



Quantification of enzyme activities under rice crop in a permanent manurial experiment in the coastal sandy tract of Onattukkara of Kerala

B. APARNA

ABSTRACT

A study was conducted at the Permanent manurial experiment on rice at Kayamkulam in the coastal tract of Onattukkara region belonging to the taxonomic class sandy, mixed, isohyperthermic, ustic Quartzic Psammets during 2004-05. The Permanent manurial experiment was started as early as 1964 in the Regional Agricultural Research Station to study the long term effects of application of manures and inorganic fertilizers. The experiment was conducted in a Simple Randomized Block Design with eight treatments replicated four times involving various combination of organic and inorganic fertilizers. The enzymes selected for the study were urease, phosphatase, protease, dehydrogenase and cellulase. Treatments involved were the different combinations of inorganic fertilizers with organic manures at different rates to meet the requirement of rice crop. It was observed that the enzyme activities viz., urease, phosphatase, protease dehydrogenase and the respiratory activity were found to be higher in the treatment T₇ where 80 kg N ha⁻¹ was applied in the form of ammonium sulphate (60 kg N ha⁻¹) and as farm yard manure (20 kg N ha⁻¹) in combination with 40 kg P₂O₅ ha⁻¹ as single super phosphate and 40 kg K₂O as muriate of potash. In the case of cellulase the treatments did not reveal any significant results. Similarly the grain yield, straw yield and soil available nutrient status except nitrogen were found to be significantly high in T₇. It is evident from the study of this permanent manurial experiment that higher activities of enzymes were reported with the treatment involving the application of organic manures and chemical fertilizers as quantity of organic amendments added to the soil per se could not sustain higher enzyme activity but required supplemental addition of chemical fertilizers also.

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Key words : Enzyme activities, Permanent Manurial Experiment, Organic amendments

INTRODUCTION

Soils may be considered as a biological entity with complex biochemical reactions. Soil enzymes play a significant role in microbial ecology by catalyzing innumerable reactions in soil. Soil enzymes mediate various biochemical processes which are derived from microorganisms, plant roots and animals. Enzymes are proteins that act as catalysts without undergoing permanent alteration and cause chemical reactions to proceed at faster rates. Historically chemical and physical properties of soil have been used as a crude measure of soil productivity. There is also evidence that enzyme activities may hold potential as early and sensitive indicators of soil productivity or ecological stress or restoration (Swathi *et al.*, 2010) and have great potential to provide a unique integrative biological assessment of soils and the possibility of assessing the soil biota. Soil enzyme activities are thus sensitive indicators of

management induced changes in soil quality and their activities are found to have increased with the addition of organic manures under permanent manurial experiments.

A systematic study on the soil enzymes status under various management practices is the need of the day to understand the benefits accrued. Since the dynamics and the status of soil enzymes in permanent manurial experiments in Kerala have not been attempted so far and the superiority of the treatments under permanent manurial experiments have to be detailed, the present study was undertaken with the overriding objective of projecting the effect of long term fertilization on soil biological properties by assessing the enzyme activities in the permanent manurial experiments on rice which is maintained in the coastal sandy Onattukkara tract of Kerala.

MATERIALS AND METHODS

The Onattukkara agronomic tract lies in Kollam and

Correspondence to :

B. APARNA, Farming Systems Research Station, Kerala Agricultural University, Sadanadapuram, Kottarakkara, KOLLAM (KERALA) INDIA