

Effect of integrated plant nutrient management (IPNM) practices on grain yield and qualities of medium slender rice (*Oryza sativa*) under rice – rice cropping system in Southern India

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ABSTRACT

A field experiment was carried out at Agricultural College and Research Institute, Madurai during *rabi* seasons of 2001 and 2002 to study the effect of cotton crop residue management practices and levels of inorganic fertilizer N and K on rice [*Oryza sativa* (L.)] - rice cropping system. The results revealed that incorporation of cotton stalks @ 5 t ha⁻¹ with *Trichoderma viride* in rice crop significantly improved yield attributes (number of panicles and number of grains) and yield of rice. Similar yield trend was seen by increasing levels of N and K and also significantly increased the grain qualities of medium slender rice in organics and bio-inoculants applied plots.

Key words : Cotton residues incorporation, IPNM, Bio-inoculants, Levels of fertilizer N and K, Grain yield and qualities.

INTRODUCTION

In recent years, rice has emerged as the principal food crop in Southern India. In Tamil Nadu, rice [*Oryza sativa* (L.)] - rice cropping system is mostly followed. Growing two or more crops per year involves heavy removal of plants nutrients, nitrogen being the key input limiting rice production. To sustain rice productivity at present levels, the plants nutrients removed in harvested produce or lost from the system must be replaced by fertilizers or must be obtained from organic manures. Addition of N through organic manures exhibited better replenishment of losses of N through crop harvest and other mechanisms, creating a dynamic equilibrium (Satheesh and Balasubramanian, 2003), this equilibrium needed to be sustained for increasing the rice production and high yielding rice varieties ability to use additional nutrient inputs which were thus developed. Moreover, use of organic manure not only acts as a source of N and other nutrients but also increase the efficiency of applied nitrogen (Zhu *et al.*, 1987). Bhudhar and Palaniappan (1994) opined that the addition of organic waste increased the microbial population during the decomposition process. In places like Srivilliputhur, Rajapalayam, Tenkasi tracts of Southern districts of Tamil Nadu (India), *rabi* rice is grown after summer cotton. Similarly in Thanjavur district rice is grown after rice fallow cotton. Disposal of cotton residues is a major problem in these areas. Cotton stalks

of about 10 – 15 t ha⁻¹ after the final picking, are normally uprooted and used as fuel. About 15 t ha⁻¹ of cotton stalks can supply 180 kg N ha⁻¹ (Bhudhar and Palaniappan, 1994). Even though *hirsutum* cotton stalks have sufficient nutrient value either it is wasted or used as fuel, in spite of poor calorific value of stalks. Burning results in huge wastage of plant nutrients and creates an environmental pollution. The nutrients present in organic materials (cotton residue) can be recycled into field either by direct incorporation or by composting with some bio-inoculants. It is the easy way to utilize the cotton stalks efficiently by integrating with biological sources. Integrated plant nutrient approach to crops by the combination of organics, bio-inoculants along with synthetic fertilizers has numerous apparent agronomical and environmental benefits over inorganic fertilizers alone. Hence, a field trial was conducted to study the effect of cotton residue management practices and levels of inorganic fertilizer N and K on grain yield and qualities of *rabi* rice.

MATERIALS AND METHODS

A field experiment was carried out at Agricultural College and Research Institute, Madurai during *rabi* seasons (September- December) of 2001 and 2002. The experimental soil was sandy clay loam with pH of 8.05, which was medium in organic carbon (0.52 %), low in available nitrogen (186.3 kg ha⁻¹), medium in phosphorus

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