Abstract

Project Code : MRG5080335

Project Title : Biodegradation and Bioremediation of Atrazine Herbicide in Thai Soil

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Project Period : 2 years

An atrazine degrading bacterium, strain KU001, was obtained from a sugarcane field at the Cane and Sugar Research and Development Center at the Kasetsart University, Kamphaeng Saen campus, Thailand. Strain KU001 had a rod-to-coccus morphological cycle during growth. Biolog carbon source analysis indicated that the isolated bacterium was *Arthrobacter histidinolovorans.* The atrazine degradation pathway in strain KU001 consists of the catabolic genes, *trz*N, *atz*B and, *atz*C. Strain KU001 was able to use atrazine as a sole nitrogen source for growth, and surprisingly, atrazine degradation was not inhibited in cells grown on ammonium, nitrate or urea, as compared to cells cultivated on growth-limiting nitrogen sources. During the atrazine degradation process, the supplementation of nitrate completely inhibits atrazine degradation activity in strain KU001, whereas ammonium and urea had no effect on atrazine degradation activity. The addition of strain KU001 to sterile or nonsterile soils resulted in the disappearance of atrazine at a rate that was 4 to 5-fold more than that achieved by the indigenous microbial community. The addition of citrate to soils resulted in enhanced atrazine degradation, 80% of atrazine disappeared within one day following nutrient supplementation. Moreover, biostimulation study showed that organic fertilizers, animal manure, compost and biogas slurry singly, which were mixed with contaminated soil, stimulate indigenous soil microorganisms to degrade atrazine. The biodegradation of atrazine (150 mg per kg of soil) in contaminated soil was investigated. It was found that there was no difference between atrazine degradation occurred in soil supplemented with animal manure and in the control. However, the atrazine degradation was inhibited in the soil mixed with organic fertilizers and citrate.

Keywords : Atrazine degrading bacteria, *Arthrobacter*, Inorganic nitrogen, Biostimulation