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Performance of rice (*Oryza sativa*) varieties under different times of planting

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ABSTRACT

A field experiment was conducted during the rainy (*kharif*) season of 1997 and 1998 on alfisols at Agricultural Research Station, Utukur, Cuddapah, Andhra Pradesh, to study the performance of 4 varieties of rice (*Oryza sativa* L.) under different times of planting. Planting of rice varieties on 16 August gave significantly higher grain yield than that of other times of planting. Among rice varieties, 'NLR 33641' outyielded other varieties. Irrespective of rice varieties, the grain yield decreased by 175 and 170 kg/ha for every 15 days delay in planting during 1997 and 1998 respectively.

Key words : Rice, Yield

Under natural conditions, environmental factors are the most difficult to be controlled and exert a profound effect on crop growth and grain yield of rice. Therefore, a considerable variation in plant behaviour for its vertical and horizontal extension in the field is natural. Growth parameters could serve as an index for rapid selection for higher photosynthetic efficiency and productivity, particularly for new high-yielding rice varieties of mid-and late-maturing group. Hence, the present study was taken up to identify suitable rice varieties and the suitable time of planting for rainy (*kharif*) season.

MATERIALS AND METHODS

The field study was conducted at Agricultural Research Station, Utukur, Cuddapah (Dist.) during the rainy (*kharif*) season of 1997 and 1998. The experiment comprised 4 dates of transplanting (16 August, 1 and 16 September and 1 October) in main plots and 4 rice varieties ['BPT 5204' and 'MTU 4870' (medium duration of 140–145 days) and 'NLR 28600' and 'NLR 33641' (long duration of 150–160 days)] in subplots. The soil was red sandy loam, having pH 8.1, electrical conductivity 0.16 mmhos/cm, organic carbon low (0.45%) and 19.0 and 490.0 kg/ha available

P_2O_5 and K_2O respectively.

The crop was planted at a spacing of 15 cm × 15 cm with 2 seedlings/hill in split-plot design keeping 4 replications. Staggered sowing of nursery was done 1 month before transplanting to get 30-day-old seedlings at the time of transplanting. The crop was fertilized with 100 kg N, 60 kg P_2O_5, 40 kg K_2O/ha. Nitrogen was applied in 3 equal splits at transplanting, active tillering and panicle-initiation stage. Full dose of P_2O_5 and K_2O were broadcast uniformly at the time of transplanting.

RESULTS AND DISCUSSION

Yield attributes

Plant height, productive tillers/m^2, filled grains/panicle, and test weight were found highest in the crop transplanted on 16 August, followed by 1 and 16 September, and lowest in 1 October planting, except where the plant height and test weight were higher on 1 September 1997 transplanting (Table 1). In 1997, the differences in these parameters between 16 September and 1 October were not significant except productive tillers/m^2, whereas in 1998 the 16 August planting was either significant or at par with 1 September transplanting. Among varieties, 'NLR 28600' gave significantly taller plants than other varieties during 1997, whereas in 1998, 'NLR 33641' produced significantly taller plants compared with other varieties. The variety 'BPT 5204' recorded lowest values of all yield attributes.

Yield and harvest index

The highest grain and straw yields were recorded in 16 August transplanting and were significantly superior to other dates of transplanting (Table 2). There was 7, 15

Table 1. Effect of time of transplanting and rice varieties on yield attributes

Treatment	Plant height (cm)		Productive tillers/m^2		Filled grains/ panicle		Test weight (g)	
	1997	1998	1997	1998	1997	1998	1997	1998
Time of transplanting (TT)								
16 August	119.1	125.2	242.6	246.7	197.8	200.4	18.42	20.08
1 September	121.8	120.5	234.4	235.3	189.8	192.2	18.78	20.06
16 September	118.4	119.7	229.4	232.7	180.7	182.6	18.22	19.91
1 October	116.8	112.6	220.8	225.7	178.6	180.3	18.10	19.68
CD (P=0.05)	2.5	1.8	6.6	6.3	3.5	4.0	0.20	0.34
Varieties (V)								
'BPT 5204'	87.3	92.2	219.1	222.6	152.9	154.6	14.17	14.84
'MTU 4870'	101.5	112.7	239.7	240.9	138.9	140.8	19.69	21.97
'NLR 28600'	146.6	133.2	231.3	234.7	220.0	222.7	19.82	21.49
'NLR 33641'	140.9	140.0	236.8	242.0	235.1	237.3	19.84	21.74
CD(P=0.05)	3.8	2.4	5.6	13.7	6.6	7.1	0.43	0.70
Interaction								
TT × V	NS	NS	NS	NS	NS	NS	NS	NS

NS, Not significant

Table 2. Effect of time of planting and rice varieties on yield and harvest index

Treatment	Grain yield (kg/ha)		Straw yield (kg/ha)		Harvest index	
	1997	1998	1997	1998	1997	1998
Time of transplanting (TT)						
16 August	4,669	4,687	8,611	8,704	0.36	0.37
1 September	4,372	4,287	7,976	7,939	0.36	0.36
16 September	4,061	3,870	7,817	7,096	0.35	0.36
1 October	3,604	3,696	7,222	7,052	0.34	0.35
CD (P=0.05)	253	237	493	434	0.01	NS
Varieties (V)						
'BPT 5204'	3,366	3,461	5,212	4,774	0.39	0.42
'MTU 4870'	4,167	4,113	6,435	6,026	0.39	0.41
'NLR 28600'	4,497	4,357	10,787	9,913	0.33	0.31
'NLR 33641'	4,676	4,574	9,180	10,078	0.30	0.31
CD(P=0.05)	232	203	476	335	0.02	0.02
Interaction						
TT×V	NS	NS	NS	NS	NS	NS

NS, Not significant

and 30%; and 9, 21 and 27% increase in grain yield with 16 August transplanting over 1 and 16 September 1997 and 1 October 1998 respectively. The average grain yields obtained in 1997 were higher than in 1998. The grain yield obtained in 16 August transplanting was higher during both the years compared to other dates of planting. This might be due to the availability of more sunshine hours during the critical periods which ultimately had its pronounced effect on more number of productive tillers/m^2 and filled grains/ panicle at harvest (Table 1). Increase in grain yield during the period of more sunshine was reported by Watanabe and Takeichi (1991). This is due to higher conversion of light energy into chemical energy and its subsequent translocation to assimilatory organs in 16 August transplanting, followed by 1 and 16 September and 1 October.

Among varieties, 'NLR 33641' gave 4, 12 and 30% and 5, 11 and 32% higher grain yield than 'NLR 286000', 'MTU 4870' and 'BPT 5204' in 1997 and 1998 respectively The grain yield obtained from 'MTV 4870 was 24 and 19% more than that fram 'BPT 5204' in 1997 and 1998 respectively. The grain yields in mid-duration varieties were lower than of long-duration varieties, which might be due to lesser number of productive tillers/m^2, filled grains/panicle and test weight. The differences for straw yield among varieties were significant. The 'NLR 28600' gave significantly higher straw yield than all other varieties during both the years except during 1998 wherein it was at par with 'NLR 33641'. The harvest index was higher with 'BPT 5204' and it was significantly superior to 'NLR 28600' and 'NLR 33641' during both the years.

All the interaction effects were not significant during both the years.

Irrespective of rice varieties, the grain yield decreased by 175 and 170 kg/ha for every 15 days delay in planting during 1997 and 1998, respectively.

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