



Microbial diversity in a continuous system based on rice husks for biodegradation of the azo dyes Reactive Red 2 and Reactive Black 5



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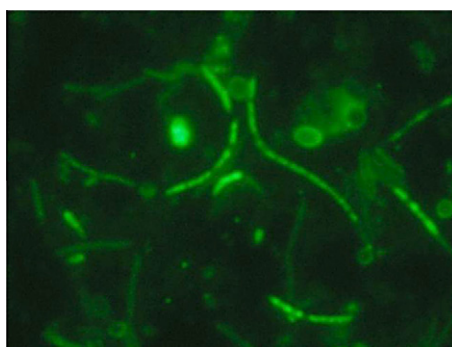
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HIGHLIGHTS

- Efficient degradation of two azo dyes by a cost-effective continuous process.
- Microorganisms analyzed by PCR, DGGE and identified by 16S rRNA sequencing.
- Several interesting species identified some known to produce azoreductase.
- Robust degradation performance over 80%, without any operational interruptions.
- Degradation monitored by LC/MS, no metabolites detected in the treated water.

GRAPHICAL ABSTRACT

Continuous biofilter with rice husks degraded azo dyes in a robust degradation performance over 80%. Molecular fingerprinting analysis (DGGE and 16S rRNA sequencing) revealed a diverse and dynamic bacterial community composition involved. Several of the species identified are known to form biofilm, to produce azoreductase and degrade other organic compounds. Capabilities most wanted for a bacterium to thrive in a biofilter treating textile wastewater. LC/MS analysis of the treated water leaving the system detected no metabolites.



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ABSTRACT

In the present study the degradation of two common azo dyes used in dye houses today, Reactive Black 5 and Reactive Red 2 was evaluated in biofilters. In two experiments, bioreactors performed over 80% decolorization at a hydraulic retention time of only 28.4 h with little production of metabolites. Molecular analyses showed a diverse and dynamic bacterial community composition in the bioreactors, including members of the *Bacteroidetes*, *Acinetobacter* (Gammaproteobacteria) and *Clostridium* (Firmicutes) that possess the capacity to reduce azo dyes. Collectively, the results indicate that the development of mixed bacterial communities from natural biomaterials contributes to an efficient and robust degradation performance in bioreactors even at high concentration of dyes.

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1. Introduction

Today, fashion is a way of life, and bright and lasting colors are a vital part of clothing design. To meet this requirement, synthetic