*Available online at http://www.journalcra.com*

*International Journal of Current Research*
*Vol. 4, Issue, 07, pp. 134-136, July, 2012*

**INTERNATIONAL JOURNAL OF CURRENT RESEARCH**

**ISSN: 0975-833X**

## RESEARCH ARTICLE

# RESPONSE OF RICE (ORYZA SATIVA) TO VERMICOMPOST, GREEN MANURE AND NITROGEN FERTILIZER APPLICATION

***Ramesh, S.**

Department of Agronomy, Faculty of Agriculture, Annamalai University, Annamalai Nagar

**ARTICLE INFO**

***Article History:***
Received 14th April, 2012
Received in revised form
17th May, 2012
Accepted 25th June, 2012
Published online 30th July, 2012

***Key words:***
Rice, Recommended Dose Of Nitrogen, Green Manure, Pressmud And Vermicompost.

**ABSTRACT**

Field experiments were conducted at Annamalai University, Experimental Farm, Annamalainagar, during 2007 and 2008 to study the response of rice to vermicompost, green manure and nitrogen fertilizer application. The experiment comprised of eight treatments which includes recommend dose of nitrogen alone and in combination with graded dose of nitrogen along with various organic manures namely green manure, vermicompost and pressmud compost. These were laid out in randomized block design and replicated thrice. In both season, the results showed that T5 - 100% RDN + vermicompost @ 5 t ha-1 striking effect on growth and yield attributes, grain and straw yields. The least values of growth and yield attributes, grain and straw yield was recorded under T1 (No fertilizer and no organic manure).



## INTRODUCTION

Rice is the staple food for over half the world's population. Approximately 480 million metric tons of milled rice is produced annually. China and India alone account for approximate 50% of the rice grown and consumed. In India, it occupies43.86 million ha of land and produces about 104.80 million tonnes of grain with the productivity of 2.39 tonnes $ha^{-1}$. However, this is not enough to feed the ever-increasing population, and there is need to increase the production to keep pace with population growth. Rice is a required strategy involving conjuctive use of organic manures along with chemical fertilizers for increasing productivity of this crop. Wetland rice removes a substantial amount of major and minor nutrients from the soil. Integrated use of organic manures and chemical fertilizers has been found promising in arresting the decline in productivity through the correction of marginal efficiencies of some secondary and micronutrients and known for their beneficial influence on the physical and biological properties of soil Yadav Kumar (2000). Organic fertilizers not only act as the source of nutrients but also enhance the efficiency of applied nutrients (Pandey *et al.* (2007). Indian farmers are unable to afford the heavy expenditure on chemical fertilizers however, it is imperative to use technologies in integrated manner so that the potential yield of wetland rice could be realized on sustained basis. Therefore, the present investigations was carried out with the objective to find out suitable combination of graded dose of nitrogen along with organic manures and to study their effect on growth and yield of transplanted rice under Cauvery Deltaic region of Tamil Nadu.

**Corresponding author:* **Ramesh, S.**
Department of Agronomy, Faculty of Agriculture, Annamalai University, Annamalai Nagar

## MATERIALS AND METHODS

Field experiments were conducted at Experimental Farm, Annamalai University, Annamalainagar, during 2007 and 2008 to study the response of rice to vermicompost, green manure and nitrogen fertilizer application. The experimental soil was deep clay, low in available soil nitrogen (192 kg $ha^{-1}$), medium in available soil phosphorus (21.7 kg $ha^{-1}$) and high in available soil potassium (275 kg $ha^{-1}$). The experiment was laid out in randomized block design and replicated thrice. The experiment comprised of eight treatments *viz.,* $T_1$ - Control (No fertilizer and no organic manure) $T_2$ - 100% RDN (Recommended dose of nitrogen) $T_3$ - $T_2$ + Green manure @ 6.25 t $ha^{-1}$ , $T_4$ - 75% RDN + Green manure @ 6.25 t $ha^{-1}$, $T_5$ - $T_2$ + Vermicompost @ 5 t $ha^{-1}$, $T_6$ - 75% RDN + Vermicompost @ 5 t $ha^{-1}$, $T_7$ - $T_2$ + Pressmud @ 10 t $ha^{-1}$, $T_8$ - 75% RDN + Pressmud @ 10 t $ha^{-1}$. Both the experiment was conducted during samba season (August to January). Fertilizer schedule of 150:50:50 kg $ha^{-1}$ of N, $P_2O_5$ and $K_2O$ was applied. N and $K_2O$ were applied as per the treatment schedule in four equal splits *viz.,* basal, tillering, panicle initiation and heading stages of rice. The entire dose of $P_2O_5$ was applied basally before transplanting. N, $P_2O_5$ and $K_2O$ were supplied through urea (46 per cent N), single super phosphate (16 per cent $P_2O_5$) and muriate of potash (60 per cent $K_2O$) respectively. All necessary management practices were carried out as per standard recommendation for rice crop. The green manure was applied seven days before transplanting and other organic manure were applied at final land preparation. Twenty-eight days old seedlings of CO 43 rice were transplanted in puddle field at a spacing of 20 x 15cm. Growth and yield parameters were recorded. The grain yield was assessed at 14 % moisture level.

**Table 1. Effect of INM practices on growth attributes of rice**

| | Plant height | | Number of tillers hill$^{-1}$ | | LAI | | DMP (kg ha$^{-1}$) | |
|---|---|---|---|---|---|---|---|---|
| Treatments | Season-I | Season-II | Season-I | Season-II | Season-I | Season-II | Season-I | Season-II |
| $T_1$ | 73.86 | 75.86 | 7.12 | 7.36 | 3.78 | 3.81 | 4824 | 4938 |
| $T_2$ | 80.31 | 81.27 | 8.93 | 9.42 | 4.96 | 5.01 | 7838 | 8185 |
| $T_3$ | 91.53 | 94.03 | 11.28 | 12.09 | 5.63 | 5.77 | 10704 | 11257 |
| $T_4$ | 89.61 | 91.96 | 10.58 | 11.46 | 5.42 | 5.56 | 10150 | 10691 |
| $T_5$ | 95.39 | 98.21 | 12.43 | 13.24 | 5.98 | 6.19 | 12342 | 13004 |
| $T_6$ | 93.42 | 96.14 | 11.87 | 12.68 | 5.81 | 5.98 | 11708 | 12364 |
| $T_7$ | 89.42 | 90.34 | 10.23 | 11.04 | 5.31 | 5.51 | 9785 | 10302 |
| $T_8$ | 86.23 | 87.69 | 9.52 | 10.31 | 5.12 | 5.24 | 9227 | 9747 |
| SEd | 0.89 | 0.99 | 0.25 | 0.26 | 0.08 | 0.09 | 248 | 237 |
| CD(p=0.05) | 1.78 | 1.98 | 0.49 | 0.51 | 0.15 | 0.18 | 497 | 475 |

**Treatment details:- $T_1$** - Control (No fertilizer and no organic manure) **$T_2$** - 100% RDN (Recommended dose of nitrogen) **$T_3$** - $T_2$ + Green manure @ 6.25 t ha$^{-1}$ , **$T_4$** - 75% RDN + Green manure @ 6.25 t ha$^{-1}$, **$T_5$** - $T_2$ + Vermicompost @ 5 t ha$^{-1}$, **$T_6$** - 75% RDN + Vermicompost @ 5 t ha$^{-1}$, **$T_7$** - $T_2$ + Pressmud @ 10 t ha$^{-1}$, **$T_8$** - 75% RDN + Pressmud @ 10 t ha$^{-1}$

**Table 2. Effect of INM practices on yield attributes, grain and straw yields in rice**

| | Productive tillers m-2 | | Filled grains panicle-1 | | Grain yield (kg ha-1) | | Straw yield (kg ha-1) | |
|---|---|---|---|---|---|---|---|---|
| Treatments | Season-I | Season-II | Season-I | Season-II | Season-I | Season-II | Season-I | Season-II |
| T1 | 193.87 | 199.13 | 59.46 | 60.32 | 2.07 | 2.11 | 2.78 | 2.85 |
| T2 | 296.62 | 301.25 | 66.83 | 68.74 | 3.47 | 3.60 | 4.41 | 4.63 |
| T3 | 362.14 | 366.93 | 77.83 | 80.21 | 4.91 | 5.14 | 5.85 | 6.17 |
| T4 | 347.81 | 352.74 | 76.05 | 78.19 | 4.62 | 4.84 | 5.58 | 5.90 |
| T5 | 396.43 | 405.27 | 82.63 | 85.13 | 5.74 | 6.02 | 6.66 | 7.05 |
| T6 | 380.29 | 387.85 | 80.72 | 83.19 | 5.42 | 5.70 | 6.35 | 6.73 |
| T7 | 339.17 | 346.62 | 74.83 | 76.73 | 4.41 | 4.62 | 5.42 | 5.73 |
| T8 | 321.52 | 327.49 | 72.73 | 75.83 | 4.14 | 4.35 | 5.13 | 5.45 |
| SEd | 7.43 | 7.93 | 0.89 | 0.98 | 0.14 | 0.15 | 0.11 | 0.12 |
| CD(p=0.05) | 14.86 | 15.86 | 1.78 | 1.96 | 0.28 | 0.29 | 0.21 | 0.23 |

Treatment details:- $T_1$ - Control (No fertilizer and no organic manure) $T_2$ - 100% RDN (Recommended dose of nitrogen) $T_3$ - $T_2$ + Green manure @ 6.25 t ha$^{-1}$ , $T_4$ - 75% RDN + Green manure @ 6.25 t ha$^{-1}$, $T_5$ - $T_2$ + Vermicompost @ 5 t ha$^{-1}$, $T_6$ - 75% RDN + Vermicompost @ 5 t ha$^{-1}$, $T_7$ - $T_2$ + Pressmud @ 10 t ha$^{-1}$, $T_8$ - 75% RDN + Pressmud @ 10 t ha$^{-1}$

The data on various studies recorded during the investigations were subjected to statistical scrutiny as suggested by Gomez and Gomez (1984).

## RESULTS AND DISCUSSION

**Effect of INM practices on growth attributes:** In both the years, there was perceptible difference observed in rice growth attributes due to effect of INM treatments. Among the INM treatments, 100% RDN + vermicompost @ 5 t ha$^{-1}$ ($T_5$) registered the maximum plant height of 95.39 and 98.21 cm, tillers number 12.43 and 13.24 hill$^{-1}$, LAI of 5.98 and 6.19, DMP of 12342 and 13004 kg ha$^{-1}$ ( Table 1) during first and second season, respectively. Favourable effect of vermicompost on plant height and tiller number hill$^{-1}$ could be attributed to sustained availability of major and micronutrients with different growth hormones like gibberellins resulting in increased plant height and tiller number hill$^{-1}$ which in turn increases LAI and DMP. These results coincide with the work of Sudhakar and Kuppuswamy (2007). Besides, when LAI is optimum the plants would become photosynthetically more active which would contribute to improvement in growth attributes (Jeyabal, 1997).The lowest values were obtained in control ($T_1$).

**Effect of INM practices on yield attributes**

The yield potential of rice is determined by yield attributes and the values of yield attributes are in accordance with that of growth parameters. Plots received with 100% RDN + vermicompost @ 5 t ha$^{-1}$ ($T_5$) significantly registered higher number of productive tillers of 396.43 and 405.27 m$^{-2}$, filled grains of 82.63 and 85.13 panicle$^{-1}$ during first and second season, respectively. It could be attributed due to vermicompost, which contains essential plant nutrients, steady supply of macro and micro nutrients during entire crop period, leading to better growth and development of filled grains panclie$^{-1}$. The results corroborate with the findings of Panda (2005). The least productive tillers hill$^{-1}$ and filled grains panicle$^{-1}$ was recorded under control ($T_1$).

**Effect of INM practices on grain and straw yields**

Integration of 100% RDN + vermicompost @ 5 t ha$^{-1}$ ($T_5$) recorded significantly higher grain yield of 5.74 and 6.02 t ha$^{-1}$ ( Table 2), which was 177.29 and 185.31 per cent higher than $T_1$ (No fertilizer and no organic manure) and 65.42 and 67.22 per cent over 100% RDN $T_2$ during first and second season, respectively. Similar trend was noticed in straw yield also. This might be due to the fact that vermicompost offer a balanced nutritional release pattern to plants, providing nutrients such as available N, soluble K, exchangeable Ca, Mg and P that can be taken readily by plants (Edwards and Fletcher, 1988) and greater microbial diversity and activity resulting in higher grain and straw production (Edwards, 2004). The least yield was registered under $T_1$ (No fertilizer and no organic manure).

**Conclusion**

Thus, it can be concluded that application of 100% recommended dose of nitrogen along with vermicompost @ 5 t ha$^{-1}$ can be an effective integrated nitrogen management practices that can be recommended to the farmers of coastal

tracts of Tamil Nadu for higher productivity and sustainability in rice.

## REFERENCES

Edwards, C.A. 2004. Earthworm ecology. Second ed. American soil and water conservation association. CRC. Press/Lewis Publ. Boca Raton, F.L.: 508.

Edwards, C.A. and K.E. Fletcher. 1988. Interaction between earthworms and microbes in organic matter breakdown. Agriculture, Ecosystems and Environment, 20(3): 235-239.

Gomez, K.A., and Gomez, A.A, 1984. Statistical procedure for agricultural research (II Ed.) John Wiley and Sons, New York. pp. 680.

Jeyabal, A. 1997. Agronomic evaluation of bio digested slurry in rice - blackgram cropping system, Ph.D. Thesis, Annamalai Univ., Annamalai Nagar, Tamil Nadu, India

Panda, D. 2005. Integrated nutrient management in rice. ISBN. Current trends in life Science, 25: 709-717.

Pandey N, Verma AK, Anurag, Tripathi RS .2007. Integrated nutrient management in transplanted hybrid rice (*Oryza sativa* L.). Ind J Agron 52 : 40—42.

Sudhakar, P. and G.Kuppuswamy . 2007. Evaluation of Different organic manures in rice and their impact on succeeding crops. Plant Archives, 7(1): 439-441.

Yadav DS, Kumar A .2000. Long-term effect of organic manures on productivity and soil fertility in rice (*Oryza sativa* L.) —wheat (*Triticum aestivum*) cropping system on farmers field. Extended summaries. Vol 1. 2nd Int Agron Cong 26—30 Nov New Delhi, pp 65—67.

*******