**Enzymes as Indicators of Soil Microbial Activity at three Locations in Kentucky**

George F. Antonious

Division of Environmental Studies, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, Frankfort, KY 40601, USA

# ABSTRACT

Soil biological monitoring is a potential sensitive indicator of soil ecological stress for early restoration. With increasing cost and shortage of nitrogen fertilizer, there is increased emphasis on the use of municipal sewage sludge (SS) for land farming. However, SS may contain trace-elements that potentially affect soil microbial growth and the enzymes they produce. Soil samples were collected from three Kentucky Counties (Adair, Meade, and Franklin) from areas where SS was applied as a soil amendment for commercial crop production. Hydrolysis of the fluorescein reagent revealed that the total soil enzymatic activities were significantly greater in SS amended soils compared to native soils. The activities of the enzymes hydrolyzing urea (urease; urea amidohydrolase, EC 3.5.1.5), sucrose (invertase; β-D-fructofuranosidase, and *p*-nitrophenyl phosphate (acid and alkaline phosphatase) were also greater in SS amended soil compared to un-amended native soil. The elevated soil urease and invertase activities (47 and 89%, respectively) as well as acid and alkaline phosphatase activities (23 and 26%, respectively) in soil amended with SS provided evidence of increased soil microbial population and the enzymes they produce.

**Key Words**:Biosolids. Urease. Invertase. Phosphatase. Total enzymes activity. Sewage sludge

George Antonious, Professor, Division of Environmental Studies, College of Agriculture, Food Science, and Sustainable Systems, Kentucky State University, 104 Chappell Building, Frankfort, KY 40601-2355; Phone: 502/597-6005; Fax: 502/597-6763; E-mail: george.antonious@kysu.edu