B-46: Effect of seed rate and nitrogen level on growth and yield of short age rice under direct sowing irrigated systems

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A field experiment was conducted at Paranthan Rice Research Station, Kilinochchi during Yala 1994 using short age rice variety co-10 (3 ½ month) under direct sowing irrigated condition with the following objectives:

(a) To study the effect of different plant population on yield components.
(b) To study the effect of nitrogen on effective tiller production.
(c) To study whether or not the high level of Nitrogen application with low plant population, could compensate the high plant population effect.
(d) To determine the optimum nitrogen level and seed rate to increase the yield.

An experiment was carried out at Paranthan Paddy Research Station during Yala in a Randomised complete block design with 4 seed rate levels of 100, 150, 200, 250 kg/ha in combination with 3 nitrogen levels of 75,100 and 125 kg/N/ha. Total of 36 plots consisting of 12 treatments were randomised to 3 replicates. Short age variety of co.10 belonging to 36 month age group was used in this experiment.

Phosphorus and potassium applied in this experiment was fixed based on the recommendation of the Dept. of Agriculture for lowland rice. Phosphorus 22 kg ha^{-1} (applied in the form of triple super phosphate) Potassium 22 kg ha^{-1} (applied in the form of muriate of potash). Nitrogen was applied according to the treatment in the form of ammonium sulphate. Twenty percent was applied as basal and 80% was given in 2 equal doses at 5th and 8th week. Weeds were efficiently controlled with 2 hand weedings at 3rd and 8th week.

Growth parameters such as initial plant populations, plant height at active and flowering stages, leaf area index at flowering stage, number of tillers at active and maximum tillering stages and effective tiller numbers were recorded. Yield components such as number of panicles/m^2, spikelet

number/panicle, filled spikelet percentage and 1000 grain weight were also recorded. Further, grain yield at 13% moisture level was also recorded. The data obtained was statistically analysed by using analysis of variance method. When significant result was found, LSD was worked out to compare the means.

It was found that the basic plant population increased significantly with the increasing seed rate. Plant population of 197 and 440/m^2 were recorded with the seed rate of 100 and 250 kg/ha respectively. Tiller production was not significantly influenced either by seed rate or nitrogen level. On an average 3 tillers per plant were recorded for varing seed rate and nitrogen level.

Leaf area index (LAI) was increased by both seed rate and nitrogen level. LAI of 7.2 was obtained with the seed rate of 200 kg/ha. Increasing seed rate from 200 to 250 kg/ha increased the LAI to 8.12, but failed to increase the grain yield significantly. This indicates that the leaf area index of 8.12 is more than the optimum to intercept 95% incoming solar radiation for maximum yield. However increasing nitrogen level upto 125 kg/ha increased LAI significantly. LAI of 7.62 was recorded with 125 kg/ha nitrogen level. This could be attributed to the expansion of leaf area.

Number of panicles/m^2 increased with increasing seed rate to 250 kg/ha. But number of spikelets/panicle and filled spikelet % increased only to 200 kg of seed rate at which grain yield of 4909 kg/ha was obtained. Increasing nitrogen level from 75 to 125 kg/ha increased the yield components such as number of spikelets /panicle and filled spikelets % which in turn increased the grain yield. No interaction effect was found between seed rate and nitrogen level. However significant yield increase was recorded at 200 kg/ha seed rate and 125 kg/ha nitrogen level. Near optimum LAI was also recorded at these levels.

Number of panicle/unit area contributes more than 60% of the yield. In transplanted rice number of panicles can be increased by increasing tiller number. This is not possible in direct sowing condition. Under direct sowing condition number of panicles can be increased by plant population since the number of tillers per plant remains same. Further, short vegetative period (30-45 days) found in short duration varieties also restrict the tiller production.

Hence increasing seed rate is the only appropriate agronomic practice to increase grain yield in short age varieties under direct sowing condition. The optimum seed rate for direct sowing condition is found to be 200 kg/ha (4 bushels/ac). At this level 125 kgN/ha is found to be an optimum.