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Dehydrogenase and phosphatases activities in soils as influenced by soil depth, organic and conventional management systems under southern transition agro climatic zone of Karnataka

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ABSTRACT

In the past decade, there has been increased scientific interest in the so-called organic farming, especially in comparison with conventional agriculture. Many recent studies compare these two fundamentally different systems for soil properties, in different regions of the world. A field study was conducted to determine the activity of acid phosphatase, alkaline phosphatase and dehydrogenase in four representative soil profiles one each from < 3years, 3-6 years and > 6 years of organic farming practice and one profile from conventional farming system under southern transition zone of Karnataka, India. The activity of dehydrogenase and soil phosphatase increased significantly in all three organic farming fields irrespective of cropping systems evaluated over conventional farming, with maximum activity being recorded in the profile where organic farming is practiced for > 6years. Depth wise distribution studies showed that the activities of all three enzymes were concentrated in surface soils and decreased with depth.

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Key words : Soil enzyme, Dehydrogenase, Phosphatase, Profile, Organic farming, Conventional farming

INTRODUCTION

Soils are a fundamental resource base for agricultural production system. Besides being the main medium for crop growth, soil sustains crop productivity, maintains environmental quality and provides for plant, animal, and human health. Agricultural management systems have been historically adopted without recognizing consequences on soil conservation and environment quality, and, therefore, significant decline in soil quality has occurred worldwide. Given that soil quality depends on the physical, chemical, biological and biochemical properties of the soil, changes in these properties must be taken into account in assessing changes in soil quality. Since, soil biological and biochemical properties do respond rapidly and enzymatic activity is highly sensitive to external agents and easy to determine, measurement of the activity of numerous hydrolytic enzymes has been widely used in recent years to study the effect of changes in soil use on processes that affect soil quality (Bandick and Dick, 1999).

Strategies based on biological indicators and correlating them with productivity of an ecosystem would be a tool to evaluate sustainability of the land use systems. Soil enzymes play a major role in nutrient availability (Martens *et al.*, 1992). In soils, enzymes may be associated with viable cells, dead cells (abiontic enzymes), cell debris and immobilized enzymes in the soil matrix (Burns, 1982). Inorganic P is released from organic matter by hydrolysis of C-O-P ester bonds by phosphatases, which are, therefore, important in the P nutrition. Dehydrogenase is considered to play an important role in the initial stages of oxidation of soil organic matter by

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