International Journal of Farm Sciences **6(1)** : 9-13, 2016

Effect of graded nutrient levels on yield, economics, nutrient uptake and postharvest soil available nutrient status of aerobic rice

PARUNA, V SUMATI and N SUNITHA

ANGRAU, Department of Agronomy, SV Agricultural College
Tirupati 517502 AP, India
Email for correspondence: aruna.agronomy.08@gmail.com

ABSTRACT

A field experiment was conducted at the dryland farm of SV Agricultural College, Tirupati during Kharif 2011 and 2012 to identify the optimum nutrient requirement of aerobic rice. The experiment was laid out in a randomized block design replicated four times with five treatments viz N_1 (75% recommended dose of nutrients), N_2 (100% recommended dose of nutrients), N_3 (125% recommended dose of nutrients), N_4 (150% recommended dose of nutrients) and N_5 (175% recommended dose of nutrients). Among all the treatments N_5 resulted in the highest yield, economic returns, N, P and K uptake and postharvest available nutrient status of soil. But it was comparable with N_4 and all of them were at their lowest with N_1.

Keywords: Nutrient levels; aerobic rice; yield; economic returns

INTRODUCTION

The traditional flooded rice requires 3000-5000 litres of water to produce just one kilogram of rice. Water is also lost through percolation and evaporation. In aerobic rice system, rice can be grown just like irrigated dry crop. The water is saved more in aerobic system as compared to transplanted rice.

Nutrient management is an inevitable component of any fertilizer management programme. It is more so for the aerobic rice crop. Hence to develop an optimum nutrient management package for aerobic rice, the present investigation was carried out.

MATERIAL and METHODS

Field experiments were conducted during Kharif 2011 and 2012 at the dryland farm of Acharya NG Ranga Agricultural University, SV Agricultural college, Tirupati. The soil of the experimental field was sandy clay loam in texture, neutral in pH (7.4)

and low in organic carbon (0.37%) and available nitrogen (168 kg/ha) and medium in available phosphorus (18.95 kg/ha) and available potassium (238.15 kg/ha). The experiment was laid out in randomized block design with four replications and five treatments viz N_1 (75% recommended dose of nutrients), N_2 (100% recommended dose of nutrients- 80, 40 and 40 kg N, P_2O_5 and K_2O/ha), N_3 (125% recommended dose of nutrients), N_4 (150% recommended dose of nutrients) and N_5 (175% recommended dose of nutrients). Entire quantity of P_2O_5 and K_2O was applied basally at the time of sowing while nitrogen was applied in three equal splits at sowing, tillering and panicle initiation stage as per the treatments. The sources of N, P_2O_5 and K_2O were urea, single super phosphate and muriate of potash respectively. The experiment was conducted on rice variety Sravani (NLR-33359). The data recorded on various parameters of crop were statistically analysed following the analysis of variance for randomised block design as suggested by Panse and Sukhatme (1985).

RESULTS and DISCUSSION

Data on grain and straw yield, nutrient uptake, economics and postharvest soil available nutrient level of aerobic rice as influenced by graded nutrient levels for Kharif 2011 and 2012 are given in Table 1.

Grain and straw yield: Grain and straw yield of aerobic rice differed significantly due to graded nutrient levels and the highest grain and straw yield was recorded in N_5 (175% recommended dose of nutrients) which was however comparable to N_4 (150% recommended dose of nutrients). The lowest grain and straw yield was recorded with N_1 (75% recommended dose of nutrients). The higher grain and straw yield obtained could be due to the favourable influence of steady, consistent and adequate availability of nutrients during the required stages of crop growth favouring the production of photosynthates coupled with better partitioning to the sink under higher level of nutrition. These results are in accordance with those of Maheswari et al (2008) and Mallareddy et al (2012).

Nutrient uptake by aerobic rice: Nutrient uptake of aerobic rice estimated at harvest was significantly influenced by graded nutrient levels. The nutrient uptake was found increased progressively with increasing levels of nutrients. The highest nitrogen, phosphorus and potassium uptake was recorded in N_5 (175% recommended dose of nutrients) which were on par with N_4 (150% recommended dose of nutrients). The higher level of nutrient supply is conducive for extensive root proliferation, to explore a greater volume of soil and absorb larger quantities of nutrients that often tend to correlate positively with dry matter production and concentration of nutrients in the plant under higher level of nutrient supply. Similar

Table 1. Grain and straw yield, nutrient uptake, economics and postharvest soil available nutrient level of aerobic rice as influenced by graded nutrient levels (pooled data for Kharif 2011 & 2012)

Nutrient level	Grain yield (kg/ha)	Straw yield (kg/ha)	Nutrient uptake (kg/ha)			Net returns (Rs/ha)	B:C ratio	Postharvest soil available nutrients (kg/ha)		
			Nitrogen	Phosphorus	Potassium			Nitrogen	Phosphorus	Potassium
N_1- 75% RDN	2540	4195	64.5	16.2	81.9	17815	2.20	136.9	19.2	161.2
N_2- 100% RDN	3107	5143	74.7	18.4	95.2	24125	2.60	151.7	23.0	177.3
N_3- 125% RDN	3642	6157	85.2	20.5	108.8	37785	2.90	166.0	26.4	192.8
N_4- 150% RDN	4106	7167	95.5	23.8	122.8	34280	2.95	179.9	29.7	207.5
N_5- 175% RDN	4232	5933	98.3	24.8	126.6	36634	3.20	185.2	30.15	211.1
SEm±	135.9	233.3	2.9	0.6	3.8	1579	0.065	4.11	0.95	4.34
$CD_{0.05}$	450	772	9.6	2.05	12.6	5229	0.2	13.4	3.1	14.2

results were also reported earlier by Jadhav and Dahiphale (2005) and Pasha et al (2013). The lowest nutrient uptake was recorded in N_1 (75% recommended dose of nutrients) which was significantly lesser than other nutrient levels tried.

Economics: Net returns from aerobic rice were significantly influenced by graded nutrient levels with similar trend during both the years of study. The net returns recorded in N_5 (175% recommended dose of nutrients) were superior as compared to all other treatments followed by N_4 (150% recommended dose of nutrients), N_3 (125% recommended dose of nutrients) and N_2 (100% recommended dose of nutrients) in descending order. The net returns recorded in N_1 (75% recommended dose of nutrients) was significantly lowest among all the treatments. These findings are in accordance with those of Aruna et al (2012).

Benefit/cost ratio of rice under aerobic culture differed significantly with graded levels of nutrient. N_5 (175% recommended dose of nutrients) showed its superiority in recording of benefit/cost ratio followed by N_4 (150% recommended dose of nutrients), N_3 (125% recommended dose of nutrients) and N_2 (100% recommended dose of nutrients). The lowest benefit/cost ratio was recorded with N_1 (75% recommended dose of nutrients). These results are in accordance with the findings of Yadav et al (2008) and Ramana Murthy (2010).

Postharvest soil fertility status: Postharvest soil available nutrient status (N, P_2O_5 and K_2O) after the harvest of aerobic rice was significantly influenced by graded nutrient levels. The highest postharvest soil available nutrients were noticed in N_5 (175% recommended dose of nutrients) which was comparable with N_4 (150% recommended dose of nutrients). The next best treatment was N_3 (125% recommended dose of nutrients) which was significantly higher to N_2 (100% recommended dose of nutrients). The above trend might be due to considerable quantities of nutrients left in the soil after meeting maximum requirement of the crop. Similar results were also reported by Pandey et al (2000) and Kishor et al (2008). The lowest postharvest soil available nutrient status was noticed in N_1 (75% recommended dose of nutrients).

REFERENCES

Aruna P, Reddy GP and Sagar GK 2012. Effect of integrated nitrogen management on growth, yield, quality and postharvest nutrient status of soil in aerobic rice (*Oryza sativa* L). Crop Research **43(1-3):** 1-4.

Jadhav AS and Dahiphale VV 2005. Effect of irrigation and nitrogen on yield and nitrogen uptake of Basmati rice in vertisols. Journal of Maharashtra Agricultural Universities **30(3):** 368-369.

Kishor KK, Alam P and Pal SK 2008. Nutrient utilization by upland rice (*Oryza sativa*) as influenced by integrated nutrient management. Birsa Agricultural University Journal of Research **20(1):** 5-10.

Maheswari J, Bose J, Sangeetha SP, Sanjutha S and Sathya Priya R 2008. Irrigation regimes and N levels influence chlorophyll, leaf area index, proline and soluble protein content of aerobic rice (*Oryza sativa* L). International Journal of Agricultural Research **3(4):** 307-316.

Mallareddy M, Padmaja B, Veeranna G and Reddy VVD 2012. Evaluation of popular Kharif rice (*Oryza sativa* L) varieties under aerobic condition and their response to nitrogen dose. Journal of Research ANGRAU **40(4):** 14-19.

Pandey N, Dhurandhar RL and Tripathi RS 2000. Grain yield, root growth and N uptake of early duration rice varieties as influenced by nitrogen levels under rainfed upland. Oryza **37(1):** 60-62.

Panse VG and Sukhatme PV 1985. Statistical methods for agricultural workers. ICAR, New Delhi India, pp 100-174.

Pasha L, Reddy MD, Reddy MG and Uma Devi M 2013. Influence of irrigation schedule, weed management and nitrogen levels on grain yield, nutrient uptake and water productivity of aerobic rice. Indian Journal of Agricultural Research **47(1):** 26-34.

Ramana Murthy KV 2010. Standardization of agro techniques for aerobic rice in north coastal zone of Andhra Pradesh. PhD thesis, Acharya NG Ranga Agricultural University, Hyderabad, AP, India.

Yadav OM, Dahiphale VV and Godhawale GV 2008. Effect of integrated nutrient management on production and economic efficiency of rice (*Oryza sativa* L) under upland drilled condition. Indian Journal of Dryland Agricultural Research and Development **23(1):** 13-18.

Received: 1.4.2015 ***Accepted: 27.7.2015***