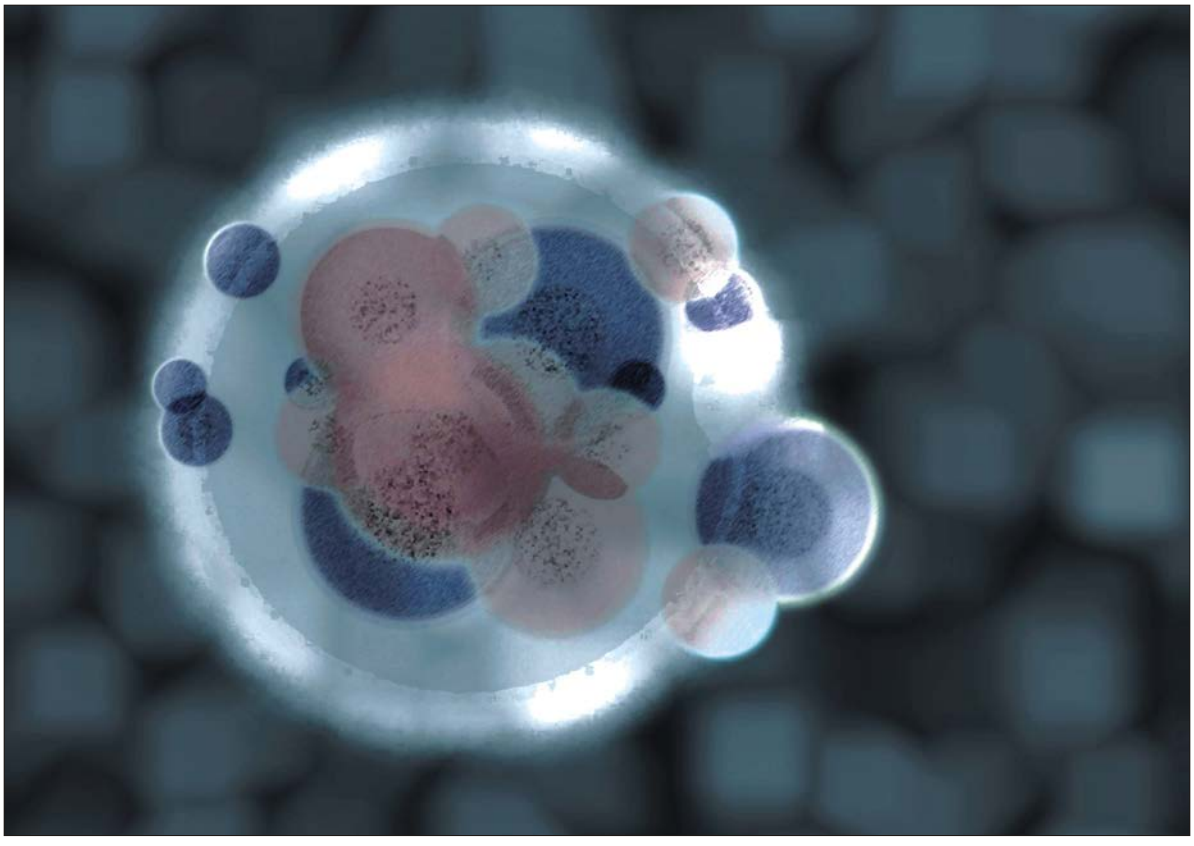

Journal of Biological Sciences

ISSN 1727-3048

science alert

ANSInet
an open access publisher
http://ansinet.com

OnLine Journal of Biological Sciences 1 (4): 291-292, 2001

Growth and Yield of Rice (Basmati-385) as Influenced by Different NP Levels

M. Maqsood, M. Naveed Akhtar, Aftab Wajid and Shakeel Ahmad
Department of Agronomy, University of Agriculture, Faisalabad, Pakistan

Abstract: In a field trial the effect of different levels of nitrogen and phosphorus on growth and yield of rice (Basmati-385) was studied at the Agronomic Research Area, University of Agriculture, Faisalabad. The results indicated that number of tillers per hill were not markedly influenced by the application of different levels of NP kg ha^{-1} and all the treated plots produced same per hill tillers as that of control. The treatment F_4 (100-80 kg NP ha^{-1}) produced maximum panicle bearing tillers and maximum normal kernels were produced by the treatment F_5 (120-100 kg NP ha^{-1}). The various levels of NP significantly influenced the 1000-grain weight and paddy yield over the control. The treatment F_5 (120-100 kg NP ha^{-1}) is the most beneficial to obtain higher yield under the given conditions.

Key words: Growth, Yield, Rice, NP levels

Introduction

The total area under rice is 2.25 million hectares with production potential of 4.31 million tonnes. This shows an increase of 15.1 percent over last year. Pakistan is earning rupees 5,400 million foreign exchange annually through the export of Basmati rice (Government of Pakistan, 1996). Fancy dishes are prepared from rice on different ceremonial occasions. Rice is important not only from the point of view of its value as an agricultural commodity but also a symbol of special prestige on wedding and other social ceremonies. The central rice problem is, therefore, to improve both its production and quality. Efforts are continuously underway to improve its yield and quality. Inspite of all efforts, the yield of this crop for the last years has not increased to the desired extent. Judicious use of fertilizer can contribute a lot to increase the yield and quality of rice (Place *et al.* 1970) and according to Mahapatra (1971) proper fertilizer can bring about a break through in rice production.

The present study was, therefore, envisaged to know the most appropriate and economical rate of nitrogen and phosphorus fertilizers to improve the yield of rice, Basmati-385.

Materials and Methods

The present study was carried out to evaluate the effect of nitrogen and phosphorus fertilizers in various combinations on the growth and yield of fine rice (Basmati-385). The experiment was conducted at Agronomy Research Area, University of Agriculture, Faisalabad. The experiment was laid out in Randomized Complete Block Design with four replications. There were six plots in each replication, each having a gross plot of 2 m × 3 m. Nursery was raised according to standard practices and 30 days old seedlings were transplanted to a well-prepared seed bed and in standing water on July 20, 1997. The distance between the rows and the hills was maintained 25 cm × 20 cm in each plot. All agronomic operations except those under study were kept normal and uniform for al the treatments. The treatments included in the experiment were as follows. F_0 0-0, F_1 40-20, F_2 60-40, F_3 80-60, F_4 100-80 and F_5 120-100, respectively. Urea and single super phosphate were used as a source of nitrogen and P_2O_5, respectively. All phosphorus was applied at transplanting whereas 1/3rd nitrogen was applied at first irrigation and remaining 2/3rd nitrogen was applied at fourth irrigation. The crop was harvest in the first week of November and following observations were recorded.

Plant height at maturity (cm)
Number of productive tillers $hill^{-1}$
Normal kernels $panicle^{-1}$
1000-grain weight (g)
Grain yield (t ha^{-1})
Harvest index (%)

The harvest index was calculated by using the following formula.

$$H.I. = \frac{\text{Economic yield}}{\text{Biological yield}} \times 100$$

The data pertaining to various characters under study ware analysed statistically using Fisher's Analysis of Variance Technique and least significant difference test was applied at 5% probability level to determine the difference among treatment means (Steel and Torrie, 1984).

Results and Discussion

Plant height: It is clear from the data that plant height was not significantly affected by application of different levels of fertilizer (Table 1). All the NP treatments were statistically at par in plant height including control treatment. The maximum plant height (136.00 cm) was observed in F_3 (80-60 kg NP ha^{-1}) treatment whereas minimum height (130.25 cm) was found with F_1 (40-20 kg NP ha^{-1}) treatment. These findings differ from those of Place *et al.* (1970).

Panicle bearing tillers: Panicle bearing tillers were also not affected by different levels of fertilizer. All the fertilizer treatments did not enhance much panicle bearing tillers over control. The maximum number of panicle bearing tiller were produced in F_4 and F_5 treatments which are not significantly different from one another, as well as from other treatments. This may be attributed due to the non availability of nitrogen and phosphorus at the plant growth stage prior to panicle. These results are in contrast with the findings of Jamal (1987).

Normal kernels: Normal kernels were significantly affected by the use of different levels of N and P. An increasing trend was found in treatments, F_3 and F_5 followed by treatments F_2 and F_4. All treated plots resulted in more normal kernels as compare to control. Normal Kernels were 101.70 in F_0, 110.90, in F_1, 116.15 in F_2, 121.50 in F_3, 115.35 in F_4 and 131.90 in F_5, respectively.

Table 1: Growth and yield of rice (Basmati-385) as influenced by different NP levels

Treatment		Plant height (cm)	Number of Productive tillers hill^{-1}	Normal kernels panicle^{-1}	1000-grain weight (g)	Grain yield plot^{-1} (t ha^{-1})	Harvest index (%)
NP levels (Kg ha^{-1})							
F_0	0-0	130.70	9.70	101.70 c	15.95 c	3.33 c	22.92
F_1	40-20	130.25	10.60	110.90 bc	18.10 b	3.95 bc	23.22
F_2	60-40	130.30	10.35	116.15 bc	18.40 ab	4.16 bc	24.48
F_3	80-60	136.00	10.50	121.50 ab	18.95 ab	5.00 ab	25.04
F_4	100-80	132.65	11.30	115.35 bc	19.15 ab	4.58 bc	21.98
F_5	120-100	134.30	11.25	131.90 a	20.10 a	6.25 a	25.45

Any two means not sharing a letter differ significantly at 5% level of probability

This may also be pointed out here that the total number of kernels and normal kernels on a panicle are two different factors which may contribute differently to the final yield under the given conditions.

1000-grain weight: The average grain weight has a direct bearing on the final grain yield of cereal crops. The data regarding 1000-grain weight given in Table 1 indicated that 1000-grain weight was significantly affected by different levels of NP. All fertilizer treatments produced more 1000-grain weight over control (F_0). The treatment F_5 (120-100 kg NP ha^{-1}) produced the maximum 1000-grain weight (20.10 g) which was not significantly different from treatments F_4, F_3, F_2 and F_1. Such indications have already been reported by Dixit and Patro (1994).

Grain yield per plot: The grain yield of a crop is function of the multiple internal and external factors prevailing in and around the plant. The data reveal that the paddy yield per plot was increased significantly by the various NP combinations over check. However, within the NP combinations, a significantly higher paddy yield (6.25 t ha^{-1}) was obtained in plots receiving 120-100 kg ha^{-1} than the plot receiving 40-20, 60-40 and 80-100 kg ha^{-1}. The higher paddy yield in case of 120-100 kg NP ha^{-1} was probably due to significantly higher number of filled grain and kernel weight per panicle. This resulted to the conclusion that for a soil having initial productive potential of 3.33 t ha^{-1} of paddy yield and 0.036% nitrogen and 16.3 ppm available P_2O_5, a fertilizer dose of 120-100 kg ha^{-1} is required to raise the paddy yield to the level of 6.25 t ha^{-1}. The results confirm the findings of Pande *et al.* (1993).

Harvest index: It can be seen from the data that the maximum harvest index (25.46%) was obtained in treatment F_5 (120-100 kg NP ha^{-1}) which was not significantly different from all other fertilizer rates including control. The lower harvest index (21.98%) was obtained in treatment F_4 (100-80 kg NP ha^{-1}). More harvest index value in treatment F_5 (120-100 kg NP ha^{-1}) may be attributed to more paddy yield in this treatment. These results confirm the findings reported by Lopez *et al.* (1985).

References

Dixit, U.C. and N. Patro, 1994. Effect of levels of NPK, Zn and plant density on yield attributes and yield of summer rice. Orissa Univ. Agric. Technol. India, 12: 72-74.

Government of Pakistan, 1996. Economic survey of Pakistan. Ministry of Finance, Economic Advisor Wing, Islambad, Pakistan.

Jamal, M.A., 1987. Effect of NP levels and per hill seedings on the kernel ripening and yield of fine rice, Bas-370. M.Sc. Thesis, Departmant of Agrononmy, Agriculture University, Faisalabad, Pakistan.

Lopez, N.R., B.G. Urbano and M. Pervez, 1985. Effect of different rates of NPK application on rice during spring season. Suelosy Agroguimica, 8: 39-51.

Mahapatra, I.C., 1971. Proper fertilizer use can bring about a break through in rice production. Indian Farm., 20: 12-13.

Pande, N.C., R.N. Samantaray, P. Mahapatra and S.K. Mohantry, 1993. Effect of optimal and sub optimal nutrient management on yield and nutrient uptake by rice in submerged soil. J. Indian Sci. Soil Sci., 41: 90-95.

Place, G.A., J.L. Sims and V.L. Hall, 1970. Effects of nitrogen and phosphorus fertilization on growth, yield and cooking characteristics of rice. Agron. J., 62: 239-241.

Steel, R.G.D. and J.H. Torrie, 1984. Principles and Procedures of Statistics. 2nd Edn., McGraw Hill Book Co. Inc., Singapore, pp: 172-178.