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Nutritional Requirement of Dwarf Rices - I. R. 8, and Jaya

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ABSTRACT

A field trial was conducted for the two Kharif seasons of 1969 and 1970 to study the nutritional requirement of two rice varieties - I. R. 8 and Jaya under 3 levels of nitrogen (100, 200 and 300 kg N / ha) and 3 levels of phosphorus (50, 100 and 150 kg P_2O_5/ha). The result indicated that rates of nitrogen and phosphorus influenced the grain yield significantly during both years. The rice variety Jaya outyielded I. R. 8 significantly. The highest yield was recorded with the application of 211.64 kg N/ha whereas the optimum dose was worked out to 166.83 Kg N/ha. Application of phosphorus varying from 50 to 100 kg P_2O_5 / ha improved the grain yield significantly.

INTRODUCTION

Since the evolution of dwarf rices, various attempts have been made at the international as well as national institutes all over the world to work out their nutritional requirements. Such studies indicated that these rices are highly responsive to heavy doses of fertilizer. Recent investigations have shown that as the levels of nitrogen increase from 0-240 kg/ha for high yielding rice varieties there is a corresponding response of these varieties even upto 120 kg P_2O_5/ha (Mahapatra, 1969). Keeping an account to this fact, the present study was planned to see the response of some dwarf rices to high doses of nitrogen and phosphorus during Kharif seasons.

MATERIAL AND METHODS

Two dwarf rices (I. R. 8 and Jaya) were tested at the Bihar Agricultural College, Sabour, under 3 levels of nitrogen (100, 200 and 300 kg N/ha) and 3 levels of phosphorus (50, 100 and 150 kg P_2O_5/ha) for two Kharif seasons of 1969 and 1970 in split plot design keeping nitrogen and phosphorus in main plot and varieties in subplot with three replications. nitrogen as urea (46.4 per cent) was applied half at planting, 1/4 after a fortnight of transplanting and 1/4th at panicle initiation stage. The entire amount of phosphorus 16 per cent single super phosphate) was dressed at planting. Potash @ the 45 kg K_2O/ha was applied as basal dose before transplanting. The soil was sandy loam, with pH 7.1 containing on an average 0.0586 per cent total nitrogen ; 0.0026 per cent available phosphorus and 0.023 per cent available potash.

An examination of the rainfall data (Table 1) clearly brings out the variation in rainfall received during two Kharif seasons of 1969 and 1970 which could be used for explaining the yield differences.

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TABLE 1. Rainfall data during growing seasons of 1969 and 1970

Period	1969	1970
July	421.2 mm	226.3 mm
August	290.3 mm	173.1 mm
September	256.5 mm	229.3 mm
October	12.0 mm	50.0 mm

Courtesy-Meteorological observatory, Rice Research Station, Sabour, Bhagalpur.

RESULTS AND DISCUSSION

Grain yield in q ha: It was observed (Table 2) that nitrogen fertilization boosted the yield significantly during both the years. The application of 200 and 300 kg N/ha increased the grain yield by 10.49 per cent (4.94 q/ha) and 3.61 per cent (1.91 q/ha) respectively over 100 kg N/ha. This fall might be due to toxic conditions produced by the deficiency of Zn which is generally observed when high nitrogen is applied as reported by Jain, 1968. He further pointed out the possibility of antagonistic effect of very high phosphatic fertilisation on the N uptake.

TABLE 2. Grain yield in q/ha as influenced by different treatments

Treatment	Grain yield in q/ha	
	1969	1970
N_{100}	48.42	47.00
N_{200}	53.64	51.66
N_{300}	50.30	48.94
C. D. at 5%	1.21	0.91
P_{50}	53.17	48.13
P_{100}	50.49	50.49
P_{150}	48.70	48.99
C. D. at 5%	1.21	0.91
I. R. 8	49.15	47.26
Jaya	52.43	51.15
C. D. at 5%	0.88	0.78

Phosphorus significantly influenced grain yield during both the years limiting the response upto 50 and 100kg P_2O_5/ha respectively in first and second seasons. The higher doses beyond these caused significant depression in the yield. The prevalence of high moisture in soil as the result of heavy rainfall in first season probably eased the phosphate availability in the soil. Under the conditions of Sabour the transplanted rice is raised generally as rain season crop with some supplementary irrigations. Hence, the rainfall received during growing season had great bearing on the production. Higher rainfall received in 1969 than 1970 created more reduced condition in the soil which resulted into increased availability of added phosphorus. It was generally attributed to the reduction of ferric phosphate to ferrous phosphate on one hand and to the hydrolysis of aluminium and iron phosphate on the other (Fujiwara, 1950; Shapiro, 1958). Hence response beyond 50 kg P_2O_5/ha was not realised during 1969.

Since variety into fertility interaction was not significant, both the varieties manifested same nature and magnitude of response. However, Jaya out yielded I. R. 8 significantly.

Response function: in the present investigation the response of rice yield to nitrogen was found to be quadratic on the basic of mean yield of both years, a response equation derived for nitrogen was $Y = 34.79 + 16.91x - 3.99x^2$ where one unit

of x = 100 kg/ha. The optimum economic dose of nitrogen was found 166.83 kg N/ha whereas the dose for maximum yield was 211.64 kg N/ha.

Since the lowest dose (50 kg P_2O_5/ha) of phosphate gave higher yield in the first season (1969) in contrary to the second season (1970) where response upto 100 kg P_2O_5/ha was seen, the response equation of phosphorus was not meaningful to workout.

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