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Atrazine degradation by stable mixed cultures enriched from agricultural soil and their characterization

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Source: JOURNAL OF APPLIED MICROBIOLOGY **Volume:** 106 **Issue:** 3 **Pages:** 986-992 **Published:** MAR 2009

Times Cited: 4 **References:** 24 Citation Map

Abstract: The aim of this work was to enrich stable mixed cultures from atrazine-contaminated soil. The cultures were examined for their atrazine biodegradation efficiencies in comparison with J14a, a known atrazine-degrading strain of Agrobacterium radiobacter. The cultures were also characterized to identify community structure and bacterial species present.

The cultures were enriched and then stabilized in bacterial media. The stable mixed cultures and J14a were tested in a medium containing 100 mu g l(-1) of atrazine. For all cultures, atrazine was removed 33-51% within 7 days and the cell optical density increased from 0.05 to between 0.50 and 0.70. Four isolates designated ND1, ND2, ND3 and ND4 were purified from the mixed cultures and identified based on sequence analysis of the 16 S rRNA gene as Alcaligenes faecalis, Klebsiella ornithinolytica, Bacillus megaterium and Agrobacterium tumefaciens, respectively. An atrazine-degrading gene, atzA, was present in ND2 and ND4.

The stable mixed cultures obtained could degrade atrazine. Klebsiella ornithinolytica ND2 and Ag. tumefaciens ND4 are atrazine degraders.

The novel stable mixed cultures could be used for bioremediating crop fields contaminated with atrazine. This is the first report of the atzA gene in Kl. ornithinolytica.

Document Type: Article

Language: English

Author Keywords: Agrobacterium; atrazine biodegradation; identification; Klebsiella; mixed cultures

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Funding Acknowledgement:

Funding Agency	Grant Number
National Science Foundation	0449125
Commission on Higher Education, Ministry of Education	
Thailand and Research Center for Environmental and Hazardous Substance Management, Khon Kaen University, Thailand	

[Show funding text]

Publisher: WILEY-BLACKWELL PUBLISHING, INC, COMMERCE PLACE, 350 MAIN ST, MALDEN 02148, MA USA

Subject Category: Biotechnology & Applied Microbiology; Microbiology

IDS Number: 405TK

ISSN: 1364-5072

DOI: 10.1111/j.1365-2672.2008.04075.x

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