

Influence of green manure and different organic sources of nutrients on yield and soil chemical properties of rice (*Oryza sativa* L.) grown under lowland condition

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ABSTRACT

A field experiment was conducted during *Rabi* season of 2008-09 on clay loamy soil at wet land under long term organic manurial trial, TNAU, Coimbatore, to study the effect of green manure and different sources of organic manures on yield and soil chemical properties of rice. Green manure incorporation *in situ* + application of poultry manure on N equivalent basis recorded significantly higher grain and straw yield (4844 and 7746 kg ha⁻¹, respectively) compared to other treatments. Green manure incorporation along with poultry manure application resulted in higher soil available N, P and increased K uptake. Higher N and P uptake and increased soil available K was recorded with green manuring and poultry manure application. Incorporation of green manure *in situ*, vermicompost and poultry manure decreased the soil EC, pH and increased the organic carbon content of soil compared to all other combination of treatments.

Key words : Rice, Organics, Green manure, Organic carbon and poultry manure

INTRODUCTION

Rice is a major staple food crop grown in Asia. An estimated 24% of the increase in Asian rice production from 1965 to 1980 was attributed to use of fertilizer, mainly N (Barker *et al.*, 1985). Despite past gains in rice production through fertilizer, recent observations of stagnant or declining yields under continuous rice growing with high levels of N fertilizer have raised concerns about the long-term sustainability impacts of monoculture rice receiving high inputs of N fertilizer. Continuous stagnation of water under the rice system may increase alkalinity of the soil and application of green manures and organic sources to the rice is one of the best and cheaper alternatives against the use of fertilizers in rice system. Heavy and imbalanced use of chemical fertilizers has led to think about the use of organic manures in intensively growing areas for sustainable production system. Judicious use of organic manures and their scientific management is important to sustain the land and to achieve production potential of crops. The addition of chemical fertilizers like nitrogen to the plant leads to nitrate leaching and caused an infant disease like methamoglobinaemia (WHO, 1998). Hence, the expectation that organic farming by reverting to the use of green manures and other sources of organics can bring sustainability in agriculture with eco-friendly environment. It must be stressed that the value of FYM, vermicompost, poultry manure and green manure in soil improvement is due to their nutrient content, besides helping in the improvement of soil structure and water holding capacity of soil (Kale and Bano, 1986 and Srivastava, 1998). Recent studies have revealed that rice crop needs more nitrogen than the present recommended

dose *i.e.*, 120 kg per ha (Modgal *et al.*, 1995). India has a vast potential to supply nitrogen (11.08 m t) through organic manures *viz.*, FYM, poultry manure, green manures etc. as against total nitrogen consumption of 8.84 m t by crops (Jabhakar, 1992). To increase the productivity and to meet the heavy demand for food of the growing population, it is necessary to recycle available resources and wastes. Nambiar and Ghosh (1994) have shown that neither organic sources nor mineral fertilizers alone can achieve sustainability in crop production. Organic farming helps to improve the physical, chemical and biological properties of soil and maintains the ecological balance as well as productivity of life supporting systems for the future generations (Raj Gopal and Sree Ramulu, 1999). In view of this, the present investigation was carried out to know the effect of green manure and different organic sources of manures on yield and soil chemical properties of rice.

MATERIALS AND METHODS

A field investigation was conducted during *Rabi* season of 2008-09 in clay loam (*Verti sol*) soil in wet lands of Central Farm Unit, Tamil Nadu Agricultural University, Coimbatore, under permanent layout of long term organic manurial trial. The pH of the soil was 8.68, EC 0.44 dS m⁻¹, available N (225 kg ha⁻¹), available P₂O₅ (35 kg ha⁻¹), available K₂O (465 kg ha⁻¹) and organic carbon (0.50%). The experiment was laid out in a split plot design assigning green manure incorporation to main plots *viz.*, G₀: Without green manure incorporation, G₁: With green manure incorporation and manures applications to sub plots *viz.*, M₁: No manure (Control), M₂: FYM,

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