Int.J.Curr.Microbiol.App.Sci (2018) *7*(4): 236-241

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 7 Number 04 (2018)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2018.704.026

Performance of Upland Rice Varieties on Different Dates of Sowing in Kymore Plateau Region of Madhya Pradesh, India

Punit Tiwari*, R.K. Tiwari, Amrita Tiwari and Jyoti Tiwari

Department of Agronomy, JNKVV, College of Agriculture, Rewa-486001, Madhya Pradesh, India

**Corresponding author*

Keywords

Upland rice, Kymore plateau, Growth parameters and economics

Article Info

Accepted:
04 March 2018
Available Online:
10 April 2018

A B S T R A C T

An investigation entitled "Effect of sowing-dates on performance of different rice varieties under upland condition" was conducted at the Instructional Farm, College of Agriculture, Rewa (M.P.) under All India Coordinated Rice Improvement Project during the *Kharif* season of 2014. The experiment was laid out in split-plot design with four replications. The treatments comprised of three sowing dates i.e. 3rd July, 8th July and 13th July in main plots and 5 varieties i.e. Danteshwari, Vandana, IR-64, PS-3 and PS-5 in sub plots. The varieties were sown by direct-seeding. Among the varieties, PS-3 and then PS-5 performed better in this region. They resulted maximum growth parameters and grain yield up to 40.90 to 43.27 q/ha with net income up to Rs. 48652 to 49778/ha. The most optimum date of sowing of upland rice was 3rd July which gave maximum growth parameters and grain yield up to 38.54 q/ha with net income up to Rs. 41446/ha. Thus, variety PS-3 or PS- 5 may be grown on 3rd July is suitable to obtain maximum productivity and economical grain from rice under upland conditions of this region.

Introduction

The slogan "Rice is life" is most appropriate for India as this crop plays a vital role in our national food security and is a means of livelihood for millions of rural households. It is the most important staple food crop of India. The importance of rice in Asia is more pronounced as rice typically accounts 32% of cropped area in Asia. India is next to China in rice production. In India, rice is grown in an area of 44.6 million hectare with a production of 109.5 million tones and average productivity of 2.62 tons per hectare. Projection of India's rice production target for 2025 AD is 140 million tones which can be achieved only by increasing rice production by 2 million tons per year over the existing in the coming decade (Sridhar *et al.*, 2011). In M.P. total area under rice production is 1.7 million ha in which only 223 thousands ha comes under irrigated situation. Total rice production is 1710 thousand tones in which 1313 thousand tones is from rained and 397 thousand tones is from irrigated area. The productivity of total rice area in M.P. is 1103kg/ha while irrigated area has 1273kg/ha.

Direct-seeded rice provides an option to make paddy cultivation cost effective and eco-

friendly, which saves not only labour required for transplanting but also helps to preserve natural resources especially underground water. Expansion in the irrigated area, introduction of early maturing rice cultivars, availability of selective herbicides for weed management together with increasing transplanting cost and declining profitability of transplanted rice production system have encouraged rice farmers to shift from transplanting to direct-seeding (Subbaiah *et al.,* 1999). One of the critical aspects of direct seeding of rice is time of sowing. Sowing time is the major factor that determines the productivity of a crop. Optimum planting time for a crop is location specific. Optimum planting time worked out June 1-10 in Punjab (Gill *et al.,* 2006), June 15 at New Delhi (Narayanaswamy *et al.,* 1982) and June 5-15 at Cuttack (Chandra *et al.,* 1991). Optimum sowing time thus needs to be standardized for every ago-ecological situation for success of direct seeded rice.

Gravois and Helms (1998) also showed that rice grain yields declined as seeding date was delayed. The sowing time of the rice crop is important for three major reasons. Firstly, it ensures that vegetative growth occurs during a period of satisfactory temperatures and high levels of solar radiation. Secondly, the optimum sowing time for each cultivar ensures the cold sensitive stage occurs when the minimum night temperatures are historically the warmest. Thirdly, sowing on time guarantees that grain filling occurs when milder autumn temperatures are more likely, hence good grain quality is achieved (Farrell *et al.,* 2003).

Sowing date also has a direct impact on the rate of establishment of rice seedling (Tashiro *et al.,* 1999). Rice varieties vary in their seedling vigor, weed competitiveness, submergence and drought tolerance, maturity duration, lodging resistance, affecting the resource utilization and productivity. Maximum numbers of total tillers are obtained when the crop was transplanted on 15 July, which decreased significantly with delayed planting on 30 July and 14 August (Patel, 1999). Early date of sowing is the best time of sowing for important properties such as maximum tillering, panicle initiation, heading date, number of tillers m^{-2}, plant height and root length at panicle initiation and heading stage, chlorophyll content, number of days to panicle initiation and heading date, leaf area index, sink capacity, spikelet's/leaf area ratio, Number of grains per panicle, panicle length (cm), 1000-grain weight (g), number of panicles m^{-2}, five panicle weight (g) and grain yield (T ha^{-1}) (Khalifa, 2009). Looking to these facts in view, the present research was taken up. Objective of this experiment was to find out the Performance of rained rice varieties under different dates of sowing in kymore plateau region.

Materials and Methods

The field experiment was conducted in *Kharif* season of 2014 at Instructional Farm, College of Agriculture, Rewa (M.P.) under All India Coordinated Rice Improvement Project. The weather conditions which prevailed during *Kharif* 2014 were favorable for growth and development of the rice crop. Monsoon commences in the first week of July and terminated in the last week of September. The rainfall during the crop season was 814.2 mm. Minimum and maximum temperature was 14.2 ^{0}C and 39.1^{0}C.

During this period, the relative humidity was maximum 62 to 100% and 22 to 80% was minimum. The experimental field was sandy clay loam in texture. It was normal electrical conductivity (0.42 dS/m) and just below neutral in reaction (pH 6.5). The organic carbon content was low (0.56-0.60%) while medium in available Nitrogen and phosphorus

contents 294-337, 18-36 respectively but high in potash content (314-611 kg/ha). The experiment was laid out in split-plot design with four replications. The treatments comprised of three sowing dates i.e. 3rd July, 8th July and 13th July in main plots and 5 varieties, Danteshwari, Vandana, IR 64, PS-3 and PS-5 in sub plots. The varieties were sown by direct seeding in lines 20 cm apart keeping a seed rate of 30kg/ha on 3rd, 8th and 13th July 2014. The seeds were treated with bavistin @ 2g/kg seed before sowing. Rice seeds were direct line sowed manually. The uniform dose of fertilizers (100 kg N, 60 kg P_2O_5 and 40 kg K_2O/ha) were applied in all the treatments. The crops were grown under recommended package of practices.

Results and Discussion

Growth parameters

The growth observations recorded periodically have exhibited many interesting architectural variations due to variation in sowing dates and varieties grown. The plant height and tillers/m row length, increased steadily in all the treatments with the successive growth and development stages i.e. from 30 DAS to 90 DAS or up to harvest stage. These growth parameters were, in general, enhanced very fast between 30 to 60 DAS; thereafter the rise was normally slow up to 90 DAS or harvest stage. Thus up to the harvest stage, plant height ranged from 78.70 to 100.79 cm and tillers 51.46 to 65.22/m row length under the various treatments. The initial plant population per m row length under each date of sowing was statistically uniform which might be due to fact that under each dates uniform number of seedlings per plot were planted. However, different varieties differed significantly with regard to plant population/m row length PS-3 registered significantly higher plant population (8.98/m row length) over the other varieties except PS-5. On the other hand Vandana recorded significantly lower plant population (8.41/m row length). Such type of variation in this parameter might be due to variation in the vitality and truthfulness of seed which influenced their generation and emergence per unit area.

As regards with the effect of different sowing dates, earliest 3rd July sowing produced significantly higher growth characters as compared to the sowing of crop on the later dates like plant height was 89.60 cm and tillers 59.53/m row length, but 13th July sowing date reduced all these parameters almost up to significant extent i.e. 88.14 cm plant height, 51.46 tillers/m row length. In fact, there is a vital role of time of planting in paddy crop because of the variation in the duration, photo-sensitiveness, thermo-sensitiveness and vegetative lag period of the variety. The variation in the above mentioned growth parameters have also been reported by many research workers (Vange and Obi, 2006; Sreenivas *et al.,* 2007; Rai and Kushwaha, 2008; Khalifa, 2009; Kerketta *et al.,* 2010; Singh *et al.,* 2012 and Limochi and Eskandari, 2013).

Amongst the varieties, PS-3 resulted in significantly higher number of tillers (65.22/m row length whereas IR-64 recorded significantly higher plant height (100.79 cm). The number of tillers/m row length (44.84 cm) was found significantly lower in case of Vandana. The other varieties also showed significant differences in all the growth characters under observation. Such type of variation in growth parameters among the different varieties might be owing to differences in their parental origin which caused variation in their genetically inheritance for such traits. The present funding corroborate with those of several researches (Ahn *et al.,* 2000; Balaswamy and Kulkarni, 2001; Mukesh *et al.,* 2008; Nawlakhe *et al.,* 2009, and Walia *et al.,* 2014) (Table 1).

Table.1 Growth parameters of upland rice as influenced by dates of sowing and varieties

Treatments	Plant population /m row length (10 DAS)	Plant height (cm)				Number of tillers/m row length		
		25 DAS	50 DAS	75 DAS	At harvest	25 DAS	50 DAS	At harvest
Dates of sowing: 3rd July	8.80	30.26	59.57	85.10	89.60	17.59	58.55	59.53
8th July	8.66	28.86	58.58	84.65	89.23	17.37	56.35	56.67
13th July	8.60	28.38	57.92	83.77	88.14	16.45	50.94	51.46
S.Em+	0.08	**0.65**	**0.38**	**0.77**	**0.52**	**0.41**	**0.31**	**0.33**
C.D. @ 5%	NS	NS	NS	NS	NS	NS	**1.09**	**1.13**
Varieties: Danteshwari	8.64	26.24	57.67	86.87	92.87	17.15	52.68	53.10
Vandana	8.41	26.95	62.44	91.20	98.63	13.75	44.27	44.84
IR-64	8.61	41.33	77.96	98.18	100.79	17.75	55.19	56.12
PS-3	8.98	26.04	47.33	72.58	78.70	18.66	64.61	65.22
PS-5	8.80	25.25	47.33	73.70	79.69	18.36	59.64	60.16
S.Em+	0.08	**0.87**	**0.54**	**0.66**	**0.57**	**0.46**	**0.60**	**0.52**
C.D. @ 5%	**0.24**	**2.49**	**1.54**	**1.89**	**1.64**	**1.32**	**1.72**	**1.49**
Interaction	NS	NS	NS	NS	NS	NS	NS	NS

Table.2 Yield and Economical gain upland rice as influenced by dates of sowing and varieties

Treatments	Grain yield (q/ha)	Straw yield (q/ha)	Harvest index (%)	Net income (Rs./ha)	B: C ratio
Dates of sowing: 3rd July	38.54	88.86	31.26	41446	3.13
8th July	37.52	87.65	31.21	40379	3.08
13th July	36.32	84.27	31.14	38024	2.96
S.Em+	0.17	0.46	0.08	-	-
C.D. @ 5%	**0.58**	**1.59**	NS	-	-
Varieties: Danteshwari	36.29	67.18	35.07	36330	2.87
Vandana	28.96	58.53	33.14	25504	2.32
IR-64	38.38	70.42	35.41	39485	3.04
PS-3	43.27	108.84	28.35	49778	3.55
PS-5	40.90	129.66	24.05	48652	3.49
S.Em+	0.48	1.75	0.27	-	-
C.D. @ 5%	**1.38**	**5.01**	**0.78**	-	-
Interaction	NS	NS	NS	-	-

Productivity parameters

Grain yield (38.54 q/ha) straw yield (88.86 q/ha) and harvest index (31.26%) was maximum in case of earliest 3rd July sowing date. The significantly lowest grain yield (36.32 q/ha) and straw yield (84.27 q/ha) was noted in case of late sowing date of 13th July under upland conditions. The variety PS-3 produced highest grain (43.27 q/ha) but lower straw (108.84 q/ha). However, the reverse was true in case of PS-5 variety of rice. The grain yield was lower (40.90 q/ha) and straw yield was highest (129.66 q/ha). However, the harvest index was found maximum (35.41%) from variety IR- 64, closely followed by Danteshwari (35.07%). The significantly lowest grain yield (28.96 q/ha) and straw yield (58.53 q/ha) was recorded from Vandana variety. The variety IR-64 attained the third position with the productivity parameters.

Economical gain

Sowing on 3rd July of upland rice proved most beneficial giving maximum net income up to Rs. 41446/ha with B: C ratio 3.13. The crop sown five days late on 8th July reduced the net income by Rs. 1067/ha, then when sown ten days late on 13th July, the net income reduced up to Rs. 3422/ha. In case of rice varieties, PS-3 proved its superiority by giving highest net income up to Rs. 49778/ha with B: C ratio 3.55. However the second equally best variety was PS-5 giving net income up to Rs. 48652/ha with B: C ratio 3.49. The third best variety was IR-64 nearly giving net income up to Rs. 39.485/ha with B: C ratio 3.04. This was followed by Danteshwari and then Vandana giving lowest net income up to Rs. 25504/ha in related to the crop productivity and the gross income received (Table 2).

Based on the research findings, it can be concluded that Among the dates of sowing of upland rice, 3rd July proved the best giving maximum growth parameters, yield attributes and grain yield up to 38.54 q/ha with net income up to Rs. 41446/ha and Among the varieties, PS-3 and then PS-5 resulted in maximum growth parameters, yield attributes and grain yield up to 40.90 to 43.27 q/ha with net income up to Rs. 48652 to 49778/ha. Based upon the grain yield it can be concluded that varieties PS-3 or PS-5 may be grown on 3rd July to obtain maximum productivity and economical grain from rice under upland conditions of this region.

References

Ahn D, Choi JS, Choi CD, Lee SP Choi BS and Lee SC. 2000. Effects of seeding dates for direct seeding on dry paddy on growth and yield of rice varieties in Youngnam region. Korean Journal of Crop Science. 45(3): 185-189.

Anonymous. 2014. Annual report. Department of Agriculture and Cooperation Ministry of Agriculture Government of India.

Balaswamy K and Kulkarni N. 2001. Influence of time of transplanting on the performance of certain scented rice varieties in Andhra Pradesh. Journal of Research ANGRAU. 29(2/3):98-101.

Chandra D, Moorthy BTS, Jha KP and Manna GB. 1991. Agronomic practices for augmenting rice (*Oryza sativa*) production in rained upland ecosystem of Orissa. Indian Journal of Agronomy. 36:313-21.

Gill MS, Kumar A and Kumar P. 2006. Growth and yield of rice (*Oryza sativa*) cultivars under various methods and time of sowing. Indian Journal of Agronomy. 51:123-27.

Gravois KA and Helms RS. 1996. Seeding rate effect on rough rice yield, head rice and total milled rice. Agronomy Journal. 88:82-84.

Kerketta NK, Dwivedi SK, Shrivastava GK and Saxena RR. 2010. Rooting pattern and yield of rice under rained upland situation in Alfisol with different sowing dates and P and K levels. Current Advances in Agricultural Sciences. 2(2): 115-117.

Khalifa AABA 2009. Physiological evaluation of some hybrid rice varieties under different sowing dates. Australian Journal of Crop Science 3(3): 178-183.

Limochi K and Eskandari H. 2013. Effect of planting date on performance of flag leaf stomata and grain yield of rice cultivar. Internation Journal of Agronomy and Plant Production 4(4): 769-773.

Mukesh, Singh I, Pannu RK, Prasad D and Ram A. 2009. Effects of different transplanting dates on yield and quality of basmati rice (*Oryza sativa*) varieties. Chaudhary Charan Singh Haryana Agricultural University, Hisar.

Nawlakhe SM. Mankar DD, and Jiotode DJ. 2009. Performance of basmati type scented rice (*Oryza sativa* L.) cultivars under different dates of transplanting in eastern Vidarbha. Crop Research (Hisar). 37(1/3):158-160.

Rai HK and Kushwaha HS. 2008. Effect of planting dates and soil water regimes on growth and Yield of upland rice. Oryza - An International Journal on Rice. 45(2): 129-132.

Singh AK, Chandra N and Bharti RC. 2012. Effects of genotype and planting time on phonology and performance of rice (*Oryza sativa* L.). Vegetos 25(1):151-156

Sridhar CJ, Ramchandappa BK, Nanjappa HV and Mavarkar NS. 2011. Effect of Genotypes, planting geometry and method of establishment on growth and yield of aerobic rice. Mysore journal of Agriculture Science. 45(3): 501-505.

Tashiro T, Saigusa M and Shibuya K. 1999. A Trial of No-tillage Direct Seeding of Rice (*Oryza sativa* L.) at Early Spring in Cold Climate Region in Japan. Japanese Journal of Crop Science 68(1): 146-150.

Vange T and Obi IU. 2006. Effect of planting date on some agronomic traits and grain yield of upland rice varieties. Sustainable Development on Agricultural Environment. 2(1):1-9.

Walia US, Walia SS, Sindhu and Nayyar S. 2014. Production of direct-seeded rice in relation to different dates of sowing and varieties in central Punjab. Journal of crop weed.10 (1):126-129

How to cite this article:

Punit Tiwari, R.K. Tiwari, Amrita Tiwari and Jyoti Tiwari. 2018. Performance of Upland Rice Varieties on Different Dates of Sowing in Kymore Plateau Region of Madhya Pradesh, India. *Int.J.Curr.Microbiol.App.Sci.* 7(04): 236-241. doi: https://doi.org/10.20546/ijcmas.2018.704.026