Short Communication **Oryza Vol. 46. No.2, 2009 (156-157)**

Effect of seedling age and number on yield of boro rice

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ABSTRACT

Field experiments were conducted at research farm of Institute of Agricultural Science, Banaras Hindu University, Varanasi during dry seasons of 2001-04 to find out the suitable age and number of seedling for maximizing productivity of boro rice cv. Gautam. Transplanting of 70 days old Gautam seedlings gave the highest grain yield of 7.0 t ha^{-1} followed by 60 days old seedlings and both were found significantly superior to transplanting of 80 – 90 days old seedlings. Transplanting of 4 seedlings per hill registered significantly higher grain yield (4.75 t ha^{-1}) than 6 and 2 seedlings hill^{-1}.

Key words: *Boro rice, seedling, age, number, yield*

Boro rice is grown in about 0.03 m ha area in eastern Utter Pradesh, India and its rapid expansion in recent years established that about 0.5 m ha area can be exploited for its cultivation particularly in low productive deep water and other lowland/midland rice area (Singh, 2003, Singh and Singh, 2003). Traditionally tall, weak stemmed and awned cultivars with poor grain yield and quality are cultivated resulting in low productivity. However, the introduction of high yield varieties offers an opportunity to break the yield barrier. These varieties generally have superior early vigor compared to traditional varieties and hence, selection of appropriate age and number of seedlings is important for realization of their yield potential as even a marginal increase in the productivity of *boro* rice in eastern Utter Pradesh would significantly increase the total rice production of the state. Therefore, the present investigation was undertaken to find out the optimum age and number of seedling for transplanting of *boro* rice Gautam.

Field experiments were conducted at the research farm of the Institute of Agricultural Sciences, Banaras Hindu University, Varanasi for 3 consecutive years during dry seasons of 2001-04. The soil was silty clay loam with pH 7.4, organic carbon 0.46 %. Available N, P_2O_5 and K_2O were 154.7, 17.9 and 271.6 kg ha^{-1}, respectively. The treatments comprised of seedlings of 4 age groups (60, 70, 80 and 90 days) in the main plots and three variations in number of seedlings hil^{-1} (2, 4 and 6 seedlings hill^{-1}) in the sub plots of a split plot design with three replications. An uniform dose of 120 kg N. 60 kg P_2O_5 and 40 kg K_2O ha^{-1} were applied to all the plots. Half of N and entire P and K fertilizers were applied at the time of transplanting remaining half of the N was applied in two equal splits at active tillering and panicle initiation.

The seeds of rice cv. Gautam were treated with thirum 2 g kg^{-1} of seeds and later sown in such a way that seedlings of the desired age were available for transplanting on the same day. The transplanting was done at a spacing of 20 x 10 cm on Jan. 10, Jan. 20, Jan. 30 and Feb. 9 during first, second and third year, respectively by putting number of seedlings hill^{-1} as per treatments.

Transplanting of *boro* rice seedlings at different age caused significant variation on plant height at maturity, tillers hill^{-1} and tillers m^{-2}, effective tillers hill^{-1}, number of panicles m^{-2}, panicle length, grains panicle^{-1}, spikelet fertility percentage, grain weight panicle^{-1} and test weight (Table 1). Transplanting of 70 days old seedlings produced significantly superior growth and yield attributing components over 60, 80 and 90 days old seedlings. Transplanting of relatively early (60 days) and very old seedlings (80 and 90 days) took more time for establishment perhaps due to inefficient utilization of growth resources as a result of tardy root and shoot growth, resulting in inferior growth

Table 1. Effect of seedling age and number on crop growth and yield attributes and yield of *boro* rice cv. Gautam (pool data of 2001-2004)

Treatment	Plant height at harvest	Tillers hill^{-1} at 45 DAT	Tillers m^{-2} at 45 DAT	Effective tillers hill^{-1}	Panicles (No. m^{-2})	Panicle length (cm)	Grains Panicle^{-1}	Spikelet fertility(%)	Grain wt. panicle^{-1} (g)	Test weight(g)	Grain yield (t ha^{-1})
Age of seedling											
60 days aged	80.0	17.0	463.2	12.3	407.5	21.8	97.8	81.84	2.12	21.5	4.73
70 days aged	81.6	17.8	491.2	13.4	431.6	22.0	100.7	83.69	2.16	21.4	5.03
80 days aged	79.3	16.5	480.6	12.8	422.2	21.5	86.12	80.22	2.10	21.1	4.52
90 days aged	77.7	13.6	426.0	12.2	409.6	21.4	84.2	79.87	1.78	21.0	4.03
CD (P= 0.05)	4.7	1.35	24.3	0.86	18.5	0.30	6.22	1.09	0.25	0.30	0.54
Number of seedling											
2	79.7	16.4	465.3	12.3	411.0	21.7	92.64	81.01	2.08	20.9	4.42
4	79.5	16.8	475.6	13.3	430.7	21.8	93.98	82.54	2.18	21.7	4.75
6	80.4	15.9	453.7	12.4	411.4	21.4	90.1	80.63	2.10	21.1	4.52
CD (P= 0.05)	NS	0.50	17.2	0.90	11.0	NS	3.00	NS	0.10	0.50	0.21

and yield attributing characters. Transplanting of boro rice seedlings in different numbers also had significant influence on tillers hill^{-1} and tillers m^{-2}, effective tillers hill^{-1}, number of panicles m^{-2}, grains panicle^{-1} and grain weight panicle^{-1} and test weight. Transplanting of 4 seedlings hill^{-1} had maximum values for the growth and yield attributes as compared to 2 and 6 seedlings hill^{-1} indicating better utilization of growth resources and this could be the reason for superiority in the growth and yield attributing characters of boro rice. The results are in close conformity with the findings of Singh *et al* (2003) and Padmaja and Reddy (1998).

Grain yield of boro rice significantly varied due to age of seedlings. Transplanting of 70 days old seedlings recorded 60%, 11% and 25% more grain yield than that of 60, 80 and 90 days old seedlings, respectively. Early establishment coupled with superior growth and yield attributing characters resulted in more grain yield with 70 days old seedlings (Table 1).

Maximum grain yield was recorded by transplanting 4 seedlings hill^{-1} and proved significantly superior to 2 and 6 seedlings hill^{-1}. The advantage of having superior growth and yield attributes under transplanting of 4 seedlings hill^{-1} resulted in the highest grain yield. None of the interactions were found to be significant. Therefore, it is concluded that *boro* rice seedlings of 70 days old to be transplanted keeping 4 seedlings hill^{-1} for higher grain yield from the *boro* rice cultivar Gautam.

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