle initiation has resulted in maximum panicle weight and 1000 grain weight. Skipping basal application of nitrogen and applying half at active tillering and the other half at panicle initiation stage has given the maximum grain yield of 4874 kg/ha.

സംഗ്രഹം

കാർഷിക കോളേജിൽ 1975—'76 ൽ നടത്തിയ ഒരു പരീക്ഷണത്തിൽ നിന്നു്, വിത്തു വിതക്കുന്നതിനോടൊപ്പം നൈട്രജൻ നൽകാതെ നെല്ലിന്റെ ചിനപ്പു പൊട്ടുന്ന arum യത്തും ranslcssisro വരുന്ന സമയത്തും വളം ചേത്താൽ കൂടുതൽ കതിർ കലകളും വിളവും ഉണ്ടാകുമെന്നു കണ്ടു.

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