B306 Isolation and Caracterization of 4-Chloro-2-methylphenoxyacetic acid-Degrading Bacteria from Agricultural Soils

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Seven numerically dominant 4-chloro-2-methylphenoxyacetic acid (MCPA) degrading bacteria were isolated from agricultural soils. The isolates utilized the herbicide MCPA as the sole carbon source, producing significant biomass in MCPA mineral medium. They exhibited diverse substrate utilization capabilities, but most of them grew very slowly in herbicide mineral medium. Their chromosomal patterns obtained by polymerase chain reaction (PCR) amplification of repetitive extragenic palindromic (REP) sequences were very distinct each other. One isolate CN2, which was identified as *Xanthomonas oryzae*, was able to degrade other herbicides such as MCPP, 2,4-D, 2,4-DP, and 4-CPA in addition to MCPA. This strain has three plasmids. When the smallest plasmid was lost through SDS curing process, the strain could not attack MCPP and 2,4-DP any more, and its MCPA or 2,4-D degradation rate was remarkablely reduced. The strain CN2 did not have homology with the tfd genes and exhibited different induction patterns for MCPA and 2,4-D degradative enzymes.

B307 Continuous toxicity test system using a luminously modified bacterium

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A freshwater borne bacterium transformed with *luxAB*-containing plasmid and subsequently mutagenized to be highly sensitive was optimized for the toxicity tests of various VOC's and heavy metals. The EC_{50} values obtained from tests using this bacterium, UV2, revealed to be much less than those from the Microtox. In addition, some physiological characteristics of this bacterium under the toxic stress conditions such as potential bioluminescence, growth pattern, and intracellular ATP content, reproducibly and reliably correlated to the toxicity of the chemicals exposed (Park *et al.*, 1998. J. Kor. Microbiol.). This bacterium seemed to be superior in detecting the presence of any toxic materials in the natural hydrosphere, therefore the advanced test system featuring a continuous measurement of the toxicity, an automated real-time monitoring of its results, and an alerting function was designed. For continual toxicity measurement by an automated instrumental system stably maintaining the *lux*-plasmid and bioluminescence of strain UV2, the conditions for continuous cultivation were established. In addition to the biological compartment of this system, the light detecting compartment was modified electronically and mechanically for uninterruped reading of emitted light resulting from bioluminescence reaction in the presence of the contaminated water sample.