Journal of Applied and Natural Science 9 (4): 1958 -1961 (2017)

JANS

Influence of different transplanting date and weed management practices on yield and quality of basmati rice (Pusa *Basmati*-1509)

Vikram Kumar[1]*, V. S. Hooda[1], D. P. Nandal[1], Sunil Kumar[2] and Gaurendra Gupta[3]

[1]Department of Agronomy, CCS Haryana Agricultural University, Hisar-125004 (Haryana), INDIA
[2]Department of Agronomy, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi (UP), INDIA
[3]Division of Agronomy, Indian Agricultural Research Institute, New Delhi, INDIA
*Corresponding author. E-mail: vikgadi@gmail.com

Received: September 11, 2016; Revised received: April 21, 2017; Accepted: September 12, 2017

Abstract: A field experiment was conducted during *kharif* 2014 at students' farm of Chaudhary Charan Singh Haryana Agricultural University, college of agriculture, Kaul (Kaithal). The experiment consisted of four transplanting dates (June 15, July 5, July 25 and August 15) in main plots and six weed control treatments in sub plots treatments consisted of pre-emergence application of pretilachlor, oxadiargyl alone and sequential application of pre and post emergence herbicides *viz*., pretilachlor *fb* bispyribac, oxadiargyl *fb* bispyribac, weed free check and unweeded check. Based on research investigation it was observed that early transplanting dates (June 15 and July 5) produced taller plant, higher tillers/m^2 and crop dry matter accumulation at all growth stages. Early transplanting produced significantly higher number of effective tillers/m^2 (263) along with higher number of filled grain/ panicle (85) than delayed planting (July 25 and August 15). The 1000-grain weight was not affected by time of transplanting. The highest grain yield (4363 kg/ha) was recorded under June 15 transplanting which was statistically at par to the grain yield (4058 kg/ha) obtained under July 5 transplanting. Among the weed management practices tried, weed free check resulted in the highest values of plant height (104.2 cm), tillers/m^2 (305), crop dry matter accumulation (964 g/m^2), effective tillers/m^2 (271), grains length (8.5 cm), filled grains/panicle (86.3) as well as grain (4516 kg/ha) and straw yield (5506 kg/ha) which were however, comparable to pre-emergence application of oxadiargyl followed by bispyribac-sodium applied at 25 DAT and pretilachlor followed by bispribac-sodium at 25DAT.

Keywords: Bispyribac, Oxadiargyl, Pretilachlor, Quality, Transplanting date

INTRODUCTION

Rice is the most important cereal food crop of the world providing major source of the food energy for more than half of the human population. India is the second largest producer of rice in the world with production of 106 million tonnes from 43.50 million hectares, with a productivity of 2.41 tonnes/ha during the year 2013 (Anonymous, 2014a). In Haryana, rice occupies an area of 1.2 million hectares with production and productivity of 3.99 million tonnes and 3256 kg/ha, respectively (Anonymous, 2014b).

The profitability in terms of yield and quality is governed by selection of varieties and management practices. Timely planting of *basmati* rice is an important factor in determining grain yield and quality parameters. 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 premiums. Selection of proper variety, suitable to the specific ecological situation, may prove to be a boom to the farmers. 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 (Sharma *et al.*, 2008).

Weeds pose major problem in rice production, by diminishing the quantity as well as quality (Rajkhowa *et al*, 2007). Hence, the weed management plays an important role in increasing productivity of rice. Hand weeding is effective and the most common method to control weeds. However, it is laborious and tedious in rice growing areas due to increase in labour cost and non-availability of labour during peak periods of other agricultural operations. The use of herbicides offers scope for economical control of weeds right from the beginning. Recent trend of herbicide use is to find out, an effective weed control measure by using low dose high efficiency herbicides which will not only reduce the total volume of herbicide/unit area, but also the application becomes easier and economical to the farmer (Subramanyam *et al.*, 2007).

MATERIALS AND METHODS

The present field experiment was conducted during

ISSN : 0974-9411 (Print), 2231-5209 (Online)

kharif 2014 at student's farm of CCSHAU, college of agriculture, Kaul (Kaithal), Hisar (latitude 29° 51' N, longitude 76° 41' E and altitude 241 metres above mean sea level). The soil of the experimental field was clay loam in texture, low in organic carbon, low in available nitrogen, medium in phosphorus, high in potash and alkaline in nature.

The experiment was laid out in a split plot design with 4 main plot treatments and 6 sub plot treatments with replicated thrice. The main plot having date of transplanting which were 15th June , 5th July , 25th July and 15th August. In sub plot plot treatments consisted of pre-emergence application of pretilachlor 1000 g/ha, oxadiargyl 100 g/ha alone and sequential application of pre- and post emergence herbicides *viz.*, pretilachlor 1000 g/ha+bispyribac 25 g/ha, oxadiargyl 100 g/ ha+bispyribac 25 g/ha, weed free check and unweeded check. The required quantities of pre- and post-emergence herbicides were applied uniformly at 4 and 25 DAT, respectively. The crop was raised according to package of practices of CCSHAU, Hisar. One-month-old nursery of well adapted high yielding coarse rice variety Pusa *Basmati*-1509 was transplanted at a hill spacing of 20 x 15 cm, therefore, plant population was 33 hills/m^2 for all the treatments. Data were recorded on different agronomic parameters including growth parameter, yield parameter and quality parameter. The data were analyzed statistically using analysis of variance technique and significant means were separated using least significance difference test for comparing the treatment means (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Growth parameters: Plant height increased with advancement in crop age up to 90 DAT (days after transplanting). The highest increase in plant height was observed between 30 and 60 DAT and minimum increase from 60 to 90 DAT. Crop planted on June 15 (104.9 cm) caused a significantly better height than all of the delayed transplanting dates except July 5 (102.8 cm) which was statistically at par to the earlier. Among the weed control treatments, weed free plots recorded significantly taller plants at harvest (104.2 cm) which were at par to that recorded with application of oxadiargyl followed by bispyribac-sodium (101.7 cm) and pretilachlor followed by bispyribac-sodium (101.2 cm). Time of transplanting had significant effect number of tillers/m^2 at all the stages of crop growth. The crop planted on June 15 (301/m^2) which was statistically at par to July 5 (275/m^2) planting, produced significantly higher number of tillers than delayed planting (July 25 and August 15). Among different weed control treatments, weed free (305/m^2) recorded significantly highest number of tillers/m^2 which was statistically similar to application of oxadiargyl followed by bispyribac-sodium (301/m^2) and pretilachlor followed by bispyribac-sodium (289/m^2). The dry matter accumulation increased with advancement of crop age. The highest increase in dry matter was observed between 30 and 60 DAT. Time of transplanting had significant effect on dry matter accumulation by the crop at different stages of crop growth. At all the crop growth stages, crop planted on June 15 (952g/m^2) which was sta-

Table 1. Effect of different transplanting dates and weed management practices on yield attributing characters in *Kharif* 2014.

Treatments	Plant height (cm)	Number of tillers/m^2	Crop dry matter accumulation (g/m^2)	No. of filled grains/ panicle	No. of unfilled grains/ panicle	1000-grain	Effective tillers/m^2
Main plot (transplanting dates)							
15-Jun	104.9	301	952	85	9.6	28.4	263
05-Jul	102.8	275	871	79.3	10.6	27.4	245
25-Jul	97.6	261	827	76.6	11.7	26.8	237
15-Aug	92	236	748	64.3	17.8	26.3	199
SEm±	1.7	7	24	2.1	0.3	0.4	6
CD at 5%	6	26	84	7.5	1.1	NS	23
Sub plot (weed control treatments)							
Oxadiargyl 100g/ha (PE)	100	262	828	74.3	13.1	27.2	228
Pretilachlor 1000g/ha (PE)	99.6	239	756	67.4	14.6	26	208
Oxadiargyl 100g/ha (PE) *fb* bispyribac-Na 25g/ha (25 DAT)	101.7	301	953	85.5	10.7	27.5	262
Pretilachlor 1000g/ha (PE) *fb* bispyribac-Na 25g/ha (25 DAT)	101.2	289	914	82	11.7	27.3	258
Weed free	104.2	305	964	86.3	10.4	28.2	271
Weedy	94.7	216	684	61.6	16.6	25	189
SEm±	1.2	6	18	1.6	0.5	0.3	5
CD at 5%	3.6	17	52	4.6	1.3	0.9	14

Table 2. Effect of different transplanting dates and weed management practices on yield and quality parameters in *Kharif* 2014.

Treatments	Grain yield (kg/ha)	Straw yield (kg/ha)	Hulling percentage	Grain length (mm)	Length-breadth ratio	Benefit and Cost Ratio
Main plot (transplanting dates)						
15-Jun	4346	5485	76.8	8.3	4.9	1.43
05-Jul	4058	5021	77.4	8.2	4.9	1.34
25-Jul	3918	4768	78.2	8.1	4.8	1.29
15-Aug	3289	4108	80	8	4.7	1.1
SEm±	109	137	0.7	0.1	0.05	
CD at 5%	383	484	NS	NS	NS	
Sub plot (weed control treatments)						
Oxadiargyl 100g/ha (PE)	3804	4718	77.5	8.1	4.8	1.32
Pretilachlor 1000g/ha (PE)	3475	4303	76.7	8	4.7	1.19
Oxadiargyl 100g/ha (PE) *fb* bispyribac-Na 25g/ha (25 DAT)	4376	5440	79.4	8.2	4.9	1.46
Pretilachlor 1000g/ha (PE) *fb* bispyribac-Na 25g/ha (25 DAT)	4196	5213	78.4	8.2	4.9	1.38
Weed free	4516	5506	80.2	8.5	5.1	1.28
Weedy	3151	3895	74.6	7.6	4.4	1.15
SEm±	83	105	0.6	0.1	0.07	
CD at 5%	238	302	1.8	0.3	0.2	

tistically at par to July 5 (871g/m^2) planting, produced significantly higher crop dry matter than delayed planting (July 25 and August 15). Weed free treatment recorded highest crop dry matter accumulation at harvest (964 g/m2) and it was at par to the application of oxadiargyl followed by bispyribac-sodium (953 g/m2) and pretilachlor followed by bispyribac-sodium (914 g/ m2). The lowest values of the growth parameters viz. plant height, number of tillers per square meter, crop dry matter accumulation of rice were recorded with unweeded check. Present studies on weed in basmati rice are also confirmed by Heisnam et al (2015).

Yield attributes and yield: Early transplanting (June 15 and July 5) produced significantly higher number of effective tillers/m^2 along with higher number of filled grain/panicle than delayed planting (July 25 and August 15). The 1000-grain weight was not affected by time of transplanting. The highest grain yield (4346 kg/ha) was recorded under June 15 transplanting which was statistically at par with the grain yield (4058 kg/ ha) obtained under July 5 transplanting but both these transplanting dates gave significantly higher yield than delayed planting on August 15 (3289 kg/ha). Delayed planting (July 25 and August 15) produced significantly lower straw yield than timely planting (June 15 and July 5). These results of different yield attributes (effective tillers, filled grain/ panicle, test- weight and yield) in rice variety are in conformity with those of Chopra *et al.* (2006).

The highest numbers of effective tillers/m^2, grains length, total grains, filled grains/panicle with lowest numbers of unfilled grains/panicle were recorded in weed free check which were comparable to pre-emergence application of oxadiargyl followed by bispyribac-sodium applied and pretilachlor followed by bispyribac-sodium applied. The lowest values of all the above yield attributing characters were recorded with unweeded check. The highest effective tillers/m^2 (262/m^2) were registered with pre-emergence application of oxadiargyl followed by bispyribac-sodium applied which were comparable to pre-emergence application of pretilachlor followed by bispyribac-sodium applied (258/m^2). The lowest grain and straw yields as well as effective tillers/m^2 were recorded with unweeded check. The highest grain and straw yield in rice variety (Pusa *Basmati* 1509) recorded in weed free check which was comparable to pre-emergence application of oxadiargyl followed by bispyribac-sodium applied and pretilachlor followed by bispyribac-sodium. These results of yield and its attributing characters are also confirmed by Singh and Paikra (2014).

Quality parameters: Delayed transplanting on August 15 did not improve hulling percentage significantly than earlier transplanting. Grain length was highest in the June 15 (8.3 mm) transplanting but decreased non-significantly with delayed in transplanting to July 5 (8.2 mm), July 25 (8.1 mm) and August 15 (8.0 mm). Length breadth ratio in June 15 (4.9) and July 5 (4.9) transplanting was non-significantly higher than July 25 (4.8) and August 15 (4.7) transplanting. These finding in basmati rice are in close agreement with those of Chopra *et al. (*2006).

The highest hulling percentage was obtained under weed free plot (80.2%) which was at par to application of oxadiargyl followed by bispyribac-sodium (79.4%) and pretilachlor followed by bispyribac-sodium (78.4%). Weed free plots recorded significantly highest grain length (8.5 mm) which was at par to oxadiargyl followed by bispyribac-sodium (8.2 mm) and pretilachlor followed by bispyribac-sodium. Highest LB ratio was obtained under weed free plot (5.1:1) which was statistically at par to application of oxadiargyl

followed by bispyribac-sodium (4.9) and these were also at par to their individual applications of oxadiargyl and pretilachlor. Significantly lowest LB ratio found in rice variety under weedy check plot (4.4:1). Results of different parameter *viz.,* Hulling percentage, grain length and lengh breadth ratio in basmati rice are in agreement with the work of Singh *et al.* (2007).

Conclusion

From the results of the present field experiment on response of *basmati* rice variety (Pusa *basmati* 1509) to time of transplanting conducted during *Kharif* 2014, it can be concluded that transplanting of *basmati rice* from June 15 to July 5 is optimum as it not only gave significantly higher grain yield (4346 kg ha^{-1}) but also fetched additional income (B:C ratio-1.43) than late planting (August 15). Among the weed control treatments, the highest grain yield (4376 kg ha^{-1}) and economic returns (B:C ratio-1.46) were found in pre-emergence application of oxadiargyl followed by bispyirbac-sodium applied at 25 DAT.

REFERENCES

Anonymous (2014a). Annual Progress Report, All India Coordinated Rice improvement programme, Indian Institute of Rice Research (ICAR), Hyderabad, 3:4.114-4.117.

Anonymous (2014b). Agricultural statistics at a glance. Department of Agriculture, Cooperation & Farmers Welfare. Ministry of Agriculture, Government of India.

Chopra, N.X., Chopra, Nisha and Yadav, R.N. (2006). Effect of transplanting dates on seed yield and quality of paddy cv. Pusa-44. *Seed Res.*, 94(2):288-290.

Heisnam, P., Moiranthem, A., Keisham, A., Singh, N.I., Singh, A.H. and Singh, L. N. (2015). Efficacy of some promising weedicides on shallowland Transplanted rice (*oryza* sativa L.) Under rainfed Conditions. *The Bio.*, 10 (1): 459-463.

Rajkhowa, D.J., Deka, N.C., Borah, N. and Barua, I.C. (2007). Effect of herbicides with or without paddy weeder on weeds in transplanted summer rice (*Oryza sativa*). *Indian J. Agron.,* 52(3):107-110.

Sharma, Neeraj, Singh, Naveen, Singh, Mandeep and Bharaj, T.S. (2008). Quality characterstics of aromatic fine grained rice (*oryza sativa*) genotype for utilization in *basmati* improvement. *Indian J. Agric. Sci.,*78(1):42-49.

Singh, I., Ram, M. and Nandal, D.P. (2007). Efficacy of new herbicides for weed control in transplanted rice under rice-wheat cropping system. *Indian J. Weed Sci.,* 39 (1&2): 28-31.

Singh, M. and Paikra P.R. (2014). Bio-efficacy of post-emergence herbicides in transplanted rice of chhattisgarh plains. *The Bio.,* 9(3): 973-976.

Steel, R.G.D., Torrie, J.H., (1980). Principles and Procedures of Statistics. McGraw Hill Book Co. Inc., New York.

Subramanyam, D., Reddy, D.S. and Reddy, C.R. (2007). Influence of integrated weed management practices on growth and yield of transplanted rice (*Oryza sativa*). *Crop Res.,* 34(1&2): 1-5.