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THE GROWTH AND YIELD OF RICE CULTIVAR IRRI-6 AS INFLUENCED BY PLANTING DENSITY

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The rice cultivar IRRI-6 was grown at spacings of 15 x 15, 20 x 20, 25 x 25, 30 x 30 and 40 x 40 cm between hills and rows to evaluate their effects on growth, yield and yield components. Increased spacing significantly increased the number of total as well as panicle bearing tillers per hill and the number of grains per panicle. The plant height, 1000 grain weight and grain yield were not affected significantly by the spacing tried. The maximum grain yield of 62.33 quintals/hectare was obtained by growing rice cultivar IRR-6 at spacing of 20 x 20 cm. between hills and rows.

INTRODUCTION

Rice is the principal food crop of nearly half of the people of the world. Its yield per hectare in our country is far below the levels obtained in other rice growing countries. spacing is an important agronomic factor which greatly influences the micro-climate of the field and eventually the yield of agricultural crops. Rumiati and Oldman [9] reported that the number of tillers and panicles per hill and the number of filled grains per panicle decreased with increasing planting densities, while 1000 grain weight was increased significantly. Population density had no significant effect on grain yield of rice [8]. Similar paddy yield of cultivar Aswathi and Triveni was obtained by growing rice at five different spacings [4]. Lin *et al.* [7] reported that yield were increased generally with decreased spacings. Similarly Shukla and Anjaneyulu [11] obtained significantly higher yields by growing two rice variaties at 10 x 10 and 10 x 15 cm. than growing at 15 x 15, 15 x 20 and 20 x 20 cm. According to Akita [1] increasing plant densities decreased the number of panicles and grains per plant. Grain yield was reduced with increasing plant densities. Increase in seeding rate increased the panicle number but did not affect grain yield [6]. Rice grown at a spacing of 10 x 10 cm gave higher grain yield than that grown at wider spacing [10]. But Bhosale *et al.* [3] showed that a spacing of 20 x 20 cm produced significantly more rice yield than a spacing of 20 x 15 and 15 x 15 cm. Ghobrial [5] obtained more panicles/m^2 and fewer grains per panicle at closer spacings. But the differences in paddy yield due to different spacings were non-significant.

Increase in spacing significantly increased the number of panicles, 1000 grain weight and grain yield per hill. 20 x 20 cm spacing yielded significantly more yield per plot than 15 x 15 and 25 x 25 cm spacing [2]. Keeping these contradictory results in view studies were undertaken to determine the optimum planting density for rice IRRI-6.

MATERIALS AND METHODS

Investigations, to study the effect of planting density on growth and yield of rice IRRI-6 were carried out at the Agronomic Research Area, University of Agriculture, Faisalabad. The experiment was quadruplicated in randomized complete block design with a net plot size of 6 x 6 m. Six-week old seedlings were transplated at distances of 15 x 15, 20 x 20, 25 x 25, 30 x 30 and 40 x 40 cm between hills and rows with an average of two seedlings per hill on 9 July, 1983. The fertilizers were applied at the rate of 135 kg N + 66 Kg P_2O_5 + 66 kg K_2O/hectare. Whole of P and K were applied at the time of transplanting, whereas nitrogen was applied in two splits 66 kg/ha at the time of transplanting and the rest 55 days after transplanting. Standard cultural practices were carried out till the crop matured. Ten hills per plot were selected at random for detailed observations on different plant characteristics such as plant height, total and panicle bearing tillers per hill, number of grain per panicle and 1000 grain weight. The paddy yield was obtained by cutting and threshing the entire crop of the net plot of every treatment in each replication. The yield was then calculated on hectare basis. The data were analysed statistically by the analysis of varience method and Duncan's Multiple Range test at 5% probability was employed to compare the treatment means.

Table. Effect of different spacings on yield and yield components of rrice variety IRRI-6.

Spacing between hills and rows (cm)	Plant height (cm)	Total tillers per hill	Panicle bearing tillers/hill	Grains/panicle	Thousand grain wt. (g)	Grain yield quintals/ hectare
15 x 15	120.87 N.S	13.12 d	11.57 c	145.2 d	23.45 N.S.	60.35 N.S.
20 x 20	122.32	15.75 d	14.55 c	153.27 c	24.12	62.33
25 x 25	125.27	24.02 c	20.87 b	165.12 b	23.75	59.07
30 x 30	126.27	31.25 b	25.47 b	168.8 b	23.75	58.25
40 x 40	127.82	40.62 a	36.72 a	197.2 a	23.52	60.07

(i) Means followed by different letters in the same column are significantly different from each other at 5% level of significance.
(ii) N.S. (non significant).

RESULTS AND DISCUSSIONS

It is evident from the data presented in the Table that spacing between hills and rows had no significant effect on plant height. Plant height varied from 120.87 in the 15 x 15 cm spacing to 127.82 cm in 40 x 40 cm spacing. There had been an increasing trend in the plant height by reducing the plant population. Total tillers per hill were affected significantly by the planting densities. 40 x 40 cm spacing produced significantly mote total tillers per hill than all other spacings. However, the differences between 15 x 15 cm and 20 x 20 cm spacing were non-significant. While the rest of the treatments differed significantly from one another. The results have been lent strong support by Rumiati and Oldman [9].

The trend of total tillers per hill was reflected in the panicle bearing tillers per hill almost in the same order. 40 x 40 cm spacing produced significantly the highest number of panicle bearing tillers per hill. 15 x 15 cm spacing not differing significantly with 20 x 20 cm produced the least number of panicle bearing tillers per hill and 25 x 25 and 30 x 30 cm spacing did not differ significantly with each other. The results are quite in line with those of Rumiati and Oldman [9], Akita [1], Lin, *et al.* [7] and Bari *et al.* [2]. The number of grains per panicle was affected significantly by various planting densities, viz., 15 x 15 and 40 x 40 cm spacing produced significantly the least and the maximum grain number per panicle respectively, whereas, non-significant differences were observed between 25 x 25 and 30 x 30 cm spacing. Similar results were also been reported by Rumiati and Oldman [9], Akita [1] and Bari *et al.* [2]. 1000 grain wt. was not affected significantly by the spacing. Grain weight varied from 23.45 to 24.12 g. in the case of 15 x 15 and 20 x 20 cm spacing respectively. The results are contrary to those of Rumiati and Oldman [9] and Bari *et al.* [2] who observed an increase in 1000 grain wt with increase in spacing.

Grain yield depends on individual plant performance as well as the total number of plants grown on the area. It is evident from the table that planting density had non significant effect on grain yield. The maximum grain yield of 62.33 quintals per hectare was obtained by transplanting rice at 20 x 20 cm spacing. Although the performance of individual plants grown with wider spacing was better as compared to the plants with narrower spacing, higher plant population in narrower spacing counteracted the beneficial effects of increased panicle bearing tillers per plant and grain number per panicle. The number of hills per hectare in the studies reported here were 444444, 250000, 160000, 111111 and 62500 in 15 x 15, 20 x 20, 25 x 25, 30 x 30 and 40 x 40 cm spacing respectively and the corresponding yields were 60.35, 62.33, 59.07, 58.25 and 60.07 quintals per hectare. On the basis of these data it was concluded that a spacing of 20 x 20 cm between hills and rows is the most suitable for obtaining optimum grain yield for IRRI-6. The results are lent strong support by Rumiati and Oldman [9], Devi *et al.* [4] and Ghobrial [5] while, contrary results were reported by Lin *et al.* [7], Shukla and Anjaneyulu [11], Akita [1], Bhosale [3] and Bari, *et al.* [2] obtained varying yields under different planting densities.

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