

Response of Rice Varieties to Age of Seedlings and Transplanting Dates

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Abstract

A field experiment was conducted at Regional Agricultural Research Station, Parwanipur in 1998/99 and 1999/00 with an aim to find out the alternate management practices to compensate the loss in the grain yield due to flood. Irrespective of the varieties and transplanting dates, age of seedlings had no effect on grain yield of rice. But transplanting dates had significant effect on grain and grain contributing characters. The yield of rice transplanted at 1 Sept was 25.6 and 37.5% less in 1998/99 and 1999/00 respectively as compared to rice grain yield of 14 July transplanting. Radha 11 registered the highest grain yield of 4086 kg ha⁻¹ in 1999/00 and 2662 kg ha⁻¹ in 1998/99, which was at par to the yield obtained by Sabitri at the same year. The interaction effect of the age of seedlings, transplanting dates and varieties were found significant in both the years. 25 days old seedlings transplanted on 14 July in 1999/00 of rice varieties Masuli and Radha 11, produced statistically the similar yield. Radha 11 was the best among the tested varieties. 25 days old seedlings of Masuli, Basmati, Sabitri and Radha 11 can be recommended to transplant as late as Sept 1.

Key words: Age of seedlings, rice, transplanting dates

Introduction

Rice acreage in the country is 1.55 million ha with an average production of 2.59 t ha⁻¹, which is much less as compared to potential yield of the newly developed varieties (MoAC, 1999/00). The major factor of low productivity is due to rainfed condition. Nearly 79% of the rice growing area are under rainfed condition which faces prolonged drought or submergence due to excessive rain because of erratic rainfall pattern in the certain years (NARC, 1996). About 7 to 10% area of total rice growing acreage was found under submerged conditions for 2 to 10 days or even more days. Prevailing of such situations did considerable damage to the rice crop stand. And re-raising of rice seedlings and retransplanting under delayed conditions might not favor for optimum production. The information to tackle the problem caused by flood is not available. Therefore, alternate management strategy needs to be explored. Hence a study was under taken to study the effect of the age of seedling of rice varieties in relation to transplanting dates under rainfed ecosystem.

Materials and Methods

A field experiment was laid out in 2 × 5 × 3 factorial randomized block design with 3 replications at Regional Agricultural Research Station, Parwanipur (27°04' N and 84°58' E), 115 m above sea level. Seedlings of 25 and 50 days old of five rice varieties (Basamati, Sabitri, Chaite 4, Masuli and Radha 11) were transplanted on 14 July, 7 Aug, 1 and 26 Sept 1998/99 and 1999/00 wet season. The plot size was kept 4 × 3-m and with spacings of 20 cm hill to hill and row to row. Two seedlings hill⁻¹ were maintained in both the years. Fertilizer dose of 50:40:30 kg N:P₂O₅:K₂O ha⁻¹ were applied as basal and remaining nitrogen was top dressed 25 days after transplanting. The cultural practices were done as per need of the crop. Data were recorded on heading, maturity days, plant stand m⁻², filled grains panicle⁻¹, 1000-grain weight and grain yield. The last date of transplanting could not produce the grain, therefore, this treatment had been deleted from the analysis of the variance. The statistical analysis was done using MSTATC program.

Results and Discussions

Effect of the age of seedlings

The age of seedling had significant effect on heading and maturity days. The 50 days old seedling headed and matured earlier as compared to 25 days old seedlings (Table 1). The number of filled grains panicle⁻¹, 1000-grain weight, plant

stand m⁻² and even grain yield were found insignificant. Such results are in agreement with the findings of Shrestha (1975), Mallik and Singh (1976). The differences in heading and maturity days due to seedlings age could not significantly influence the grain yield in both the years.

Table 1. Average yield and yield contributing characters of 5 rice cultivars as influenced by the age of seedlings at transplanting during 1998/99 and 1999/2000

Seedling age	Heading days		Maturity days		Plant stand m ⁻²		Filled grains panicle ⁻¹		1000-grain wt, g		Grain yield, kg ha ⁻¹	
	98/99	99/0	98/99	99/00	98/99	99/00	98/99	99/00	98/99	99/00	98/99	99/00
	0											
25 day old	124	119	154	147	169	236	94	101	19.4	21.8	2203	3643
50 day old	102	104	133	132	174	232	97	98	19.2	21.1	2356	3320
F test	**	**	**	**	ns	ns	ns	ns	ns	ns	ns	ns
LSD (0.05)	1.7	1.2	1.9	1.8	-	-	-	-	-	-	-	-

** Significant at 0.1; ns, Non significant.

Effect of transplanting dates

The yield contributing characters and grain yield exhibited the poor performances due to heavy attack of brown plant hopper, despite of all measure taken to control in 1998/99 whereas crop was free from brown plant hopper in 1999/00. Transplanting dates had significant or highly significant effects on all characters except 1000-grain weight in both the years. The number of days from seeding to heading and maturity was recorded in the decline trend, as transplantation was delayed. The number of filled grains panicle⁻¹ and plant stand m⁻² followed the same pattern. Grain yield of rice transplanted on 14 July and 7 Aug did not differ significantly in 1998/99. The grain yield of 1 Sept transplanting was 21.7 and 37.8% less in 1998/99 and 1999/00 respectively as compared to 14 July transplanting. The results are in agreement with

the findings of Koirala (1983), Kunwar and Shrestha (1979), Bhurer et al. (1990) who reported that early planting of rice gave higher yields and gradual decline in the grain yields in delayed transplanting. The reason for declining the grain yield might be due to delayed panicle formation and grain filling in the season where temperature and solar radiation was less (IRRI, 1993). It is natural process that the crop which had taken more number of days from seeding to maturity might have a more vigorous and extensive root system, increased growth rate during vegetative growth, more efficient sink formation and greater sink size, greater carbohydrate translocation from vegetative plant parts to the spikelets and longer leaf area index during grain filling period. So, this might be the possible reason to have high yields in earlier transplanting.

Table 2. Effect of the transplanting dates on agronomic characters and grain yield (average of 5 rice cultivars) during 1998/99 and 1999/2000

Transplanting date	Heading days		Maturity days		Plant stand m ⁻²		Filled grains panicle ⁻¹		1000-grain wt, g		Grain yield, kg ha ⁻¹	
	98/99	99/00	98/99	99/00	98/99	99/00	98/99	99/00	98/99	99/00	98/99	99/00
14 July	120	114	149	141	176	257	110	103	19.2	21.9	2574	4149
7 Aug	112	112	141	139	163	227	91	106	19.4	21.4	2349	3706

1 Sept	107	110	140	139	150	200	85	90	19.5	21.1	1914	2590
F test	**	**	**	**	**	**	*	*	ns	ns	**	**
LSD (0.05)	2.1	1.5	2.3	1.93	11	14	11.3	11.6	-	-	225	184

** Significant at 0.1; ns, Non significant.

Effect of varieties

All characters were found statistically highly significant different among rice varieties (Table 3). Chaite 4 took minimum days to heading and maturity and vice versa in Basmati in both the years. Radha 11 registered the maximum number of grains panicle⁻¹ and reverse trend was reflected

in Chaite 4 in both the years. Radha 11 produced the highest grain yield of 4086 kg ha⁻¹ in 1999/00 and 2662 kg ha⁻¹ in 1998/99 which was at par to the grain yield of Sabitri in the same year. The highest grain yield of Radha 11 might be due to more number of filled grains panicle⁻¹ and plant stand m⁻².

Table 3. Agronomic characters of 5 rice cultivars during 1998/99 and 1999/2000

Cultivar	Heading days		Maturity days		Plant stand m ⁻²		Filled grains panicle ⁻¹		1000-grain wt, g		Grain yield, kg ha ⁻¹	
	98/99	99/00	98/99	99/00	98/99	99/00	98/99	99/00	98/99	99/00	98/99	99/00
Basamati	122	120	156	152	142	223	74	97	22	24.2	1930	3259
Sabitri	118	118	150	148	194	241	105	103	19.1	21.1	2693	3421
Chaite 4	90	89	119	116	202	260	65	75	20.2	23.8	1874	3020
Masuli	120	115	148	142	151	219	125	122	17	17.6	2238	3623
Radha 11	116	114	144	141	170	226	107	101	18.4	20.7	2662	4086
F test	**	**	**	**	**	**	**	**	**	**	**	**
LSD (0.05)	2.7	1.9	2.9	2.5	14	18.3	14.6	14.9	0.83	0.6	290	238

** Significant at 0.1.

Interaction effect of grain yield

Three level interaction of age of seedlings, transplanting dates and varieties of two years is presented in Table 4. Two level interactions of three factors are not included, however, the LSD values can be used to compare any two means within a year.

Twenty five days old seedlings of Basamati rice transplanted either on 14 July or 1 Sept could not bring statistical differences in the grain yield and the same case was observed in 50 days old seedlings in 1999 (Table 4). However, 25 days old seedlings of Masuli and Radha 11 produced the grain yield more or less similar to transplanted on 14 July and 7 Aug and significant decline in the grain yields was observed on 1 Sept transplanting in both the years. 50 days old seedlings of Sabitri in first year and all varieties in second year gave significantly high yield

transplanted on 14 July as compared to 1 Sept 1 transplanting. 25 days old seedlings of Sabitri, Masuli and Radha 11 produced significantly higher grain yield as compared to 50 days old seedlings transplanted on 1 Sept.

Radha 11 was considered as the best among the test varieties in respect of producing the grain yield. Though, reduction in the grain yield had been noticed to a greater extent on 1 Sept transplanting as compared to 14 July and 7 August transplanting. However, 25 days old seedlings of Basmati, Sabitri, Masuli and Radha 11 might be recommended to transplant as late as 1 Sept. Transplanting of rice irrespective of age of seedlings and varieties should be adjusted up to first week of Aug. Otherwise, decline trend in grain yield might be registered in delayed transplanting.

Table 4. The grain yield, kg ha⁻¹ as affected by the interaction effect of age of seedlings, transplanting dates and rice cultivars

Transplanting date	25 days old seedlings									
	1998/99					1999/00				
	Basmati	Sabitri	Chaite 4	Masuli	Radha 11	Basmati	Sabitri	Chaite 4	Masuli	Radha 11
14 July	1997	2427	2278	2672	2758	3303	3738	3387	4352	4506
7 Aug	1650	3165	1480	2509	2762	4026	3894	2905	4116	4187
1 Sept	1530	2504	1807	1657	1843	2663	3473	2941	3444	3702

50 days old seedlings										
14 July	2423	3002	2309	2586	3288	3577	4945	3822	4576	5278
7 Aug	2115	3233	1738	2069	2771	3562	3627	3190	3609	3942
1 Sept	1865	1825	1634	1933	2549	2420	846	1874	1639	2898
F test			**					**		
LSD (0.05)			712					580		

** Significant at 1%.

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