Original Research Article

EVALUATION OF APPROPRIATE RICE VARIETY IN AEROBIC RICE CULTIVATION

ABSTRACT

A Field experiment was carried out for nutrient and weed management in aerobic rice (Oryza sativa L.). The present study was taken up to identify a suitable variety for aerobic rice in Cauvery delta region. In *2017 and 2018, screening of suitable rice variety was conducted in Semmangudi village for two consecutive Kharif seasons, under aerobic condition. Ten rice varieties were evaluated and ANNA4 proved to be the best variety in terms of production. The study of aerobic rice registered a grain yield of 3.9 ton/ha for 100 hills/m^2 (20 X 15 cm) and a comparable grain yield of 3.8 ton/ha was realized in the second season.*

Comment [H1]: If possible add conclusion sentence..
Methodology also should be more improved.

Key words:Aerobic rice, ANNA4, plant population, grain yield

1. INTRODUCTION

Rice (Oryzasativa L.) is the widely cultivated and popular crop in the world. It is the major source of energyfor more than two billion people in the world. Approximately 60-70% of their energy requirement is met from rice and its derived products. It plays an important role economically and in terms of food security. Rice is the native of Asia and more than 90% of world rice is grown and consumed in Asia. India ranks first in area under rice cultivation (43.42 million ha) and second in terms of production (106.54 million tonnes) with an average productivity of 24.54 q/ha. In India, population explosion and rapid urbanisation are gradually depleting the availability of water for agriculture. Groundwater tables have dropped down on an average of 0.5 - 0.7 meter per year in Indian states like Karnataka, Maharashtra, Rajasthan, Punjab, Haryana, northern Gujarat and Tamil Nadu. Thus forcing the farmers to look for alternative methods of irrigation to attain sustainable production.

The term "aerobic rice" was coined by the International Rice Research Institute and refers to a water-saving method in which high-yielding rice varieties are grown as an upland crop with adequate input and supplementary irrigation when rainfall is insufficient by direct seeding in un-puddled conditions without water logging in unsaturated conditions. (Rajkumar et al., 2009). With a moderate application of fertiliser, aerobic rice types may maintain rapid development in soil with moisture content at or below field capacity and achieve yields of 4-6 t/ha (Parthasarathi*et al.,* 2012). Thus, the newly upcoming approach of rice cultivation called aerobic rice cultivation reduces the water consumption in rice production and increases the water use efficiency.

Production practices for rice cultivation are shifting from lowland rice to aerobic rice to make more efficient use of irrigation. The water use from sowing to harvest for transplanted rice is 1200 - 1300 mm whereas for aerobic rice it varied from 470 to 650 mm, which is less by 60 per cent. In comparison to low land rice, total water productivity was 1.6 to 1.9 times higher.About 92 percent, 42 percent, and 40.6 percent of water (including rainfall) was used for evapotranspiration or consumptive purposes for aerobic, wet seeding, and transplanted rice, respectively, while the remaining 8.0 percent, 58.0 percent, and 59.4 percent of water left the root zone as seepage and deep percolation flows. (James Martin *et al.,*2007).Under this context, the present study was conducted to identify an appropriate rice variety for aerobic condition.

2. MATERIALS AND METHODS

Field experiment was conducted during *kharif* (June to September) 2017-2018 at a farmer's field in Semmangudi village, SirkaliTaluk. Ten rice varieties, including ADT36, ADT37, ADT43, ADT45, ADT48, IR50, CO47, ASD16, PMK3, and ANNA4, were sown under dry condition in a randomised block design with ten treatments in three replications.The texture of the soil in the experimental field was clay loam in nature. The field was thoroughly prepared using tractor drawn disc plough, cultivator and rotavator. The seeds were soaked in water for 12 hours and incubated for 10 hours. Sprouted seeds were line sown with a spacing of 20 x 15 cm. A fertilizer dose of 150:50:50 kg N, P, K per ha was adopted. The entire dose of P was applied as a basal, whereas Nitrogen and K fertilizers were split and applied in four equal doses after 15th day of sowing, tillering stage, panicle initiation stage and heading stage. Initial irrigation was done immediately after sowing and frequent irrigations were done followed by alternate wetting and drying. Two handweeding were taken up on 15 and 30 DAS. The recommended package of practices for individual crop was followed for the rest of the management practices. .

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3. RESULTS AND DISCUSSION

3.1 Growth parameters of rice variety (Table-1)

Plant height was recorded in different growth stages viz., maximum tillering, panicle initiation, flowering and harvest and the highest plant height was recorded in ANNA4 (37.86, 59.91, 78.83, 85.58) at growth stages viz., maximum tillering, panicle initiation, flowering, harvest which was followed by PMK3. The lowest plant height was recorded in ADT37. Leaf area index (LAI) was observed at flowering stage. ADT 45 had the highest LAI of 4.70 and was significantly superior to other rice varieties. This was followed by IR50 (4.51) and ADT48 (4.42). The lowest LAI was recorded in ADT 37(2.71). The root length is significantly influenced by the rice varieties. At flowering stage, the longest root was observed in ANNA4 (20.59 cm), which was followed by PMK3 (19.58 cm) and ADT37 (19.34cm). The lowest root length was observed in ADT36 (16.40cm). The rice variety ANNA4 recorded the maximum root dry weight at flowering stage (5.99 gm.plant^{-1}) followed by PMK3 (5.73 gm. plant^{-1}). The minimum root dry weight was observed in ADT43 (3.82gm plant^{-1}).

Table - 1. Growth attributes of different rice varieties under aerobic cultivation.

Treatments	Plant Height (cms)				Leaf area index at flowering	Root length at flowering (cm)	Root dry weight at flowering (g)
	Maximum Tillering	Panicle initiation	Flowering	Harvest			
ADT37	28.75	48.17	67.31	71.22	2.71	19.34	4.92
ADT43	27.85	50.50	58.91	68.17	3.37	15.73	3.82
ADT45	32.65	51.11	71.22	71.22	4.71	16.43	5.31
ADT48	33.48	52.33	71.45	71.45	4.42	17.44	4.42
IR50	30.61	48.68	68.79	76.02	4.51	16.73	5.46
CO47	31.30	48.82	67.17	72.64	2.41	14.45	4.83
ASD16	31.40	54.86	71.19	80.70	3.23	18.73	5.61
PMK3	36.59	56.83	76.20	84.00	4.26	19.58	5.73
ANNA4	37.86	59.91	78.83	85.58	4.30	20.59	5.99
ADT36	30.14	49.84	71.51	71.51	2.84	16.40	4.48
CD(0.05)	**1.10**	**1.60**	**1.71**	**1.40**	**0.10**	**0.23**	**0.032**

3.2 Yield parameters of rice variety: (Table -2)

The results indicated a significant difference in panicles per unit area for different rice varieties. It was found that rice variety ANNA4 was significantly superior to other rice varieties with a higher root length (20.59), root dry matter (5.99) and number of panicles ($362m^{-2}$), followed by PMK3 ($346m^{-2}$). ASD16 (314^{m-2}) was found to be on par with ADT45 ($312\ ^{m-2}$). The lowest number of panicles per unit area was recorded in ADT 36 ($226\ m^{-2}$). The total DMP also differed significantly among the rice varieties. ANNA4 recorded the highest DMP of 9.86 t/ha. This was followed by PMK3 (9.31t/ha) and was on par with ADT45 (9.21 t/ha). The next best treatment variety was ASD16 (8.32 t/ha) and the lowest DMP was recorded in ADT43 (6.35t/ha). The total grain yield was also significantly different among the rice varieties. ANNA4 recorded the highest grain yield (3869 kg/ha) followed by PMK3 (3695 kg/ha), ASD16 (3133 kg/ha) and ADT45 (3125 kg/ha).The lowest grain yield was recorded in ADT 43 (1244 kg/ha).

Table-2 .Yield attributes of different rice varieties under aerobic cultivation.

Treatments	Panicles m^{-2}	DMP at flowering (t ha-1)	Grain yield (kg ha-1)
ADT37	253	7.55	174
ADT43	293	6.35	124
ADT45	312	9.21	312
ADT48	264	6.58	133
IR50	271	7.92	242
CO47	261	7.34	230
ASD16	314	8.32	313
PMK3	346	9.31	369
ANNA4	362	9.86	386
ADT36	226	6.68	138
CD(0.05)	**6.343**	**0.12**	**15.05**

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4. CONCLUSION

As a result of the depleting water sources and increasing competition for water from other sectors, aerobic rice cultivation will be the future of rice farming, considering its low water usage with reasonably higher yield. The study revealed that ANNA4 and PMK3 were the suitable rice varieties for aerobic cultivation. ANNA4 performed better than PMK3 in terms of grain yield and DMP. Considering the scope of aerobic rice, more research need to be done in terms of breeding suitable rice varieties and develop systems which are sustainable and viable for aerobic rice.

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