

SOIL NITROGEN AND MICROBIAL POPULATION UNDER MANAGED RICE-WHEAT-GREENGRAM CROPPING SYSTEM

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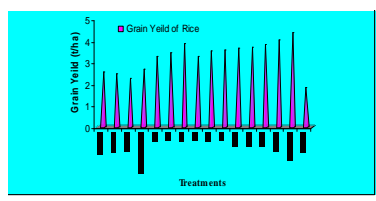
INTRODUCTION

The management of soil nitrogen is critical for maintaining a productive organic farming system especially when exhaustive system like rice-wheat system is taken up. No one source of nutrient usually suffices to maintain productivity and quality control in organic system. In addition, the inputs to supplement nutrient availability are often not uniform and presenting additional challenges in meeting the nutrient requirement of crops in organic systems.

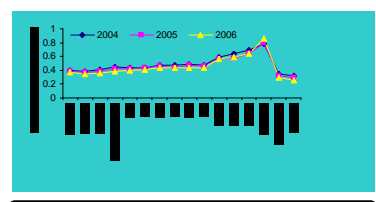
Organic farming is a holistic production management system which promotes and enhances agro-ecosystem health, biodiversity, biological cycles and soil biological activity".

MATERIALS AND METHODS

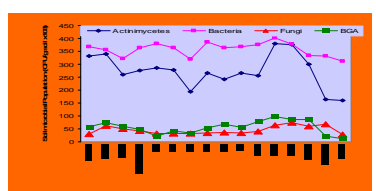
Field experiment was conducted at the research farm of IARI, New Delhi, India during 5 wet and dry seasons of 2003-08 in rice-wheat-green gram cropping system. In this experiment different treatments comprising organic amendments such as Blue Green Algae (BGA) @ 2.0 kg / ha, Azolla @1.0 tonne / ha, Vermicompost and Farm Yard Manure (FYM) @ 5.0 tonne / ha applied alone or in combination were tested in organic crop production. These treatments were compared with total control (N0P0K0) and recommended dose of fertilizer (N80P40K40). In wheat crop Azotobacter replaced Azolla, but other treatments remained same. Bio mass of green gram was incorporated in soil after picking of pods and wheat was sown using zero tillage practice



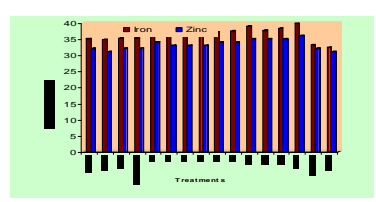
Effect of different treatments on rice grain yield (mean of 5 years)



Effect of different treatments on soil organic content



Soil microbial population in rice fields after 3 years of cropping



Effect of different treatments on Iron and Zinc content in rice grains



On-farm Testing

RESULTS

India had only 0.54 million ha under organic farming in 2007 and it is estimated to increase to 2.0 mha in 2012

Organic production in India growing @ 15-20% annually

We obtained 4.38 and 3.68 t/ha rice and wheat grain yield, respectively under combined application of four organic amendments and this yield was at par with the yield recorded under recommended dose of chemical fertilizer

Total and available nitrogen content in soil (0-15 cm) was found to be continuously built up over the period of five years due to the organic farming through the combined application of four organic amendments. Total N content in absolute control plots declined sharply due to the continuous depletion of N by the crops.

Soil organic carbon (SOC) contents also showed the same trends as total soil N contents and SOC were correlated. A built up in soil organic carbon up to 0.92% due to the application of four amendments from the initial level of 0.46% was recorded during this period. SOC declined up to 0.34% and 0.22% due to chemical fertilizer application and absolute control, respectively over the same period.

Iron and Zinc contents and uptake in rice grain increased significantly due to organic farming

Microbial population and dehydrogenase enzyme activity in organic treatments was higher over the years as compared to control and recommended fertilizer application.

On-farm Testing on organic rice farming in 2 villages with two rice varieties 'Pusa Basmati 1' and 'Pusa Sugandh 4' varified above results.

Organic cultivation was found economical to the farmers when they got premium price of their produce.

CONCLUSION

Addition of four organic amendments (BGA, Azolla, FYM and Vermicompost) could maintain proper level of soil nitrogen and organic matter and give the optimum yield of organic Basmati rice and wheat. Quality of the produce was also improved.