Madras agric. J. 62 (6): 346 — 348, June, 1975.

Studies on the Quality of IR20 Rice (*Oryza sativa* L.) as Influenced by Fertilization

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ABSTRACT

A field experiment was conducted with four levels of N and three levels of P_2O_5 and K_2O alone and in combination to study their effect on the quality of IR 20 rice. The results showed that the increased application of N increased the crude protein and true protein content of the rice grain. Phosphorus and potassium contents of the grain were increased by the application of phosphorus. Carbohydrate, magnesium and manganese contents of the grain were not influenced by the application of fertilizers.

INTRODUCTION

High yielding varieties are introduced with the main objective of getting better response to fertilizers and increasing yield. But from the nutrition point of view, the quality of crop produce in terms of nutrient content needs to be considered. There is sufficient evidence that N application increases the protein content of the rice grain (Chavan and Magar, 1971; Honyo, 1971 and Krishnasamy *et al.*, 1974). Increased application of P also increased the P and Mg contents in the grain (Krishnasamy *et al.*, 1974). The present investigation was undertaken to study the effect of different levels of N, P_2O_5 and K_2O on the quality of IR 20 rice grain.

MATERIALS AND METHODS

A field experiment was conducted with four levels of N at O, 180, 360 and 540 kg/ha, three levels of P_2O_5 at O, 90 and 180 kg/ha and K_2O at O, 90 and 180 kg/ha alone and in combination to study their effect on the quality of IR20 rice at the wet lands of Tamil Nadu Agricultural University farm, Coimbatore. Nitrogen was applied in the form of urea, P as superphosphate and K as muriate of potash. Half of N and full dose of P_2O_5 and K_2O were applied at planting. The other half of N was applied at the 65th day as top dressing. The crop was harvested and the rice grain was analysed for its nutritive value. The total N content was estimated by Kjeldahl's method and crude protein was arrived at by multiplying by a factor 6.25. The true protein was estimated by using Stutzer's reagent. The total carbohydrate was estimated by the calorimetric method of Somogyl (1952).

RESULTS AND DISCUSSION

The details about the contents of crude protein, true protein, total carbohydrate and the results of statistical analysis are furnished in Table 1.

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TABLE 1. Crude protein, true protein, and total carbohydrate contents in IR 20 rice grain (per cent on moisture free basis)

Treatments	N_0			N_1			N_2			N_3		
	Crude protein	True protein	Total carbohydrate	Crude protein	True protein	Total carbohydrate	Crude protein	True protein	Total carbohydrate	Crude protein	True protein	Total carbohydrate
P_0K_0	4.56	3.52	75.0	8.75	5.32	83.5	8.38	6.19	85.0	9.50	8.32	78.5
P_0K_1	9.81	8.00	75.0	7.69	6.65	83.0	8.38	7.07	83.0	11.56	10.26	85.0
P_0K_2	8.06	6.44	88.0	7.63	6.57	82.0	9.13	7.50	78.0	11.37	10.72	81.0
P_1K_0	8.06	6.32	84.0	9.63	8.76	85.5	10.86	9.13	79.0	9.44	8.76	83.5
P_1K_1	5.65	4.88	80.0	9.06	6.76	70.0	10.50	9.53	87.0	9.81	7.63	86.0
P_1K_2	8.70	6.57	87.5	9.63	7.95	83.0	8.05	6.19	84.0	9.64	7.88	79.0
P_2K_0	7.88	6.00	87.5	8.75	6.19	81.0	8.06	6.32	72.0	10.68	9.63	77.5
P_2K_1	7.50	6.44	84.0	9.13	7.63	84.0	10.50	9.19	83.0	9.40	7.65	80.0
P_2K_2	7.50	5.25	77.0	7.88	6.76	76.0	8.38	6.24	79.0	8.75	6.40	85.0

N_0 = 0 kg/ha
N_1 = 180 kg/ha
N_2 = 360 kg/ha
N_3 = 540 kg/ha

P_0 = 0 kg/ha
P_1 = 90 kg/ha
P_2 = 180 kg/ha

K_0 = 0 kg/ha
K_1 = 90 kg/ha
K_2 = 180 kg/ha

	S. E.	C. D. (5 per cent)
Crude protein	0.46	1.42
True protein	0.33	0.97
Potassium	0.004	0.012
Phosphorus	0.013	0.028
Carbohydrate, magnesium and manganese	Not significant.	

Protein Content : The results revealed that the maximum content of crude protein (10.02 per cent) and true protein (8.58 per cent) of the rice grain was obtained by the application of N at 540 kg/ha. The result revealed the significant influence of N application on the protein content in rice grain. Among N levels, N_3 (540 kg/ha was significantly superior to other levels N_2 (360 kg/ha) and N_1 (180 kg/-ha). It is evident that increase in N dose increases the crude protein as well as true protein content of rice grain. This is in conformity with the results obtained by Chavan and Magar (1971), Honyo (1971), Gupta and Das (1962) and Krishnaswamy *et al.* (1974).

Total Carbohydrate : There is no significant variation in the total carbohydrate content of rice grain and the total carbohydrate was not influenced by any of the treatments. Muthuswamy *et al.* (1973) reported that increased N application did not show any marked effect on the carbohydrate content of high yielding rice varieties.

Content of Nutrient Elements P, K, Ca, Mg and Mn : The results showed that maximum content of P (0.27 per cent) and K (0.22 per cent) in grain was obtained by the application of P at 180 kg/ha. Significant increase in the P and K contents was observed by the increased application of P. Similar results were obtained by Basak *et al.* (1961) and Krishnasamy *et al.* (1974) in the rice grain. Nitrogen application also significantly increased the P content of the grain and 180 kg N/ha registered maximum P content in the rice grain. Calcium, Mg and Mn contents in the rice grain were not influenced by the application of nitrogenous and potash fertilisers. Phosphorus in combination with K or N significantly influenced the Ca content in the rice grain.

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