

YIELD AND YIELD ATTRIBUTES OF FINE RICE BAS-385 AS AFFECTED BY DIFFERENT NP LEVELS ON FARMERS' FIELD.

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A field study was conducted to investigate the effect of different NP levels i.e., 0-0, 25-0, 50-25, 75-50, 100-75 and 125-100 kg ha⁻¹ on yield and yield attributes of rice Bas-385. Yield attributes (No. of effective tillers per hill, spikelets per panicle, normal kernels per panicle, 1000-grain weight) were improved linearly with increasing NP levels up to 100-75 kg/ha. The NP level of 100-75 kg ha⁻¹ resulted in the highest grain yield of 4.53 t ha⁻¹ with minimum kernel abnormalities (Sterility, abortive kernels and opaque kernels) as against the minimum of 2.356 t ha⁻¹ in the control (0-0) followed by 25-0 kg NP ha⁻¹ with maximum kernel abnormalities.

INTRODUCTION

Rice is the staple food of teeming millions in South East Asia. Its productivity in this region is the lowest in the world. In Pakistan, rice occupies second position after wheat. Production of rice is an effective weapon for increasing the national income. But a big yield gap exists between the potential and actual yield being obtained by the farmers. The production can be increased 2-3 times with use of recommended production technology and judicious use of artificial fertilizers.

Besides many factors ill ripening of rice is one of the major causes of low yield, which occurs due to lack of plant nutrients (Nagato and Chaudhry, 1969). Application of fertilizer helps in increasing the rice yield as well as grain quality but the use of fertilizer either in excess or less than optimum rate deteriorates both yield and quality of rice to a remarkable extent (Asif et al., 1997). The present study was, therefore, designed to find out the most suitable and appropriate combination of fertilizers to enhance the productivity and quality of rice under conditions prevailing at Toba Tek Singh.

MATERIALS AND METHODS

The study was conducted at the demonstration center of On Farm Water Management, Toba Tek Singh during the year 2001 to determine the effect of Nitrogen (N) and phosphorus fertilizer in various combinations on the yield, yield attributes and quality of fine rice Bas-385. The experiment was laid out in a RCBD design with four replications having a net plot size of 2x3 m. The nursery was sown in the last week of May and transplanting was done in the first week of July. The treatments comprised of F₀ (0-0), F₁ (25-0), F₂ (50-25), F₃ (75-50), F₄ (100-75) and F₅ (125-100) NP kg/ha. All the phosphorus in the form of single super phosphate was applied at transplanting of seedlings. The remaining 1/3 N at panicle initiation was applied. All other cultural practices other than under study were kept normal and uniform for all the treatments. Twenty-five hills were selected for recording the observations on plant height, panicle bearing tillers, number of spikelets per panicle etc. A common electric table lamp and counting board were used to see the occurrence of sterility, abortiveness and opaqueness in panicle using the standard methods (Nagato and Chaudhry, 1969). The data pertaining to various characters under study

were analyzed statistically using fishers Analysis of Variance Techniques and Duncan's New Multiple Range Test was employed at 5% probability level to determine the difference among the treatment means (Steel and Torrie, 1984).

RESULTS AND DISCUSSION

Data regarding plant height presented in Table 1 revealed that the plant height was significantly affected by the application of different levels of fertilizer. All the fertilized plots resulted in significantly more plant height than the control. However, the maximum plant height was recorded in F₄ treatment (100-75 kg NP/ha) that did not statistically differ from F₅ (125-100) and F₂ (50-25). Singh and Sharma (1993) reported similar results. The maximum number of effective tillers per hill (8.58) was produced in the treatment F₄ which was at par with F₅ (8.17). This might be attributable to more availability of NP during the plant growth stages prior to panicle initiation as compared to F₀, which produced the minimum number of effective tillers. These results are in conformity with those of Chandra and Mishra (1991).

Table 1. Yield and yield attributes of fine rice Basmati-385 as affected by different NP levels.

Treatments (kg NP/ha ⁻¹)	Plant height (cm)	Effective tillers/hill	Spikelets/ Panicle	Sterility (%)	Abortive kernels (%)	Opaque kernels (%)	Normal kernels (%)	1000- grain wt. (g)	Paddy yield (t/ha)
F ₀ (0-0)	95.71 c*	3.81 c*	187.0 d*	14.13	3.60	1.08	81.02	18.7 bc*	2.35 e*
F ₁ (25-0)	101.14 b	5.71 b	201.6 c	14.51	4.12	1.16	80.38	19.7 ab	3.11 de
F ₂ (50-25)	101.63 ab	6.00 b	234.6 b	13.54	3.98	0.76	83.34	19.5 b	3.57 bcd
F ₃ (75-50)	101.41 b	6.58 b	235.32 b	13.04	3.64	0.81	82.58	20.06 ab	3.67 bc
F ₄ (100-75)	103.4 a	8.58 a	241.7 a	11.18	3.07	0.80	84.75	20.62 a	4.53 a
F ₅ (125-100)	103.35 a	8.17 a	242.8 a	10.40 NS	3.62 NS	1.24 NS	82.29 NS	20.3 a	3.79 b

* = Any two means in a column not sharing a letter differ significantly at $P \leq 0.05$.
NS = Non-significant

Data pertaining to spikelets per panicle (Table 1) indicated that the spikelets per panicle were markedly affected with the application of different levels of NP. Treatments F₄ and F₅ produced significantly more number of spikelets per panicle than all other NP combinations. Similar results have been reported by Asif et al., 1997.

Data regarding sterile, abortive, opaque and normal kernels are presented in Table 1. Sterile spikelets are those which do not get fertilized at all. Abortive kernels are those, which get fertilized but stop growing during an early stage of kernel development and do not attain full size. Opaque kernels are those that get fertilized, attain full size but do not become translucent due to shortage of carbohydrates during later kernel development stages. It is evident from the data (Table 1) that the different combinations of NP did not affect the occurrence of sterile spikelets, opaque kernels, abortive and normal kernels to a significant level. However, slightly more sterile and abortive kernels were recorded in F₁ as compared to rest of the treatments. Similar results were reported by Khan and Chaudhry (1995) and Anonymous (1994).

Compactness of grain has a direct bearing in the grain yield of cereal crops. Data on 1000-grain weight (Table 1) clearly indicated that although significantly higher 1000-grain weight was obtained in treatment F₄ (100-75 kg NP ha⁻¹) than F₂ (50-25 kg NP ha⁻¹) but it did not differ significantly from F₅, F₃ and F₁ treatments.

Data regarding grain yield (Table 1), revealed that the paddy yield per hectare was significantly increased by the application of different NP levels over F₁ & F₀. However, NP combination F₄ (100-75 kg NP ha⁻¹) produced the maximum paddy yield of 4.53 t ha⁻¹ followed by F₅ (125-100 kg NP ha⁻¹), F₃ (75-50 kg NP ha⁻¹) and F₂ (50-25 kg NP ha⁻¹) which produced 3.79, 3.76 and 3.57 t ha⁻¹, respectively.

Higher paddy yield in F₄ (100-75 kg NP ha⁻¹) was attributed to significantly higher number of normal kernels (filled grain) with the minimum kernel abnormalities (sterility, abortiveness and opaque kernels). It is thus concluded that for a soil having an initial productive potential of 2.35 t ha⁻¹, a fertilizer dose

of 100-75 kg NP ha⁻¹ is required to raise the paddy yield to the level of 4.53 t ha⁻¹. These results are in conformity with those of Mahanty and Maity (1992) and Panda et al. (1993).

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