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STUDIES ON THE RATE AND TIME OF TOP DRESSING NITROGEN FOR RICE VAR. JAYA

M. Paul Mathew and N. Sadanandan

Agricultural College, Vellayani

In recent years, a large number of high yielding, fertilizer responsive varieties of rice have been introduced in Kerala. But the optimum requirements of nitrogen for all these varieties have not been clearly worked out. Similarly the time of application of nitrogen, especially the effect of different quantities of nitrogen applied as top dressing at different stages of growth, has also not been worked out. Therefore, the present investigation was undertaken with a view of finding out the optimum rate and best time of nitrogen application for a high yielding rice variety 'Jaya.'

Materials and Methods

A field experiment was conducted in the farm attached to the Agricultural College and Research Institute, Vellayani, during the first crop season (Viruppu) of 1970-71. The soil of the experimental area was sandy clay with the following analysis: Total nitrogen – 4013 kg per hectare, available phosphorus – 8.39 kg per hectare and available potash – 35.52 kg per hectare, with a pH of 5.5. The experiment was laid out in a confounded factorial experiment in randomized block design with two replications. A uniform dose of 3.6 tons of farm yard manure, 50 kg P_2O_5 and 50 kg K_2O per hectare was applied as basal in all the plots. All treatments except the control received a basal dose of 60 kg nitrogen per hectare. Top dressings of nitrogen were given at three different stages of growth, viz. active tillering (A), primordia initiation (B) and boot leaf (C). Three levels of nitrogen, i.e. 0, 15 and 30 kg per hectare were tried at the three growth phases given above.

Results and Discussion

(i) *Grain yield*

The data on the yield of grain from different treatments are presented in Tables 1 and 2.

The data given in Table 1 show that the application of higher levels of nitrogen at the primordia initiation stage has resulted in a significant increase in yield over those receiving no nitrogen at this stage.

Table 1

Mean yield of grain and straw in various treatments in kg per hectare

Treatment	Yield of grain	Yield of straw
a0, b0, c0.	5033	11066
a0, b0, c1.	5078	8704
a0, b0, c2.	5247	10211
a0, b1, c0.	5434	8681
a0, b1, c1.	5225	12303
a0, b1, c2.	5484	11044
a0, b2, c0.	5175	8187
a0, b2, c1.	6028	11561
a0, b2, c2.	5810	10481
a1, b0, c0.	5106	11651
a1, b0, c1.	4951	8929
a1, b0, c2.	4983	9795
a1, b1, c0.	5006	8447
a1, b1, c1.	5877	10886
a1, b1, c2.	5585	10324
a1, b2, c0.	7580	14170
a1, b2, c1.	5502	12169
a1, b2, c2.	5522	8682
a2, b0, c0.	5601	10065
a2, b0. c1.	5355	9942
a2, b0, c2.	5578	10560
a2, b1, c0.	5286	11043
a2, b1, c1.	5101	8525
a2, b1, c2.	5619	10481
a2, b2, c0.	5859	10942
a2, b2, c1.	6158	14417
a2, b2, c2.	5529	11356
Control 0	4922	7805
C.D. for mean at 5% level	1043	3721
C.D. for treatment Vs control at 5% level	852	3044

(A) Active tillering stage 0, 15 and 30 kg N per hectare denoted by a0, a1, a2.

(B) Primordia initiation stage 0, 15 and 30 kg N per hectare denoted by b0, b1, b2.

(C) Boot leaf stage - 0, 15 and 30 kg N per hectare denoted by c0, c1, c2.

Table 2

Mean yield of grain in kg.per hectare

Levels	A_0	A_1	A_2	Mean
B_0	5120	4897	5511	5175
B_1	5381	5645	5335	5453
B_2	5671	6201	5849	5457
C_0	5215	6064	5582	5620
C_1	5444	5343	5538	5442
C_2	5514	5346	5575	5478
Mean	5391	5584	5565	

Levels	B_0	B_1	B_2	Mean
C_0	5247	5408	6205	5620
C_1	5028	5401	5896	5412
C_2	5248	5562	5620	5478
Mean	5176	5456	5457	

C. D. at 5 percent level

Mean = 247.73 $\overline{B_2\ B_1\ B_0}$

Combination = 602.34

The maximum yield (Table 2) was obtained from the treatment receiving 30 kg of nitrogen per hectare at the primordia initiation stage which was closely followed by treatments receiving 15 kg of nitrogen at the same stage. Application of nitrogen at other stages viz. active tillering and boot leaf had no significant effect on the grain yield of rice. Oshima (1962) reported that for getting higher yields in rice nitrogen must be applied during the first half of the vegetative phase.

The highest yield (Table 1) was obtained from the treatment receiving 15 kg nitrogen per hectare at the active tillering stage, followed by 30 kg nitrogen per hectare at the primordia initiation stage over a basal dressing of 60 kg nitrogen per hectare. In general, top dressing of nitrogen with a basal application was found significantly better than applying nitrogen as top dressing alone.

The primordia initiation stage appears to be the critical stage for top dressing nitrogen, as the higher levels of nitrogen applied at this stage have recorded a significant increase in yield. The yield attributes like number of panicles, the number of grains per panicle and the percentage of filled grains were also the highest in treatments receiving nitrogen at the primordia initiation stage. The increase in yield observed may be due to the fact that most of the nitrogen was absorbed by plants when applied at the primordia initiation stage as reported by Evatt (1964). Similar findings were also reported by Tanaka *et al* (1959 and 1964).

(ii) *Straw yield*

The data on straw yield presented in Tables 1 and 3 show that graded levels and timings of nitrogen application had no significant influence on straw yield. However, top dressing of 30 kg nitrogen per hectare at the primordia initiation stage has resulted in a substantial increase in straw yield over 15 kg and 0 kg levels of nitrogen top dressed at the same stage.

The highest straw yield was recorded by the treatment which received 30 kg of nitrogen per hectare at the active tillering stage, 30 kg of nitrogen per hectare at the primordia initiation stage and 15 kg of nitrogen per hectare at the boot leaf stage over and above the uniform basal dose of 60 kg nitrogen per hectare.

Thus in high yielding varieties top dressed nitrogen does not exert a great influence on straw production. Similar lack of response on straw yield has been reported by Daniel (1969) and Gopalakrishnan *et al* (1970).

Table 3

Mean yield of straw in kg per hectare

Levels	A0	A1	A2	Mean
B0	9994	10125	10189	10103
B1	10676	9885	10016	10193
B2	10076	11507	12239	11274
C0	9311	11422	10669	10468
C1	10856	10495	10961	10771
C2	10579	9600	10800	10327
Mean	10429	10506	10812	

Levels	B0	B1	B2	Mean
C0	10928	9390	11099	10468
C1	9192	10571	12549	10771
C2	10189	10616	10174	10327
Mean	10103	10193	11274	

S. E. at 5 per cent level

Mean = 878.542

Summary

An experiment was conducted at the Agricultural College and Research Institute, Vellayani, during the first crop season (Viruppu) of 1970-71 to study the best time of application and optimum dose of nitrogen for rice, var. 'Jaya'. It was found that 30 kg per hectare applied at primordia initiation stage, in addition to a basal dose gave significant increase in yield of grains. Application of 60 kg nitrogen as basal dose, 15 kg at the active tillering stage and 30 kg per hectare at the primordia initiation stage gave the highest yield.

There was no significant increase in yield of straw by the split application of nitrogen at different stages of growth.

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