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Seedling Age Effect on Agronomic Traits of Basmati-385

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Abstract: Investigation on the effect of seedling age on agronomic traits of fine rice revealed that forty days old seedlings resulted in increased number of panicle bearing tillers, which produced the maximum grain yield of 3.7 t ha^{-1}, while fifty days old seedlings gave the minimum grain yield of 3.1t ha^{-1}. Number of spikelets $panicle^{-1}$ and 1000-grain weight were also improved, though the differences among the treatments were not large enough to reach the level of significance.

Key words: Rice, seedling age, agronomic traits, Basmati-385

Introduction

Transplanting of healthy seedlings of optimum age ensures better rice yields. When seedlings are transplanted at right time, tillering and growth proceed normally. However, when seedlings stay longer in seed nursery bed, primary tiller buds on the lower nodes of the main culm often degenerate. Primary tiller buds of 4th to 7th nodes are held inside when seedlings are planted at 7th leaf age (Matsuo and Hoshikawa, 1993). Age of seedlings at the time of transplanting is an important factor for uniform stand establishment of rice (Paddalia, 1981). If the age of seedling is less than optimum, the tender seedlings may die in greater number due to high temperature and ultimately the plant population is reduced. On the other hand, if the age of seedlings is more than optimum, the seedlings produce less tillers due to reduced vegetative period and thereby results in poor yield. Thus, to improve yield and quality of fine rice, optimum age of seedlings for transplanting needs investigation.

The present study was, therefore, planned to evaluate the effect of seedling age on agronomic traits of fine rice (cv. Basmati-385) under the agro-ecological conditions of Faisalabad in irrigated environment.

Materials and Methods

The experiment was conducted at the Agronomic Research Area, University of Agriculture, Faisalabad during 1997 and 1998. Basmati-385 was used as test crop. Except the experimental treatments, all other agronomic practices were normal and uniform for all experimental units. The experimental soil was sandy-clay loam having pH 7.9, organic matter 0.78%, total nitrogen 0.05%, available phosphorous 5.90 ppm and potassium 173 ppm.

The treatments comprised three seedling age, 30-day old seedlings (S_1), 40-day old seedlings (S_2) and 50-day old seedlings (S_3). The experiment was laid out in Randomized Complete Block Design. The not plot size was 2 × 3 m^2. Recommended basal dose of 120-75-75 NPK kg ha^{-1} was applied in the form of Urea (46% N), single super phosphate (18% P_2O_5) and sulphate of potash (50% K_2O), respectively. The whole quantity of phosphorus and half of nitrogen was applied prior to transplanting and the remaining half of nitrogen was applied in two equal splits each at tillering and panicle initiation. To overcome the zinc deficiency, zinc sulphate (20%) was applied @ 25 kg ha^{-1} 4 days after transplanting. A granular insecticide Sunfuran-3 G (Carbafuran) was applied twice @ 20 kg ha^{-1} against leaf folder and stem borer.

Data on different morphological traits were recorded using standard procedures and analyzed statistically by using Fisher's analysis of variance technique. Least significant difference (LSD) test at P 0.05 was employed to compare the treatments' means (Steel and Torrie, 1984).

Results and Discussion

Seedling age affected the number of tillers $hill^{-1}$ significantly during both years (Table 1). During 1997, significantly more number of tillers $hill^{-1}$ (13.7) was recorded in S_1 (30-days old seedlings), which was followed by S_2 (40-day old seedlings). Significantly less number of tillers $hill^{-1}$ (12.7) were produced by S_3 (50-day old seedlings). During 1998, although significantly more number of tillers $hill^{-1}$ (13.3) was recorded in S_2 (40-day old seedlings) but it was at par with S_1 (30-day old seedlings) against significantly the minimum in S_3 (50-day old seedlings). These results are not in agreement with Tsai and Lai (1988), who reported that number of tillers $plant^{-1}$ was the highest with oldest seedlings in the second crop season. On the contrary, Mannan and Siddique (1990) reported that tiller number did not differ significantly with seedling age.

Different seedling age treatments affected panicle bearing tillers $hill^{-1}$ significantly in both years. During 1997, though S_2 (40-days old seedlings) produced significantly more number of panicle bearing tillers $hill^{-1}$ (11.6) than S_3 (50-day old seedlings) but it was at par with S_1 (30-days old seedlings).

Similarly during 1998, the crop raised with 40-days old seedlings (S_2) although resulted in significantly more number of panicle bearing tillers $hill^{-1}$ (11.6) but was statistically similar to the crop raised with 30-day old seedlings (Table 1). The crop raised with 50-day old seedlings (S_3) gave significantly the minimum number of panicle bearing tillers $hill^{-1}$ (9.4), which was also at par with S_1 (30-days old seedlings). These results are in line with those of Ashraf and Mahmood (1989), who stated that number of panicle bearing tillers $hill^{-1}$ decreased with an increase in seedling age. The effect of seedling age on number of spikelets $panicle^{-1}$ was non-significant in both years. During 1997, the average number of spikelets $panicle^{-1}$ varied from 151.7 to 203.4, while their range was from 165.1 to 178.3 in 1998. These results are contrary to Tsai and Lai (1988) who reported that younger seedlings resulted in more spikelets $panicle^{-1}$.

The average 1000-grain weight did vary significantly among all the seedling age treatments in both years. However, it tended to decrease with increase in seedling age. These findings are contrary to those of Gill and Shahi (1987), who reported that aged seedlings gave higher 1000-grain weight. Whereas Bhagat *et al.* (1991) and Kadmi *et al.* (1991) established that 1000-grain weight decreased with the increase in seedling age.

In 1997, seedling age did not affect the grain yield which on an average varied from 3.2 to 3.6 t ha^{-1}. By contrast, during 1998 seedling age affected grain yield significantly. The highest grain yield (3.9 t ha^{-1}) was recorded in S_2 (40-day old seedlings). The grain yield in S_1 was similar to that obtained in S_3 (50-day old seedlings). These findings are not in conformity with those of Shahani *et al.* (1984), Chandra and Manna (1988), Ali and Rahman (1992) and Paul (1994), who stated that the seedling age had non-significant effect on grain yield.

Harvest index was not influenced significantly by different seedling age treatments in both years. However, the mean values of harvest index varied from 20.5 to 21.7% during 1997 and from 18.4 to 21.5% during 1998.

Table 1: Effect of seedling age on the yield and yield components of fine rice (cv. Basmati-385) during 1997 and 1998

Seedling age	Number of tillers hill^{-1}	Panicle bearing tillers hill^{-1}	Number of spikelets panicle^{-1}	1000-grain weight (g)	Grain yield (t ha^{-1})	Harvest index (%)
1997						
S_1 (30-days)	13.7a	11.4a	187.2NS	20.1NS	3.4NS	20.5NS
S_2 (40-days)	13.3b	11.6a	203.4	19.9	3.6	21.2
S_3 (50-days)	12.7c	10.2b	151.7	19.5	3.2	21.7
LSD value	0.1	0.9	-	-	-	-
1998						
S_1 (30-days)	12.9a	10.6ab	173.8NS	20.4NS	3.2NS	18.4NS
S_2 (40-days)	13.3a	11.6a	178.3	20.3	3.9	21.5
S_3 (50-days)	11.8b	9.4b	165.1	19.1	3.0	19.9
LSD value	0.4	1.5	-	-	0.5	-

Means sharing not a letter in common differ significantly at P 0.05 NS = non-significant

It can be concluded that 40-day old seedlings due to their better vigour and rooting capability are better for plant establishment compared to too young i.e., 30-day old seedlings. On the other hand 50-day old seedlings resulted in poor rooting of the transplanted crop.

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