International Journal of Research in Agronomy

E-ISSN: 2618-0618
P-ISSN: 2618-060X

www.agronomyjournals.com
2024; SP-7(11): 251-255
Received: 20-09-2024
Accepted: 22-10-2024

P Spandana Bhatt P
Scientist, Institute of Rice Research Centre, Professor Jayashankar Telangana Agricultural University, Hyderabad, Telangana, India

P Raghu Rami Reddy
Director of Research, Institute of Rice Research Centre, Professor Jayashankar Telangana Agricultural University, Hyderabad, Telangana, India

YC Mohan
Principal Scientist, Institute of Rice Research Centre, Professor Jayashankar Telangana Agricultural University, Hyderabad, Telangana, India

L Krishna
Principal Scientist, Institute of Rice Research Centre, Professor Jayashankar Telangana Agricultural University, Hyderabad, Telangana, India

TK Babu
Principal Scientist, Institute of Rice Research Centre, Professor Jayashankar Telangana Agricultural University, Hyderabad, Telangana, India

NRG Varma
Principal Scientist, Institute of Rice Research Centre, Professor Jayashankar Telangana Agricultural University, Hyderabad, Telangana, India

Corresponding Author:
P Spandana Bhatt P
Scientist, Institute of Rice Research Centre, Professor Jayashankar Telangana Agricultural University, Hyderabad, Telangana, India

Performance of elite rice cultures under different dates of sowing

P Spandana Bhatt P, P Raghu Rami Reddy, YC Mohan, L Krishna, TK Babu and NRG Varma

DOI: https://doi.org/10.33545/2618060X.2024.v7.i11Sd.1975

Abstract
A field experiment was conducted during Kharif, 2021at Institute of Rice Research, Rajendranagar, and Hyderabad in Telangana state. The experiment was laid out in split plot design with consisting of two sowing dates in main plots i.e. June 2nd week and July 1st week and 4 pre released rice cultures WGL 1289, RNR28361, RDR 1200, JGL 33134 and two check varieties WGL 44 and RNR 2458. Rice transplanted during June 2nd week and July 1st week recorded on par grain yield. Among the elite cultures WGL 1289 recorder significantly higher grain yield (6295 kg/ha) followed by RDR 1200 (5848 Kg/ha) which is in turn on par with WGL 44.

Keywords: Cultures, rice, dates of sowing and varieites

Introduction
The time of sowing in rice is critical to ensure higher yields sowing too soon or too late reduces yield in ways that no other input or practice can compensate for (Kapoor *et al*., 2017) [10]. Various studies revealed that changes in microclimate by altering sowing dates has great role to play during vegetative and reproductive stages of the crop and also nutrient content and its uptake which ultimately affects the yield potential. Among the crop production tools, optimum time and method of sowing are the important agronomic tools that allow the crop to complete its growth timely and successfully under specific agro-ecology zone. Thus, determining the sowing time is critical to maximize yield and grain quality. To reduce growing environment risks, the impact of climate change mitigation strategies and management systems for crop adaptation to climate change conditions should be considered (Kumar *et al*., 2017) [6].

Climate is the most important factor that influence the crop yield and it is uncontrollable. To ensure global food security the one of the effective way is to adaptation to climate change. adjusting the sowing dates during the crop season is the non-monetary input method for regulating the influence of the climate parameters, thereby decreasing the negative weather parameters on rice production. Optimising the sowing date to increase yield is the easiest way for the farmers to adopt the varieties for cultivation.

Some researchers suggested that adjusting the rice sowing date in Sichuan province could improve dry matter accumulation and grain yield (Zhang, 2013) [14]. This is owing to higher solar radiation and lower temperature during the growing season, which contributed to higher dry matter accumulation pre- and post-anthesis and a greater number of panicles. Tu and Jiang (Zhong, 2021) [15] investigated the rice responses to temperature and solar radiation variations and suggested that delaying the sowing date could stabilize and improve rice yield and resource use efficiency in central China. A similar study has been reported in India that the delay of the sowing date increased the amount of dry matter and nitrogen uptake at anthesis, which increased the grain yield of rice (Jiang, 2019) [12].

Hence sowing date adjustment to new cultures to synchronise crop phenophases with favourable weather parameters is the practical, economical strategy to reap higher grain yield.

Therefore, present investigation was carried out to check the performance of the rice cultures under two dates of sowing keeping the prominent check varieities.

Material and Methods

The investigation was carried out during *Kharif* 2022 at Institute of Rice Research, Professor Jayashankar State Agricultural university, Rajendranagar, Hyderabad, situated at an altitude of 542.3 m above MSL at 17°19' N latitude and 78°23' E longitude. It is in the Southern Telangana agro-climatic zone of Telangana state. According to Troll's climatic classification, it falls under semi-arid tropics (SAT). The soil of the experiment cites was clay loam in texture. Low in available Nitrogen (196 kg ha^{-1}), high in phosphorus (79 kg ha^{-1}) and potash content (485 kg ha^{-1}). The experiment was laid out in split plot design with three replications. Treatments consist of two dates of sowing staring from June 2nd week and July 1st week. In both dates transplanting was done with respective 25 days old seedling with 2-3 seedlings per hill. Cultures in sub plot consist of WGL 1289, RNR28361, and RDR 1200, JGL 33134 and two check varieties WGL 44 and RNR 2458. Row to row distance was 20 cm and plant to plant 15 cm was maintained. Recommended dose of 120-60-40 kg NPK were supplied to the crop. The recommended dose of 60 kg P_2O_5, half of the recommended K_2O and 1/3rd of nitrogen were applied as basal dose. Remaining nitrogen was applied in two equal splits at 20 days after planting and at panicle primordial initiation (PI) stage. Remaining potash was applied at PI stage along with nitrogen. A thin film of water was maintained at the time of transplanting. Later, a submergence depth of 5 ± cm was maintained up to tillering stage later 2+cm maintained up to physiological maturity. Ten days before harvest the water was drained off from the field to facilitate ripening and maturity. Harvesting was done at physiological maturity, judged visually when about 95 per cent grains were turned into golden color. Initially the border rows were harvested. Later the net plot hills were harvested and bundled. The post-harvest observations were recorded from the harvest samples. The hills from net plot area were threshed and winnowed. After sun drying, the net plot grain yields and straw were recorded treatment wise and reported in kg ha^{-1}.

Plant height was measured from ten tagged hills by measuring length from the basal node of the plant to the tip of the longest leaf at harvest. Mean height was presented as cm. Four samples of 2×2 hills were ear marked at random at four places in each treatment for tiller count. The wooden peg was fixed at the centre of four hills. Totally, sixteen hills per plot were considered for tiller count. The total number of tillers was presented as number m^{-2}. Ten panicles were selected randomly from the net plot area for recording the panicle length. It was measured from the base of the primary rachis to top most spikelet and average was calculated to get the mean length of panicle. Weight of ten sampled panicles was recorded and mean values were calculated. Total number of spikelets from same ten panicles was counted and filled grains were separated and counted and then mean values were reported. Dried seed samples were drawn randomly from each treatment and 1000 grains were counted and weight was recorded in grams. The grain yield from each net plot area treatment wise including 16 hills was weighed and expressed as kg ha^{-1}.

Results

Plant height at maturity

At maturity (Table1) crop sown on June 2nd week recorded highest plant height (109.0cm), however it was on par with the July 1st week sown crop (107.9 cm). Among the cultures WGL1289 recorded significantly taller plants (146.9 cm) followed by RDR1200 (109.8 cm) and was on par with JGL33134 (108.4 cm), followed by RNR 2458 (97.2 cm) and was on par with RNR28361 (96.8 cm) and shortest plant height was recorded in entry WGL 44 (91.7 cm). The interaction effect of dates of sowing (Table 2) and cultures on plant height was significant. Rice cultures at same level of date of sowing and date of sowing at same level of rice cultures WGL1289 recorded significantly highest plant height (145.9 am and 148.0 cm respectively). Results are in accordance with the findings of (Akram *et al*., 2007) [2].

Number of tillers m^{-2} at maturity and days taken to 50% flowering

Number of tillers m^{-2} at maturity (Table 1) was significantly effected by dates of sowing and different cultures. At maturity crop sown on June 2nd week recorded significantly highest no. of tillers m^{-2} (385) and was followed by the July 1st week sown crop (349). Among the cultures WGL 44 recorded significantly highest no of tillers m^{-2} (415) and was on par with RNR28361 (402) and it was followed by RNR 2458 (395) further followed by RDR1200 (348), it was statistically at par with WGL1289 (343). Significantly lowest no. of tillers m^{-2} was recorded with JGL33134 (297). The interaction effect of dates of sowing and cultures (Table 3) on no. of tillers m^{-2} was significant. All the cultures recorded decrease in no. of tillers m^{-2} during July 1st week sown crop compared to June 2nd week except WGL1289 which recorded increased no. of tillers m^{-2} during later sown crop. The results are in close conformity with Dawadi and Chaudhary (2013) [7], who also found highly significant difference in number of tiller $plant^{-1}$ due to variety.

June 2nd week sown crop taken significantly more day to attain 50% flowering (Table1) than late sown by 15 days. Among the cultures RNR 2458 (104) took significantly higher days compared to other cultures. Significantly lower number of days to attain 50% flowering was taken by culture RNR 28361 (99).

Number of panicles m^{-2} at maturity

Number of panicles m^{-2} at maturity (Table 4) was significantly effected by dates of sowing and different cultures. At maturity crop sown on June 2nd week recorded significantly highest no. of panicles m^{-2} (356) and was followed by the July 1st week sown crop (325). Among the cultures WGL 44 recorded significantly highest no. of panicles m^{-2} (390) and was on par with RNR28361 (378) and it was followed by RNR 2458 (376) further followed by RDR1200 (326), it was statistically at par with WGL1289 (312). Significantly lowest no. of panicles m^{-2} was recorded with JGL33134 (262). The interaction effect (Table 5) of dates of sowing and cultures on no. of panicles m^{-2} was significant. All the cultures recorded decrease in no. of panicles m^{-2} during July 1st week sown crop compared to June 2nd week. (Akhter *et al*., 2016 and Allah *et al*., 2019) [1, 3].

Panicle length (cm) and weight (g)

Early sown crop recorded significantly (Table 4) lengthiest panicles (25.3cm) than later sown (24.4 cm) among the cultures significantly lengthy panicles were recorded by WGL1289 (27.5 cm) followed by JGL33134 (25.3 cm), RDR1200 (24.9 cm), RNR28361 (24.5 cm), WGL 44 (24.1 cm) were on par with each other. Significantly shortest panicles were recorded in RNR 2458 (22.9 cm). Panicle weight recorded non-significant results with respective to dates of sowing and cultures. Anil, D and Siddi S, 2020 [4] and Begum *et al*., 2018 [5] reported similar results.

Number of filled and chaffy grains panicle^{-1}: June 2nd week sown crop recorded significantly lower number of (Table1) filled grains panicles^{-1} (260) compared to 15 days delay sown crop (277) while dates of sowing was non-significant with respective to the chaffy grains panicle^{-1}. Among the cultures significantly highest number of filled grains panicles^{-1} recorded in JGL33134 (396) and was followed by RDR1200 (300) which was on par with WGL 44 (281), further followed by RNR 2458 (220) which was statistically at par with WGL1289 (214) and RNR28361 (200). Significantly lower number of chaffy grains was recorded on WGL1289 (19) and was on par with JGL33134 (22) further followed by remaining all cultures, which were on par with each other. Interaction effect of chaffy grains (Table 6) with respective to cultures was significant. Yuan *et al*. (2004), who also reported that, sowing date of rice not only had effects on the grain filling parameters, but also on the difference of grain filling parameters between the two cultivars. These results are in conformity with findings of Nagabhushanam U and Bhatt PS (2020) [11].

Test weight (g): Test weight was non-significant (Table 4) with respective to dates of sowing. These results clearly indicated that, Test weight is a varietal genetically feature which might be affected least with the environmental conditions. Among the tested cultures significantly highest test weight was recorded with RNR28361 (25.6 g) and was on par with WGL1289 (24.1g), it was followed by RNR 2458 (14.5 g) which was on par with remaining cultures i.e., RDR1200 (14.3 g), JGL33134 (14.0 g) and WGL 44 (13.6 g). Test weight interaction recorded non-significant results with respective to dates of sowing and cultures. Chengde *et al*., 2017 [6] also reported similar similar results.

Grain yield (kg ha^{-1})

Grain yield (Table 4) was significantly effected by Different tested cultures. WGL1289 (6295) recorded significantly highest grain yield, followed by RDR1200 (5848), further followed by WGL 44 (5564) and was at par with JGL33134 (5553), RNR 2458 (5377) and RNR28361 (5344). Grain was not effected by dates of sowing with 15 days interval and interaction was also non-significant. (Jagtap *et al*., 2016 and Kapoor *et al*., 2017) [8, 10].

Table 1: Growth and phenology of rice cultures as influenced by different dates of sowing during *Kharif*, 2021

Treatments	Plant Height (Cm) At Harvest	No Tillers/M^2 At Harvest	Number of Days Taken 50% Flowering	No of Filled Grains/Panicles	No of Chaffy Grains/Panicles
Main Plots: Dates of Sowing					
D1:18.June .2021	109.0	385	104	260	25
D2:05.July.2021	107.9	349	100	277	23
S.E.M±	0.86	1.32	0.1	2.3	2.4
CD (P=0.05)	NS	8	0.6	14	NS
Subplots: rice cultures					
WGL1289	146.9	343	103	214	19
WGL 44	91.7	415	103	281	29
RNR28361	96.8	402	99	200	24
RDR1200	109.8	348	101	300	27
RNR 2458	97.2	395	104	220	24
JGL33134	108.4	297	101	396	22
S.E.M±	1.24	5.59	0.38	11.2	1.7
CD (P=0.05)	3.7	16	1	33	5
Interaction					
Rice cultures at same level of D/S					
S.E.M±	2.11	3.25	0.25	5.64	5.9
CD (P=0.05)	6.47	24.1	NS	NS	11
D/S at same level of variety					
S.E.M±	1.82	7.33	0.5	16.4	3.3
CD (P=0.05)	6.7	22.4	NS	NS	15

Table 2: Plant height interaction effect of varieties under different dates of sowing during *Kharif*, 2021

	WGL1289	WGL 44	RNR28361	RDR1200	RNR 2458	JGL33134	Mean
D1:18.June.2021	145.9	92.5	93.2	111.4	98.6	112.6	109
D2:05.July.2021	148	90.9	100.5	108.2	95.7	104.3	107.9
Mean	147.0	91.7	96.9	109.8	97.2	108.5	108.5
Rice cultures at same level of D/S				D/S at same level of variety			
S.E.M±	2.11			S.E.M±	1.82		
CD (P=0.05)	6.5			CD (P=0.05)	6.7		

Table 3: Interaction effect of No tillers/m^2 of varieties under different dates of sowing during *Kharif*, 2021

	WGL1289	WGL 44	RNR28361	RDR1200	RNR 2458	JGL33134	Mean
D1:18.June.2021	334	446	432	369	402	325	385
D2:05.July.2021	352	383	372	328	389	269	349
Mean	343	415	402	348	395	297	
Rice cultures at same level of D/S				D/S at same level of variety			
S.E.M±	3.25			S.E.M±	7.33		
CD (P=0.05)	24			CD (P=0.05)	22		

Table 4: Yield attributes and yield of varieties as influenced by different dates of sowing during *Kharif*, 2021

Treatments	No of Panicles/M^2	Panicle Length (Cm)	Panicle Weight(G)	Test Weight (G)	Grain Yield (Kg/Ha)
Main Plots: Dates of Sowing					
D1:18.June.2021	356	25.3	2.0	17.8	5545
D2:05.July.2021	325	24.4	2.3	17.5	5782
S.E.M±	2.99	0.03	0.05	0.24	68.4
CD (P=0.05)	18	0.2	NS	NS	NS
Subplots: Cultures					
WGL1289	312	27.5	2.4	24.1	6295
WGL 44	390	24.1	2.2	13.6	5564
RNR28361	378	24.5	2.3	25.6	5344
RDR1200	326	24.9	2.3	14.3	5848
RNR 2458	376	22.9	1.9	14.5	5377
JGL33134	262	25.3	1.9	14.0	5553
S.E.M±	5.42	0.64	0.21	0.5	145.7
CD (P=0.05)	16	1.8	NS	1.54	430
Interaction					
Rice cultures at same level of D/S					
S.E.M±	1.33	0.07	0.14	0.6	167.6
CD (P=0.05)	26	NS	NS	NS	NS
D/S at same level of variety					
S.E.M±	7.61	0.82	0.28	0.72	200.2
CD (P=0.05)	26	NS	NS	NS	NS

Table 5: Interaction effect of No EBT/m^2 of varieties under different dates of sowing during *Kharif*, 2021

	WGL1289	WGL 44	RNR28361	RDR1200	RNR 2458	JGL33134	Mean
D1:18.June.2021	315	422	401	341	381	276	356
D2:05.July.2021	309	359	355	311	371	248	326
Mean	312	391	378	326	376	263	312
Rice cultures at same level of D/S				D/S at same level of cultures			
S.E.M±	1.33			S.E.M±	7.61		
CD (P=0.05)	26			CD (P=0.05)	26		

Table 6: Interaction effect of No. chaffy grains/panicle of varieties under different dates of sowing during *kharif*, 2021

	WGL1289	WGL 44	RNR28361	RDR1200	RNR 2458	JGL33134	Mean
D1:18.June.2021	16	34	29	35	21	18	25
D2:05.July.2021	21	23	19	20	28	26	23
Mean	19	29	24	27	25	22	
Rice cultures at same level of D/S				D/S at same level of cultures			
S.E.M±	5.9			S.E.M±	3.3		
CD (P=0.05)	11			CD (P=0.05)	15		

Conclusion

In southern Telangana Zone, Rice transplanted during June 2nd week and July 1st week recorded on par grain yield. Among the elite cultures WGL 1289 recorder significantly higher grain yield (6295 kg/ha) followed by RDR 1200 (5848 Kg/ha) which is in turn on par with WGL 44

References

1. Akhter M, Mahmood A, Raza MA, Haider Z, Saleem U, Bibi T. Effect of transplanting dates on cooking, milling and eating quality parameters of some fine and coarse grain rice lines. Int J Nutr Food Sci. 2016;8(4):254-258.
2. Akram HM, Ali A, Nadeem MA, Iqbal S. Yield and yield components of rice (*Oryza sativa* L.) varieties as affected by transplanting dates. J Agric Res. 2007;45(2):105-111.
3. Allah MMA, Mikhael BB, Rahem AWT. Performance of different rice genotypes under different production conditions. 2019;10(12):973-981.
4. Anil D, Siddi S. Performance of pre-released rice (*Oryza sativa* L.) genotypes under different sowing windows in Rabi season. Int J Environ Climate Change. 2020;10(10):43-51.
5. Begum S, Rahman MH, Nasif SO, Ahamed KU. Effect of sowing dates on some morpho-physiological traits of an exotic hybrid rice variety in Bangladesh. J Agric Ecol Res Int. 2018;15(2):1-10.
6. Chengde PD, Chavan SA, Patil A, Kumar S. Effect of sowing times on yield and economics of different rice genotypes under climatic condition of Konkan. J Pharmacogn Phytochem. 2017;6(5):2462-2466.
7. Dawadi KP, Chaudhary NK. Effect of sowing dates and varieties on yield and yield attributes of direct seeded rice (*Oryza sativa* L.) in Chitwan condition. J Agric Environ. 2013;14:121-130.
8. Jagtap DN, Chavan VG, Mahadkar UV, Chavan SA. Effect of sowing times on the yield and yield attributes of rice (*Oryza sativa* L.) varieties. J Indian Soc Coastal Agric Res. 2016;34(2):27-30.
9. Liu K, Song C, Ye P, Liu H, Xia Z, Waseem H, *et al*. Optimizing rice sowing dates for high yield and climate adaptation in Central China. Agronomy. 2023;13:1339.
10. Kapoor A, Singh I, Serawat M, Dhaiya S, Meena D, Meena BR. Effects of different dates of transplanting on yield attributes, yields and quality of non-scented varieties of rice

(*Oryza sativa*). Int J Chem Stud. 2017;5(6):831-833.
11. Nagabhushanam U, Bhatt PS. Effect of sowing dates and nutrient management practices on yield attributes, yield and economics of rice (*Oryza sativa* L.). Int J Chem Stud. 2020;8(3):668-673.
12. Tu D, Jiang Y, Liu M, Zhang L, Chen L, Cai M, *et al*. Improvement and stabilization of rice production by delaying sowing date in irrigated rice system in central China. J Sci Food Agric. 2019;100:595-606.
13. Yuan JC, Liu CJ, Zhu QS, Li JQ, Yang JC. Effects of sowing date on grain filling properties of rice (*Oryza sativa* L.). Southwest China J Agric Sci. 2004;17(2):164-8.
14. Zhang Z, Shi W, Liu Y, Xiao D, Zhang S, Zhu Z, *et al*. Single rice growth period was prolonged by cultivars shifts but yield was damaged by climate change during 1981–2009 in China, and late rice was just opposite. Glob Change Biol. 2013;19:3200-9.
15. Zhong XY, Li QP, Yang F, Chen D, He LH, Yang ZP, *et al*. Higher solar radiation and lower temperature enhance biomass production and grain yield of rice under high-altitude condition. Arch Agron Soil Sci. 2021;68:1664-1680.