

Effect of Select Surfactants on Activities of Soil Enzymes Involved in Nutrient Cycling

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Abstract : Soils are recipient for surfactants in herbicide formulations. Surfactants entering the soil environment can possibly disrupt different chemical, physical and biological interactions. Therefore, it is critical that we understand the fate, behavior and transport of surfactants upon entering the soil. A comprehensive study was conducted to examine effect of surfactants on nutrient uptake, microbial community, and enzyme activity. The research was conducted in the greenhouse growing corn (*Zea mays*) as a test plant in a factorial experiment (three surfactants at two different rates with control, and three herbicides) organized as randomized blocked design. Surfactants evaluated were Activator 90, Agri-Dex, and Thrust; herbicides were glyphosate, atrazine, and bentazon. Treatments examined were surfactant only, herbicide only, and surfactant + herbicide combinations. Corn was planted in fertilized soils (silt loam and silty clay) with moisture content maintained at the field capacity for optimum growth. This paper will report results of above mentioned treatments on acid phosphatase, beta-glucosidase, arylsulfatase, beta-glucosaminidase, and dehydrogenase activities. In general, there were variations in the enzyme activities with some inhibition and some being enhanced by the treatments. Activator 90 appeared to have the highest inhibitory effect on enzymatic activities. Atrazine application significantly decreased the activities of acid phosphatase, beta-glucosidase, and dehydrogenase in both soils; however, combination of Atrazine + Agridex increased the acid phosphatase activity while significantly inhibiting the other enzyme activities in soils. It was concluded that long-term field studies are needed to validate changes in nutrient uptake, microbial community and enzyme activities due to surfactant-herbicide combination effects.

Keywords : herbicides, nutrient cycling, soil enzymes, surfactant

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