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Research Communication

Effects of different transplanting dates on yield and quality of basmati rice (*Oryza sativa*) varieties

MUKESH[1], ISHWAR SINGH[2], R.K. PANNU[3], DASHARATH PRASAD[4] AND ASHA RAM[5]

Rice Research Station of CCS HAU, Kaul, Haryana 132 021

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ABSTRACT

Results of field experiment conducted during *kharif* 2008 at Hisar, revealed that early transplanting dates (25 June and 10 July) increase the grain yield (3.5 t/ha and 3.4 t/ha) and yield contributing character of basmati rice (*Oryza sativa* L.) as compared to late planting (25 July). The late planting, improved the quality traits *viz*. hulling, milling and head rice recovery than early planting. 'Pusa Sugandha 4' recorded the highest grain yield, longest kernel and length breadth ratio. In interaction effect, 'Taraori Basmati' and 'CSR 30' recorded statistically similar yield across the dates of transplanting, while 'Pusa Basmati' and 'Pusa Sugandha 4' yield declined markedly with late transplanting.

Key words: Basmati rice, Dates of transplanting, Quality, Yield

Aromatic (Basmati) rice enjoys a special place both in domestic as well as the international trade (Gupta and Kumar, 2008). The profitability in terms of yield and quality is governed by varieties and management practices. Timely planting of basmati rice is an important factor in determining grain yield and quality parameters. The major share of basmati production (50–70%) is exported from India. The area under scented rice varieties is increasing day by day with the opening of world market as well as domestic consumption (Singh *et al.*, 2008). India is a natural repository for long and short grained aromatic rice, which have been conserved by the farmers over centuries. Among these, basmati rice, which is cultivated in the foothills of Himalayas is endowed with unique quality features; (unique fragrance, taste and texture), which develop under specific geographical demarcation make it best among the aromatic rice of the world (Nene, 1998). Time of transplanting may be one of the agronomic strategies to exploit full potential of a variety and its photoperiod sensitivity so as to harness maximum production with improved quality of grain for high premium. Selection of proper variety, suitable to the specific ecological situation, may prove to be a boom to the farmer. The traditional varieties of scented rice grown in Haryana are tall and prone to lodging particularly when a higher dose of nitrogen is applied. Therefore, growing suitable dwarf varieties of scented rice with higher yield and acceptable quality is important to increase the production of basmati rice. Selection of suitable varieties in relation to time of transplanting is an important aspect. Delay in planting has been found to reduce the yield of basmati rice (Dhiman *et al*., 1997 and Rao *et al*., 2000). The present study was undertaken to evaluate the grain yield and quality of basmati varieties under different dates of transplanting.

A field experiment was conducted at Rice Research Station, Kaul (Kaithal) of CCS Haryana Agricultural University during *kharif* season of 2008 to study the effect of transplanting dates on yield and quality of basmati rice varieties. The soil of the experimental site was clay loam having pH 8.2 and was low in organic carbon (0.32%) and available nitrogen (161 kg/ha), medium in available phosphorus (16 kg/ha) and high in available potassium (330 kg/ha). The treatments consisted of three dates of transplanting *viz.* 25 June, 10 July and 25 July and four varieties *viz.* 'Taraori Basmati', 'CSR 30', 'Pusa Basmati 1' and 'Pusa Sugandha 4'. The experiment was laid out in split-plot design with four replications, keeping transplanting dates in main plots and varieties in sub-plots. The thirty days old seedlings were transplanted on a well puddled soil at a hill spacing of 20 × 15 cm. For tall cultivars 'Taraori Basmati' and 'CSR 30' nitrogen @ 60 kg N/ha

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[1]**Corresponding author Email:** mukeshkanwal07@gmail.com
[1]Research Scholar; [2&3]Professors, CCS HAU, Hisar, Haryana; [4]Assistant Professor, ARS, SKRAU, Sriganganagar; [5]Scientist, NRC Agroforestry, Jhansi

was applied through urea in two equal splits at 21 and 42 days after transplanting (DAT). For semi dwarf cultivars, nitrogen @ 90 kg N/ha was applied in three equal splits at 4 DAT, 21 DAT and 42 DAT. Weed control and plant protection measures were adopted as per the recommended package of practices. The crop was harvested at maturity and threshed as per schedule.

Yield attributes *viz.* number of panicles/m^2, number of grains/panicle and 1,000-grain weights are presented in table 1. Transplanting on 25 June and 10 July were on par and produced significantly more panicles than late planting (25 July). The dwarf rice varieties differ significantly in respect of panicles/m^2. 'Pusa Sugandha 4' recorded the maximum numbers of panicles/m^2 followed by 'Pusa Basmati 1', 'CSR 30' and 'Taraori Basmati'. Number of grains/panicle did not differ significantly due to time of transplanting. Both the semi dwarf varieties produced significantly more grains/panicle than the taller ones, which were on par. The highest number of grains/panicle was recorded with 'Pusa Basmati 1', which was significantly higher then 'Pusa Sugandha 4'. The 1,000-grains weight did not differ significantly due to time of transplanting. Varieties differed in respect of 1,000-grain weight. The highest 1,000-grain weight was observed with 'Pusa Sugandha 4' (25.7 g), which was significantly higher than other cultivars.

Transplanting on 25 June produced the highest grain (3.5 t/ha) and straw yields (5.9 t/ha), which was statistically on par with 10 July. The grain and straw yield decreased significantly due to delayed transplanting (25 July). The reduction in yield due to delayed planting on 25 July was 11 and 7% over 25 June and 10 July planting respectively. Semi dwarf varieties proved significantly better than the taller ones. 'Pusa Sugandha 4' gave the highest grain yield (4.1 t/ha), followed by 'Pusa Basmati 1' (3.7 t/ha), 'CSR 30' (3.0 t/ha) and 'Taraori Basmati' (2.6 t/ha). Contrary to grain yield, tall varieties, 'Taraori Basmati' and 'CSR 30' produced significantly more straw (5.8 t/ha) than 'Pusa Sugandha 4' (5.3 t/ha) and 'Pusa Basmati 1' (4.1 t/ha), Harvest index was higher with late planting. Among the varieties 'Pusa Basmati 1' recorded the highest harvest index (46.8%) followed by 'Pusa Sugandha 4' (43.5%), 'CSR 30' (33.6%) and 'Taraori Basmati' (31.0%).

Interaction between dates of transplanting and varieties was found significant in respect of grain yield (Table 2), which revealed that tall varieties showed virtual no decline in the grain yield across the transplanting dates, while the dwarf rice varieties grain yield declined with delay in planting. Delayed in planting on 25 July recorded higher hulling and milling percentage and head rice recovery as compared to 25 July and 10 June planting, (Table 1), however kernel length and length: breadth ratio reduced due to delayed planting. The improvement in hulling, milling and head rice recovery under late planting might be due to mild temperature coinciding with reproductive and ripen-

Table 2. Interaction effect of different dates of transplanting and varieties of basmati rice on grain yield (t/ha)

Treatment	Varities			
	Taraori Basmati	'CSR 30'	'Pusa Basmati 1'	'Pusa Sugandha 4'
Dates of transplanting				
June 25	2.7	3.0	4.0	4.3
July 10	2.6	2.9	3.7	4.4
July 25	2.6	3.0	3.3	3.6
	SEm±	CD (P=0.05)		
V at same level of D	0.12	0.29		
D at same level of V	0.10	0.31		

Table 1. Yield and yield contributing characters and quality of basmati rice as affected by different dates of transplanting and varieties

Treatment	Panicles/ m^2	Grains/ panicle	1,000-grains wt.(g)	Yield (t/ha) Grain	Straw	Harvest index (%)	Hulling percentage	Milling percentage	Head rice recovery (%)	Kernel length (mm)	Length: Breadth ratio
Date of transplanting											
June 25	300	84.2	22.9	3.5	5.9	36.9	76.1	67.4	45.0	7.3	3.92
July 10	296	81.3	22.5	3.4	5.7	36.6	76.3	67.7	45.5	7.2	3.89
July 25	264	81.4	22.6	3.1	4.2	42.5	78.4	69.0	46.8	7.1	3.87
SEm±	4	2.2	0.3	0.06	0.09	0.3	0.4	0.3	0.3	0.01	0.01
CD (P=0.05)	14	NS	NS	0.20	0.30	1.2	1.5	1.1	0.9	0.03	0.03
Varieties											
'Taraori Basmati'	230	74.3	22.2	2.6	5.8	31.0	76.5	68.5	46.5	7.0	3.76
'CSR 30'	279	74.9	21.8	3.0	5.8	33.6	76.3	68.2	46.4	7.0	3.78
'Pusa Basmati 1'	311	93.1	20.9	3.7	4.1	46.8	77.3	67.7	45.2	6.7	3.72
'Pusa Sugandha 4'	327	87.0	25.7	4.1	5.3	43.5	77.6	67.8	45.0	8.0	4.31
SEm±	4	2.0	0.2	0.05	0.12	0.5	0.5	0.3	0.3	0.01	0.01
CD (P=0.05)	13	6.0	0.7	0.16	0.36	1.6	NS	NS	0.8	0.04	0.04

ing period under delayed transplanting (Rao *et al*. (1996).

Varieties did not differ in hulling and milling percentage, but recovery was significantly more in tall varieties than dwarf varieties. Kernel length and length: breadth ratio was the higher in 'Pusa Sugandha 4' and lowest is 'Pusa Basmati 1'. Gururani (1997) also observed the better quality in terms of milling and head rice recovery, in tall photosensitive variety 'Basmati 370' than semi dwarf photo-insensitive varieties 'Pusa Basmati 1' and 'Haryana Basmati 1'.

REFERENCES

Dhiman, S.D., Nandal, D.P. and Om, H. 1997. Performance of scented dwarf rice (*Oryza sativa)* varieties under different time of transplanting. *Indian Journal of Agronomy* **42**(2): 253–56.

Gupta, K.R. and Kumar, Rakesh 2008. Inheritance of photoperiodic response in basmati rice. *Agricultural Science Digest* **28**(1): 65–66.

Gururani, Jitendra 1997. Performance of semi dwarf aromatic rice varieties under different dates of transplanting. *M.Sc. thesis* submitted to G.B. Pant University of Agriculture and Technology, Pantnagar.

Nene, Y.L. 1998. Basmati rice: A distinct variety (cultivar) of the Indian subcontinent. *Asian Agri-history* **2**: 175–88.

Rao, C.B.B., Shaik Mohammad, Ikramullah, M. and Mohammad, S. 2000. Response of planting date alterations on scented rice varieties an economic appraisal. *Annals of Biology* **16**(2): 131–32.

Rao, K.S., Moorthy, B.T.S., Dash, A.B. and Lodh, S.B. 1996. Effect of time of transplanting on grain yield and quality traits of basmati-type scented rice (*Oryza sativa*) varieties in Coastal Orissa. *Indian Journal of Agricultural Sciences* **66**(6): 333–37.

Singh, R.P.; Singh, Nasib; Mehta, S. and Godara, A.K. 2008. Adoption of fertilizers and weedicides in basmati paddy crop in Kurukshetra Distt. (Haryana). *Agricultural Science Digest* **28**(1): 36–38.