EFFECT OF DIFFERENT DATES OF DRY SEEDING AND STAGGERED NURSERY SOWING ON GROWTH AND YIELD OF *KHARIF* RICE

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ABSTRACT

A field experiment was conducted to study the effect of different dates of dry seeding and staggered nursery sowing on growth and yield of *Kharif* rice. The experiment was based on the difficulties faced by the farmers in the coastal areas of Andhra Pradesh and those who depend on canal irrigation and are located at the tail end areas. The experimental results have showed no difference among the methods of stand establishment in terms of yield. However, among the dates of sowing the delay in sowing beyond 30th July significantly reduced the grain yield and returns per rupee invested. It has been concluded that the rice crop may be established either by direct seeding or by transplanting nurseries but the sowing of the respective cultures should be done by the end of July for obtaining maximum yield and profits.

Key words: Rice, direct seeding, staggered nursery sowing, yield

In Andhra Pradesh rice is largely grown in coastal districts, which contribute 60 percent of the state rice production. In some of these areas farmers are compelled to transplant the crop late in the season with aged seedlings due to late onset of monsoons and late filling of the reservoirs and subsequently late release of canal water. This problem is further aggravated in tail end areas of canal irrigation system, where water supply is delayed by another 15 days resulting into lower yields. The research conducted at various locations revealed that late transplanting of the rice crop reduces the yield in the range of 30-60 percent (Surenderreddy and Buchareddy, 1992; Paliwal *et. al*., 1996). To solve such problem there could be two possible strategies that need to be evaluated through experimentation. One could be dry seeding of rice directly in the filed with onset of monsoons and converting the dry field

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into wet condition as soon as canal water is released. In areas with high water table the maintaining of Water in the field is not a problem even without puddling. If proven effective it can help in overcoming the problem of delayed sowing. The other strategy could be staggered sowing of nurseries at different dates so as to facilitate transplanting of right aged seedlings depending upon the letting of water into canal. This can help in avoiding yield loss due to transplanting aged seedlings. The present investigation was, therefore, undertaken, to compare the initial direct seeding and later converting into wet with that of transplanting after receipt of canal water and also to find out the suitable date of dry seeding and compare them with corresponding sowing dates in the nursery.

MATERIALS AND METHODS:

The experiment was conducted in the agricultural farm of the Bapatla Agricultural College, Andhra Pradesh during the *Kharif* season, 1996. The soil was sandy clay loam with a pH of 8.3, and EC of 0.2 ds m^{-1}. The organic carbon content of the soil was 0.35% with available nitrogen of 209 Kg ha^{-1}. The experiment is laid out in randomized block design with factorial concept. The variety of rice used was Chaitanya (MTU-2067), which is a BPH tolerant, high yielding with duration of 150 days. The sowing of nursery and direct seeding of rice in the main field was done on the same dates i.e. on 29th June, 16th and 30th July and 13th August (Table 1). The nursery was raised with tank water and with the fertilizer dose of 100 kg N, 50 kg P_2O_5, and 50 kg K_2O per hectare. The transplanting of different nurseries and flooding of the direct seeded rice was done on the same date i.e., 20th August except the nursery sown on 13th August which was too young for transplanting (7 days). This nursery was transplanted on the 3rd September.

It can be observed (table 1) that the seedlings with different ages were transplanted because of staggered nursery sowing and transplanting all the nurseries on the same day *viz.,* the day on which the canal water was released in the experimental region. It can also be noted that the dates of sowing of direct seeding and nursery has no particular fixed interval. This was

due to the fact that the sowings were taken up immediately after receiving rain so as to ensure good soil moisture for better germination of the seeds under direct seeded condition. This was felt necessary so that the experiment would be conducted near to the farmers' field conditions. However, the interaction of different dates of sowing and ages of seedling with the ultimate yield of the rice crop is not discussed in this paper. The seed rate (50 kg ha^{-1}), spacing (20X10 cm) and fertilizer dose (120-60-60) were followed according to the state recommended practices for the region. Crop was maintained weed free throughout the critical period of crop weed competition. The insect control was taken up when ever the infestation was above the threshold level.

RESULTS AND DISCUSSION:

Methods of Planting:

The experimental results have shown that the plant height was not influenced by the methods of raising crop (table 2). The total tiller number per square meter is found to be significantly higher in the direct seeded crop. This could be due to uninhibited growth of the direct seeded crop when compared to transplanted crop that have undergone the transplanting shock (Dingkuhn *et. al*., 1990). The tiller mortality is also found to be higher in the direct seeded crop than the transplanted one (Figure 1). The setting in of tiller mortality is between 90 to 120 days after sowing and declined after 120 days. However, the high tiller number in the direct seeded crop could not be realized into higher LAI (table 2). This could be due to the less leaf area duration and small leaf blade size resulting from the crowded plant strand from the direct seeded crop and higher tiller mortality at 120 days after sowing. These findings are in conformity with that of Schnier *et. al.* (1990). The total drymatter production (g m^{-2}) at harvest was not influenced by the methods of planting. Understandably, the direct seeded crop flowered two days early than the transplanted one, because the latter have undergone a transplanting shock. This could be advantageous in maturing the crop few days early and make the field available for the next. In this case the direct seeded crop matured five days early. Similar advantage with direct seeded crop was reported by Thakur (1993). Among the yield attributes the direct seeded crop produced 32 more

productive tillers per square meter than the transplanted crop. The production of higher number of productive tillers by direct seeded crop was also reported by Narayanaswamy *et. al.* (1993). However, the advantage was neutralized by the less number of filled grains per panicle in the direct seeded crop (19.5) resulting in to non-significant difference in the yield. Similar findings were also made by Sharma *et.al* (1995). The transplanted crop recorded higher harvest index than the direct seeded crop owing to efficient translocation of the carbohydrates to the reproductive parts.

Dates of sowing:

Among the dates of sowing, the 7th August sown crop was significantly shorter when compared to all others (Table 2). The sowing of the nursery on 29th June has resulted into significantly higher number of tillers when compared to sowing on 13th July. Among the dates of sowing the 29th June sown crop retained more LAI at 120 days after sowing. The biomass production was higher with 30th July sown crop when compared to the 13th August sown crop and was at par with rest of the sowing dates. The difference between the highest and lowest drymatter production was 317.2 g m^{-2}. The reduction in biomass production with delay in sowing was also reported by Venkateswarlu (1989). It can be seen from the data that crop flowered early as the sowing gets delayed. On an average the crop flowered 1.28 days early for every two days delay in sowing. The effect of early flowering can be attributed to early maturity of the crop too. It can be seen from the data that the crop matured early with delay in sowing or transplanting of the younger seedlings than the older seedlings. However, there is no difference between the first two dates of sowing regarding the days to maturity, as was the case with later two dates. All the yield attributes were significantly influenced by the dates of sowing. Productive tillers per square meter and filled grain per panicle were significantly higher in the 29th June sown crop than the 13th August sown crop. However it has shown higher spikelet sterility along with the 30th July sown crop. This could be attributed to the unfavorable weather conditions (rainfall of 104 mm was received in three

rainy days) experienced during the flowering period of the respective treatments. The delay in sowing of nursery up to the 30th July did not influence the yield significantly. However, the delayed sowing on 13th August resulted reduction in the yield, and also the harvest index. Jha *et.al.,* (1991) also reported similar reduction in grain yield with delay in sowing of the rice crop. The returns per rupee were higher with the first three dates of sowing.

It can be concluded from the experiment that the farmers may raise the crop either through staggered nursery sowing or by direct seeding, as the methods of sowing failed to influence the grain yield and the returns per rupee invested. However, the date of sowing is found to be more important for realizing higher production. The delay in nursery may be tolerated up to 30th July beyond which the yield loss will be 28 kg per each day of delay in sowing, under the present experimental conditions. However, the further delay may lead to even higher losses. To avoid further delay and loss of yield the farmers may raise the community blocks nurseries with protected water supply from the tanks.

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Table: 1. Different dates of sowing of nurseries and dry seeding in the main field and the corresponding age of nursery transplanted.

Components	Different dates of sowing			
	Date-1	Date-2	Date-3	Date-4
Date of sowing	29-6-96	16-7-96	30-7-96	13-8-96
Date of transplanting	20-8-96	20-8-96	20-8-96	3-9-96
Age of seedlings at transplanting	52	35	21	21

Table 2. Growth attributes, yield attributes and yield and returns per rupee invested of *Kharif* rice as influenced by different methods and dates of establishing rice crop.

Treatments	Plant height (cm) at harvest	Total tillers (m^{-2}) at harvest	LAI at 120 DAS	Shoot drymatter (g m^{-2}) at harvest	Days to 50% flowering*	Ear-bearing tillers m^{-2}	Filled grain per panicle	Spikelet sterility (%)	1000 grain weight (g)	Days to maturity*	Grain yield (t ha^{-1})	Harvest Index (%)	Returns per rupee invested (Rs.)
Methods of planting:													
Direct seeding	104.6	305	2.14	1130.3	103.8	243.8	104.3	13.8	22.1	140	4.16	40.2	1.66
Transplanting	102.5	246.3	2.06	1029.3	105.4	211.4	123.8	15.7	21.9	145	4.41	46.6	1.57
CD at 5%	NS	25.9	NS	NS	-	16.8	9.1	NS	NS	-	NS	3.2	NS
Dates of sowing:													
29th June	107.6	298.8	3.48	1105.7	119.7	279	121.1	15.6	21.6	149	4.20	43.7	1.56
16th July	105.4	287.5	2.17	1123.5	108.8	215.9	121.4	11.2	22.8	149.5	4.79	48.4	1.90
30th July	103.8	292.5	2.04	1203.6	99.2	222.7	110.9	17.8	21.7	134	4.27	43.7	1.60
13th August	97.5	223.8	0.72	886.4	90.8	192.9	102.9	14.3	22.0	136	3.88	37.8	1.40
CD at 5%	4.7	36.5	0.79	301.8	-	23.5	12.9	4.1	0.9	-	0.56	4.7	0.32

*The data has not been subjected to statistical analysis