

Effect of Association of *Azotobacter* with Nitrogenous Fertilizer on Yield of Paddy

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ABSTRACT

The effect of *Azotobacter* with different levels of nitrogenous fertilizer *viz.*, 50, 62.5, 75, 87.5 and 100 kg N/ha through urea on the yield of paddy was studied. The seeds, seedlings and soil were inoculated with efficient strain of *Azotobacter*. The results of the experiment were statistically significant. The response of *Azotobacter* was also found significant. In each case the application of *Azotobacter* with different levels of nitrogenous fertilizer gave more yield than control. The *Azotobacter* alone gave higher yield over 50 kg N/ha applied as urea. In general, the yield of paddy was found to be increased to the extent of 28 per cent when nitrogen was applied with *Azotobacter*. The data indicated that seed inoculation with *Azotobacter* would reduce fertilizer nitrogen requirement to certain extent.

INTRODUCTION

Among the food crops rice (*Oryza sativa* L.) occupies large area in India. It has been established experimentally that higher doses of nitrogenous fertilizer increase the crop yield. However, recent increase in prices of chemical fertilizer has reduced its use considerably. In order to fill this gap the use of *Azotobacter* was considered. Rangaswami (1975) reported that the addition of *Azotobacter* to paddy crop was found to reduce the requirement of nitrogenous fertilizer by about 20 to 40 kg/ha. Therefore an experiment on paddy with different levels of nitrogenous fertilizer with *Azotobacter* was conducted during 1974-75 in medium-black soil of Poona and the results are presented in this paper.

MATERIALS AND METHODS

A plot of medium-black soil at Manjri near Poona was selected for this purpose. The physico-chemical properties of soil are as follows:-

PH	...	8.2
T. S. S. (mmhos/cm ²)	...	0.33
Ca CO ₃ (%)	...	8.78
O. M. (%)	...	1.31
Total N (%)	...	0.078
Organic C (%)	...	0.76
Available P ₂ O ₅ (%)	...	0.0032
Available K ₂ O (%)	...	0.049
Total exchangeable bases (me/100 g soil)	...	58.25
Textural Class		Clayey

Raising of seedlings: The experiment was conducted in *Kharif* 1975. For this purpose seedlings of paddy variety *Ratnagiri-24* were raised

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on specially prepared seed beds. Seeds were inoculated with the efficient strain of *Azotobacter* developed at the Agriculture College, Poona and uninoculated seeds were sown as control in raised seed beds.

Transplanting: The plots having the size of 5.0 x 4.0 m. were prepared by regular tillage operations and basal dose of farm yard manure at 10 tonnes/ha was applied before transplanting. Besides, 40 kg. P_2O_5 and K_2O /ha each, in the form of single superphosphate and sulphate of potash respectively were also applied at the time of transplanting. For transplanting one month old inoculated and uninoculated seedlings were used. Factorial randomized block design with three replications was used. One additional dose of bacterial culture was applied to soil before transplanting in order to ensure optimum inoculum in the soil.

Nitrogenous fertilizer: A recommended dose of nitrogenous fertilizer in the form of urea was applied in two equal doses. First dose was given at the time of transplanting and the second a month after transplanting.

Treatment details:

- A) Main treatments
 - 1) *Azotobacter*
 - 2) No *Azotobacter*
- B) Sub treatments
 - 1. 0.0 kg N/ha (Control)
 - 2. 50.0 kg N/ha (N 1)
 - 3. 62.5 kg N/ha (N 2)

- 4. 75.0 kg N/ha (N 3)
- 5. 87.5 kg N/ha (N 4)
- 6. 100.0 kg N/ha (N 5)

In all, there were twelve treatments.

The soil was analysed before sowing of crop for the per cent of N and organic carbon and also for *Azotobacter* count. The observations on germination percentage, tillering, height of plant and grain yield of paddy were recorded.

RESULTS AND DISCUSSION

Results of this experiment are presented in Table. Grain yield was statistically significant. All the treatments of *Azotobacter* gave more yield than control with no *Azotobacter*. These data also revealed that there was significant response of paddy to *Azotobacter* inoculation. The application of *Azotobacter* with nitrogen doses also gave higher yield over only nitrogen. Sulaiman (1971) reported that *Azotobacter* inoculation increased the paddy yield approaching the level of significance. However, he did not compare the inoculation treatment with different levels of nitrogen fertilizer. But in the present study, the treatment of *Azotobacter* was compared with various levels of nitrogen fertilizer.

The yield of paddy was found to be increased with increase in dosage of nitrogen fertilizer. The treatment of *Azotobacter* alone gave higher yield over 50 kg N/ha applied in two equal

TABLE. Effect of *Azotobacter* in association with various levels of fertilizer nitrogen on the Yield of Paddy in Ratnagiri 24 variety

N application Kg/ha	Grain yield (Q/ha)		Mean	S. E.	C. D.
	<i>Azotobacter</i>	No <i>Azotobacter</i>			
0.0 (Control)	41.83	33.30	37.58	4.19	12.29
50.0 (N ₁)	55.91	38.08	46.99		
62.5 (N ₂)	61.50	47.33	54.41		
75.0 (N ₃)	64.33	48.00	56.16		
87.5 (N ₄)	66.91	57.75	62.23		
100.0 (N ₅)	71.50	58.16	64.83		
Mean	60.33	47.11			
S. E.	2.42				
C. D.	7.09				

doses. It can be seen from these results that with *Azotobacter* application the yields were comparative to nitrogen fertilizer application. *Azotobacter* is also known to produce growth stimulating substances which might have contributed to the increased yield of paddy. There were no appreciable differences between tillering and germination percentage among the treatments.

Rangaswami (1975) stated that the required fertilizer dose in paddy could be reduced by 20 to 40 kg

N/ha by the application of *Azotobacter*. In the present study also, such reduction in nitrogen doses was observed to certain extent. It may be concluded that seed, seedling and soil inoculation with *Azotobacter* will be beneficial to paddy crop.

REFERENCES

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