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Research article

EVALUATION OF RICE VARIETIES UNDER DIFFERENT MANAGEMENT PRACTICES FOR LATE PLANTING SITUATION OF NAGARJUNA SAGAR LEFT CANAL COMMAND AREA OF ANDHRA PRADESH, INDIA

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ABSTRACT: A field experiment was conducted at Agricultural Research Station, Garikapadu to evaluate rice varieties for late planted conditions by direct seeding as semidry rice in comparison with transplanting for tail end areas of NSP left canal command area. The experiment was laid out in split plot design replicated thrice with methods of seeding and dates of sowing as main plots and varieties as subplots. Methods of seeding adopted were direct seeding of sprouted seeds by seed drill on 1st August, 15th August & 1st September and transplanting under puddled conditions on 1st September, 15th September & 1st October. Three varieties tested were BPT-5204, MTU-1010 and MTU-7029. There were significant differences among main treatments, sub treatments and interaction effects. BPT-5204 performed well both under direct seeding and transplanted conditions but only when sown early. Late sowing/planting resulted in lower yields due to severe blast infection and significantly lower yield (3442 kg/ha) was recorded when BPT-5204 was transplanted on 1st October. Whereas, MTU-1010, variety recorded significantly superior yield (6259 and 5481 kg/ha) over BPT-5204 (4961 and 4316 kg/ha) under late direct seeding on 15th August and 1st September. Under delayed release of water in the canal command areas direct seeding of relatively short duration varieties like MTU-1010 may be recommended.

Key words: Rice, semidry, transplanting, canal command area, yield

INTRODUCTION

In the Indian sub continent, the amount and timing of release of irrigation water from canals is dependent on the success of the South-West monsoon. Increased uncertainties of the monsoon rains is leading to late release of canal water to the command areas where rice is the pre dominant crop thriving on the irrigation needs. Rice (*Oryza sativa* L.) is staple food of more than 60% of the world's population. Flood-irrigated rice utilizes two or three times more water than other cereal crops such as maize and wheat. In Asia, flood-irrigated rice consumes more than 45% of total freshwater used [2]. The increasing water crisis threatens the sustainability of irrigated rice production [5]. It is predicted that by 2025, 15 out of 75 million hectare of Asia's flood-irrigated rice crop will experience water shortage [9]. Yet more rice needs to be produced with less and less water to feed the ever-growing population, which needs judicious water management practices and suitable water saving technologies in rice cultivation [9]. International Rice Research Institute (IRRI) developed the "aerobic rice technology" to address the water crisis in tropical agriculture. In aerobic rice systems, wherein the crop is established in non-puddled, non-flooded fields [6] and rice is grown like an upland crop (unsaturated condition) with adequate inputs and supplementary irrigation when rainfall is insufficient [3].

However, with the passage of time and in global climate change scenario, the rainfall has become erratic and one out of every 3–4 years showed poor availability of water during one or other stages of rice growing periods [8]. The new concept of aerobic rice may be an alternate strategy, which combines the characteristics of rice varieties adopted in upland with less water requirement and irrigated varieties with high response to inputs. In China, the water use for aerobic rice production was 55–56% lower than the flooded rice with 1.6–1.9 times higher water productivity. Net returns to water use were also two times higher [3]. It indicates that aerobic rice or semidry rice may be a viable option where the shortage of water does not allow the growing of lowland rice.

The Nagarjuna Sagar Project (NSP) left canal stretches' for 295 km with a command area of 4.2 lakh ha, catering to the irrigation needs of Nalgonda, Krishna and Prakasam districts [7]. Due to late release of canal water, the sowing of nurseries and planting of rice is very much delayed beyond 15th August in tail end areas of NSP left canal command area and the rice yields of popular long duration varieties are reduced by 15 to 30 %. The pest and disease incidence is also likely to increase. In such situations, sprouted seeds of rice may be sown with seed drills as rain fed paddy (semi-dry-rice) in the initial stages and later converted to wet conditions when irrigation water is made available, as other crops may not come up due to water stagnation at later stages since the fields are low lying and prone to submergence. There is also need to identify and recommend suitable varieties for late planting situations in NSP left command areas as this is a common feature where in water is released late in middle of August.

Under these conditions the experiment was formulated to evaluate the suitable rice varieties for late planted conditions by direct seeding as semidry rice in comparison with transplanting for tail end areas of NSP left canal command area.

MATERIAL AND METHODS

A field experiment was conducted at Agricultural Research Station, Garikapadu, Krishna district of Andhra Pradesh to evaluate rice varieties for late planted conditions by direct seeding as semidry rice in comparison with transplanting for tail end areas of NSP left canal command area or for the circumstances of late release of canal water. The soil of the experimental site was sandy clay loam with low in organic carbon, available nitrogen, medium in available phosphorus and medium to high in available potassium. The soil reaction of the site was normal. The experiment was laid out in split plot design replicated thrice with methods of seeding and dates of sowing as main plots and varieties as subplots. Methods of seeding adopted were direct seeding of sprouted seeds by seed drill on 1st August (D_1), 15th August (D_2) & 1st September (D_3) and transplanting under puddled conditions on 1st September (T_1), 15th September (T_2) & 1st October (T_3). Three promising varieties tested were BPT-5204 (V_1), MTU-1010 (V_2) and MTU-7029 (V_3). Transplanting was done maintaining a plant population of 44 hills per m^2. Regarding direct seeding, the sprouted seeds were directly sown with the help of a seed drill at 15 cm row spacing. The individual plot size was 4.5 m x 3.0 m with buffer channels all around. The recommended fertilizer dose of 100-60-40 kg/ha of NPK was adopted for all the treatments. Grain yield at harvest was recorded in all the treatments and the data was statistically analyzed [4].

RESULTS AND DISCUSSION

The results of the experiment conducted revealed that there were significant differences among main treatments, sub treatments and interaction effects (Table 1). BPT-5204 (V_1) performed well both under direct seeding (5720 kg/ha) and transplanted conditions (6706 kg/ha) but only when sown early (D_1 & T_1). Late sowing / planting resulted in lower yields due to severe blast infection and significantly lower yield (3442 kg/ha) was recorded when BPT-5204 was transplanted on 1st October. Whereas, MTU-1010 (V_2) – a short duration variety recorded significantly superior yield (6259 and 5481 kg/ha) over BPT-5204 (4961 and 4316 kg/ha) under late direct seeding on 15th August (D_2) and 1st September (D_3) respectively.

Table 1: Performance of rice varieties under different methods and dates of planting

Varieties	Methods of seeding and dates of sowing/planting						Mean grain Yield (kg/ha)
	D_1	D_2	D_3	T_1	T_2	T_3	
V_1 – BPT 5204	5720	4961	4316	6406	4783	3442	4938
V_2 – MTU 1010	4658	6259	5481	4859	4881	4650	5131
V_3 – MTU 7029	5257	5116	4916	5552	4856	4029	4954
Mean	5212	5445	4904	5606	4840	4040	5008

D_1 – Direct seeding on 1st August
D_2 – Direct seeding on 15th August
D_3 – Direct seeding on 1st September
T_1 - Transplanting on 1st September
T_2 - Transplanting on 15th September
T_3 - Transplanting on 1st October

CD at 5% for methods of planting : 694.2
CD at 5% for varieties : 342.9
Interaction : 839.7

The studies conducted at Agricultural Research Station, Maruteru also indicated that direct seeding was found to be equally effective compared to transplanting. MTU-9993 recorded significantly higher grain yield of 6500 kg/ha. In puddled soils, sprouted seeding in lines followed by pre- emergence weedicide application and one hand weeding at maximum tillering stage recorded higher grain yield of 6000 kg/ha and it was found on par with transplanting with two hand weedings (5600 kg/ha) [1].

CONCLUSION

Under late release of canal water or for the tail end areas of the canal command area it is recommended to go for MTU-1010 rice variety under direct seeding, which would require less amount of water and could be sown early i.e., direct sowing by 15th August or 1st September rather than transplanting of BPT-5204 during 1st October.

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