

## THE EFFECT OF DIFFERENT NPK FERTILIZERS ON THE GROWTH AND YIELD OF RICE VARIETY IRRI-6

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Fertilizers as a source for N, P and K were applied to a crop of rice, IRRI-6, at the rate of 135-0-0, 135-66-0 and 135-66-66 kg/ha. on a sandy loam soil against control. The whole of P and K was applied at transplanting, whereas N was applied in two splits-66 kg/ha, the time of transplanting and the rest 55 days after transplanting. All fertilizer treatments increased significantly the grain yield over control due to their beneficial effects on panicle bearing tillers and the number of grains per panicle. Within N, P and K combinations comparable results were obtained. Addition of K along with N and P resulted in the maximum increase of 26 quintals of paddy per hectare over control. Addition of P at high levels of N did not bring about significant increase in yield over that of the application of nitrogen alone.

### INTRODUCTION

Rice is one of the most important cereal crops of our country and is also a major source of foreign exchange earning. It is grown on an area of 19.72 million ha. with an annual production of over 3 million tons. The present yield level is far below the levels attainable with the application of modern agro-techniques in developed countries of the world. Among these agro-techniques, the judicious application of fertilizer plays a vital role in enhancing the yield of crops. Khan *et al.* [2] reported that the application of N, N+P<sub>2</sub>O<sub>5</sub> or N + P<sub>2</sub>O<sub>5</sub> + K<sub>2</sub>O each at 30 lb/acres increases the yield of Basmati-370 by 54.8%, 64.9% and 85.9% respectively and those of Jhona-349 by 39.3% 47.9% and 54.3%. The yield and yield components of rice like panicle number, grain number and fertile grains were increased significantly by the application of N, H<sub>3</sub>PO<sub>4</sub> and K alone or in combinations [9]. K application in 4 equal split dressings increased the rice yield up to 32% by reducing the sterile tillers and increasing the panicle number per hill [3]. Munegowda *et al.* [4] obtained the highest yield of 5.41 ton/ha. in IR-8 and 3.53 ton/ha. in S 701 by the application of NPK. They further reported that NP and NPK increased the number of fertile tillers/hill as compared with N or P applied alone. Novais *et al.* [5] obtained maximum paddy yield (4.49 ton/ha.) by applying 120 kg. N + 120 kg. P<sub>2</sub>O<sub>5</sub> + 60 kg. K<sub>2</sub>O/ha. as compared to that of the control (2.8 ton/ha.). However, the growth and yield of rice were not affected significantly by the application of K. According to Raj and Morachan [8], Padalia [6] and Dixit and

Singh [1] paddy yields were not affected significantly by the rates or kinds of fertilizers. Tripathi and Agrawal [10] reported that the application of 120 kg N + 60 kg. P<sub>2</sub>O<sub>5</sub> + 60 kg. K<sub>2</sub>O/ha. increased the yield of paddy by 19-50% from 9.37 tons/ha. in the control by increasing the number of productive tillers/plant, panicle length, grains/panicle and 100-grain weight. Keeping these contradictory results in view, studies were undertaken to obtain accurate and reliable information about the response of rice to various fertilizer combinations.

### MATERIALS AND METHODS

The investigations to ascertain the effects of IRRI various NPK combinations on the growth and yield of IRRI-6 were carried out at the Agronomic Research Area, University of Agriculture, Faisalabad. The experiment was quadruplicated in a randomized complete block design. The various NPK combinations, applied to IRRI-6, grown on a sandy loam soil, were 66-0-0, 66-0 and 66-66-66 kg./ha. against control in the form of urea, nitrophos and NPK at the time of sowing. These were supplemented with 69 kg. N/ha. fifty five days after transplanting in the form of urea. Observations were recorded on plant height, total tillers, panicle bearing tillers, grains/panicle and grain weight. The data were analysed statistically by the analysis of variance method and Duncan's Multiple Range test at 5% probability was used to compare the treatment means.

## RESULTS AND DISCUSSION

As is evident from the data presented in Table 1, all fertilizer treatments increased significantly the paddy yield of IRRI-6 over the control. The differences between nitrogen and nitrogen + P<sub>2</sub>O<sub>5</sub> could not reach a level of significance. However, the addition of 66 kg. K<sub>2</sub>O/ha along with 135 kg. N + 66 kg. P<sub>2</sub>O<sub>5</sub>/ha. resulted in maximum increase of 26.04, 10.43 and 8.29 quintals of

As regards plant height all fertilizer applications produced significantly taller plants than the control. Within the fertilizer applications, N and NPK both remaining at par with NP differed significantly with each other. The results are contrary to those of Pande *et al* [7]. Increase in height noticed with NPK application might be due to more balanced nutrition of the plants.

Measurable differences in grain weight were not obtained by fertilizer combinations. The thousand grain

Table 1. Effect of different NPK fertilizers on the growth and yield of rice variety IRRI-6

NPK fertilizer	Plant height (cm)	Total tillers/hill	Panicle bearing tillers/hill	Grains/panicle	Thousand grains wt(g)	Grain yield in quintals/hectare.
0+0+0	72.41C	15.11C	13.19C	105.13b	23.63 N.S.	33.93C
135+0+0	72.26b	21.53b	18.52ab	105.06b	24.13	50.68b
135+66+0	79.68ab	21.18b	17.34b	113.63a	24.21	49.54b
135+66+66	82.87a	25.24a	21.16a	111.66a	24.02	59.97a

i. Any two means not sharing a letter in common differ significantly at 5% probability. ii. N.S. (non-significant).

paddy/ha. over control, (N and N + P<sub>2</sub>O<sub>5</sub> respectively). This increase in yield might be due to a more balanced nutrients availability. Favourable effects of K<sub>2</sub>O and rice yield had also been substantiated by Khan *et al.* [2], Kim and Park [3], Shibata *et al.* [9], Novais *et al.* [5] and Tripathi and Agrawal [10] while contrary results were reported by Pande *et al.* [7], Raj and Morachan [8], Padalia [6] and Dixit and Singh [1]. The controversial results might be due to differences in the initial fertility status of the fields to be rice grown on. The trend in paddy yield was reflected in the total tillers per hill almost in the same order. All fertilizer applications produced significantly more panicle bearing tillers per hill than control.

Application of NPK producing the maximum tillers per hill (21.16), remained at par with nitrogen alone which in turn was at par with NP. The results are lent strong support by those of Shibata *et al.* [9], Munegowda *et al.* [4], Pande *et al.* [7], Tripathi and Agrawal [10].

The number of grains per panicle, a major yield component, was also affected significantly. The application of NP and NPK remaining at par with each other produced significantly more grains per panicle than N alone and control, which in turn did not differ significantly. Similar results have also been reported by Tripathi and Agrawal [10].

weight varied from 23.63 g. in the control to 24.21 g. in the case of NP. However, Tripathi and Agrawal [10] observed significant differences due to fertilizer application.

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