International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(3): 1168-1170

Received: 22-03-2019
Accepted: 24-04-2019

V Sujatha
Mallikarjuna Rao,
Retired Teacher, Vizinigiri Village, Jami (Mondal)
Vizianagaram, Andhra Pradesh, India

K Mosha
Associate Professor
Department of Agronomy
Acharya N.G. Ranga Agricultural University,
Agricultural College, Bapatla,
Andhra Pradesh, India

P Prasuna Rani
Associate Professor
Department of Soil Science and Agricultural Chemistry,
Acharya N.G. Ranga Agricultural University,
Agricultural College, Bapatla,
Andhra Pradesh, India

Correspondence
V Sujatha
Mallikarjuna Rao,
Retired Teacher, Vizinigiri Village, Jami (Mondal)
Vizianagaram, Andhra Pradesh, India

Effect of different organic sources of nitrogen on yield and quality of *kharif* rice (*Oryza sativa* L.)

V Sujatha, K Mosha and P Prasuna Rani

Abstract
A field experiment was conducted at the Agricultural College Farm, Bapatla, during *kharif*, 2012 to study the effect of different sources of organic nutrients (poultry manure, FYM, neemcake and vermicompost) and recommended dose of NPK on grain yield and quality of rice. The experimental results indicated that the different sources of organic nutrients significantly influenced the grain yield. However the quality parameters *viz.*, protein, amylose contents, milling per cent, hulling per cent, head rice recovery, L/B ratio, volume expansion ratio, kernel elongation ratio, water uptake and solid loss were not influenced by the different organic sources of nitrogen.

Keywords: Organic manures, grain yield and grain quality

Introduction
Rice (*Oryza sativa* L.) is the principal food crop for billions of people throughout the world. It is a means of livelihood for millions of rural households and it plays a vital role in our national food security, hence the slogan 'Rice is Life' is most appropriate. Use of higher doses of high analysis fertilizers and insufficient use of organics has created deficiencies of secondary and micronutrients. The soils are showing signs of fatigue, as judged by decline in the yields of rice as well as a lower response to applied chemical fertilizers (Yadav *et.al*, 1998) [15]. Organic farming is generally preferred because of improvement in quality of food grain by reducing the cost of cultivation. Long term addition of organic materials to soil results in increased organic matter, crop productivity and soil biological activity (Collins *et al*., 1992) [5], also quality of the produce. Quality parameters like hulling percentage, milling percentage, protein and amylose contents also increased due to use of organic manures (Dixit and Gupta, 2000) [7]. Incorporation of organic manures has given a hope to reduce the cost of cultivation and minimize adverse effects of chemical fertilizers. Keeping all these things in view, the present investigation was undertaken to study the effect of inorganic fertilisers and organic manures on grain quality of lowland rice.

Materials and methods
A field experiment was conducted on clay loam soil of Agricultural College Farm, Bapatla, during *kharif* season of 2012. The experiment was laid out in a randomized block design with three replications. The soil of the experimental site was clay loam in texture, slightly alkaline in reaction (pH 7.9), with 0.43 % organic carbon and 210.0, 29.0 and 385.0 kg ha^{-1} N, P and K respectively. The experiment consisted of nine treatments *viz*., 100% RDN through inorganic sources (120:60:40 kg N, P_2O_5, K_20)(T_1), 100% RDN through poultry manure (10 days before puddling) (T_2), 100% RDN through FYM (10 days before puddling) (T_3), 100% RDN through Neem cake (10 days before puddling) (T_4), 100% RDN through vermicompost (10 days before puddling) (T_5), 50% RDN as basal +50% at 10 days before PI stage through poultry manure (T_6), 50% RDN as basal +50% at 10 days before PI stage through FYM (T_7), 50% RDN as basal +50% at 10 days before PI stage through neem cake (T_8), 50% RDN as basal +50% at 10 days before PI stage through vermicompost (T_9).Well decomposed poultry manure, FYM, neemcake and vermicompost with 2.0 %, 0.5%, 2.5 % and 1.2 % N respectively was used as organic source for nitrogen. Based on the equal N basis, and required quantities of organic manures were incorporated in the soil 10 days before puddling in order to supply RDN i.e.120 kg N ha^{-1}. In the treatment T_1, recommended doses of 120:60:40 kg ha^{-1} of N, P and K in the form of Urea (46% N), single super phosphate (16% P_20_5) and murate of potash (60% K_20)

were applied to the rice crop. The nitrogen was applied in three splits i.e. 1/2 as basal, 1/4 at maximum tillering and 1/4 at panicle initiation stage. Entire dose of phosphorus was applied basally before sowing. Half of potassium was applied basally and remaining half was applied at maximum tillering stage. The consumer preference rice variety, BPT-5204 (Samba Mahsuri) was used. Thirty day old seedlings were transplanted using two seedlings hill^{-1} 17-08-12 with a spacing of 20 cm ×15 cm. Recommended agronomic practices and plant protection measures were followed.

The grain samples, which were properly dried and processed, were taken for the assessment of quality of rice. The quality parameters like hulling, milling (Chauhan *et al*., 1994), head rice recovery (Bandyopadhyay and Roy, 1992) [2] were analysed. Grain length and breadth were measured using the dial micrometer. The chemical quality parameters like amylose (Sadasivam and Manickam, 1992) [12] and protein contents (AOAC, 2000) were determined. The cooking characters of rice like water uptake (DRR, 2006) [6], kernel elongation ratio, solid loss (Sidhu *et al*. 1975) [13] and volume expansion ratio were determined by the method as suggested by Murthy (1965) [11]. The data on various characters studied during the course of investigation were statistically analysed as suggested by Gomez and Gomez (1984) [8].

Results and discussion

Yield

Application of recommended dose of fertilizer was found to be superior in realizing maximum grain yield (5856 kg ha^{-1}) which remained on a par with 50% RDN as basal+50% at 10 days before PI stage through poultry manure (T_6), but proved significantly superior to the rest of the treatments.

Highest grain yield obtained with chemical fertilisers might be due to better growth and yield attributes recorded there by resulted in increased rice yields (Manivannan and Sriramachandrasekharan, 2009) [10]. The supremacy of poultry manure might be due to higher nitrogen content which is readily available as compared to other organic manures. The poultry manure contains about 60 per cent of its nitrogen as uric acid, 30 per cent as more stable organic form of N and less than 10 per cent as mineral N (Srivastava, 1998). The uric acid N changes rapidly to ammonical form of nitrogen. Similar results were also reported by Channabasavanna (2002) [3].

Table 1: Physical and chemical quality characters of rice as influenced by organic manures

	Treatments	Grain yield (kg ha^{-1})	Hulling %	Milling %	Head rice recovery (%)	L/B ratio	Protein content (%)	Amylose content (%)
T_1	100% RDN through inorganic sources (120:60:40 kg N,P_2O_5,K_20)	5856	81.5	72.0	62.0	3.5	9.2	23.4
T_2	100% RDN through poultry manure (10 days before puddling)	5102	79.9	68.7	58.7	3.3	9.1	22.8
T_3	100% RDN through FYM (10 days before puddling)	2796	75.0	65.3	55.3	3.1	8.5	21.2
T_4	100% RDN through Neem cake (10 days before puddling)	3548	76.7	67.7	57.8	3.1	8.6	21.4
T_5	100% RDN through vermicompost (10 days before puddling)	4338	75.0	69.0	59.0	3.3	8.9	22.2
T_6	50% RDN as basal + 50% at 10 days before PI stage through poultry manure	5665	80.8	71.7	61.3	3.4	9.1	23.2
T_7	50% RDN as basal + 50% at 10 days before PI stage through FYM	2685	75.0	67.0	57.0	3.0	8.4	20.8
T_8	50% RDN as basal + 50% at 10 days before PI stage through neem cake	3580	77.5	68.7	58.7	3.2	8.6	21.8
T_9	50% RDN as basal + 50% at 10 days before PI stage through vermicompost	4340	78.9	69.3	59.3	3.3	9.0	22.6
	SEm (±)	249.0	2.2	2.2	2.1	0.1	0.2	0.6
	CD (P=0.05)	748	NS	NS	NS	NS	NS	NS
	CV (%)	10.3	4.8	5.5	6.0	6.1	4.3	4.7

Quality characters of rice

Physical and chemical (quality) characters of rice grain viz., hulling and milling percentages, head rice recovery, L/B ratio, protein and amylose contents were not significantly influenced by time and application of organic sources of nitrogen.

Table 2: Cooking qualities of milled rice as influenced by different organic manures

	Treatments	Kernel elongation ratio	Water uptake (ml)	Volume expansion ratio	Solid loss in gruel (%)
T_1	100% RDN through inorganic sources (120:60:40 kg N,P_2O_5,K_20)	1.46	153.7	4.0	4.3
T_2	100% RDN through poultry manure (10 days before puddling)	1.44	148.6	3.7	4.0
T_3	100% RDN through FYM (10 days before puddling)	1.40	139.3	3.3	3.4
T_4	100% RDN through Neem cake (10 days before puddling)	1.41	142.4	3.4	3.4
T_5	100% RDN through vermicompost (10 days before puddling)	1.42	144.5	3.6	3.7
T_6	50% RDN as basal + 50% at 10 days before PI stage through poultry manure	1.45	150.4	3.8	4.2
T_7	50% RDN as basal + 50% at 10 days before PI stage through FYM	1.36	138.6	3.2	3.2
T_8	50% RDN as basal + 50% at 10 days before PI stage through neem cake	1.41	145.3	3.5	3.6
T_9	50% RDN as basal + 50% at 10 days before PI stage through vermicompost	1.46	153.7	4.0	4.3
	SEm (±)	0.02	3.3	0.2	0.2
	CD (P=0.05)	NS	NS	NS	NS
	CV (%)	2.37	3.9	7.9	11.2

Cooking qualities of milled rice

None of the cooking qualities of milled rice studied was found to be significant.

Rice crop enjoying comfortable N nutrition has resulted in better quality parameters. However, most of the milling, physical, chemical and cooking characters are genotype dependent and hence, would be altered only to a marginal extent by nutritional management practices. The results of the present investigation clearly infer that grain quality characters

of rice were not significantly influenced by time and application of organic sources of nitrogen.

From the above discussion, it can be concluded that different organic sources significantly influenced the grain yield of rice. However, the different quality parameters did not influenced significantly.

References

1. AOAC. Official methods of analysis, 17th edition, Washington D., 2000C.
2. Bandyopadhyay S, Roy NC. Rice Process Technology. Oxford and IBH Publishing Co., Pvt., Ltd., New Delhi, 1992, 15 &28.
3. Channabasavanna AS. Efficient Utilization of Poultry Manure with Inorganic Fertilizers in Wet Land Rice. Journal of Maharashtra Agricultural Universities. 2002; 27(3):237-238.
4. Chauhan JS, Chauhan JS, Lodh SB. Studies on milling quality components of upland rice. Oryza. 1994; 31:50-52.
5. Collins HP, Rasmussen PE, Douglas CL. Crop rotation and residue management effect on soil carbon and microbial biomass dynamics. Soil Sci. Soc. America. J. 1992; 56:783-788.
6. Directorate of Rice Research (DRR, Hyderabad). Laboratory Manual on Rice Grain Quality Procedures, 2006.
7. Dixit KG, Gupta BR. Effect of farmyard manure, chemical and biofertilizers on yield and quality of rice and soil properties. Journal of the Indian Society of Soil Science. 2000; 48(4):773-780.
8. Gomez KA, Gomez AA. Statistical procedures for agricultural research. John Wiley and Sons, New Delhi, 1984, 680.
9. Hirannaiah BV, Bhashyam MK, Ali SZ. An improved cooking quality test for basmati rice. Journal of Food Science. 2001; 38(2):116-119.
10. Manivannan R, Sriramachandrasekharan MV. =Haplusterts soil. Journal of Applied Sciences Research. 2009; 7:1988-1991.
11. Murthy PSN. Genetic studies in rice (*Oryza sativa* L.) with special reference to certain quality features. *M.Sc.* (Botany) *thesis*, Orissa University of Agriculture and Technology. Bhubaneswar, 1965.
12. Sadasivam S, Manickam A. Biochemical methods for Agricultural Sciences. Wiley Eastern Limited. New Delhi, 1992, 10-11.
13. Sidhu JS, Gill MS, Bains GS. Milling of paddy in relation to yield and quality of rice of different varieties. Journal of Agricultural and food chemistry. 1975; 23:1183-1185.
14. Srivatsava OP. Role of organic matter in crop production. Indian Journal of Agricultural Chemistry. 1998; 21:10-15.
15. Yadav RL, Yadav DS, Singh RM,Kumar A. Long-term effects of inorganic fertilizer inputs on crop productivity in a rice-wheat system. Nutr. Cycl. Agroecosyst. 1998; 51:193-200.