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Title:

Continuous system based on rice husks for biodegradation of a simulated textile waste water containing azo dyes

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Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

Textile industry wastewater can have a heavy impact on the local environment and the water quality, especially the textile dyes and their metabolites. Large sections of the textile industry are located in developing countries and wastewater treatment is often considered expensive to utilize. Biological treatment based on lignocellulosic material could be a cost-efficient wastewater treatment applicable in developing countries.

Wastewater from textile mills are complex, contain a mixture of dyes, chemicals and high salt concentrations. In this study a wastewater containing two azo dyes, Reactive Black 5 (200 mg l^{-1}) and Reactive Red 2 (200 mg l^{-1}) in a salt solution of cotton wash water, were degraded in biological filters with the degradation of dyes were monitored by spectrophotometer and Liquid Chromatography coupled with mass spectroscopy (LC/MS).

The biofilters were highly efficient and performed as best over 89% decolourization (fig. 1) at a turnover time of 56.8 h, with 2 gl^{-1} at 20ºC. Increased flow to a retention time of 24,8h still showed good degradation capacity of 82,8 %. The treated water was analysed on LC/MS by SP Technical Research Institute of Sweden and no detected any metabolites in the treated water leaving the system was detected.

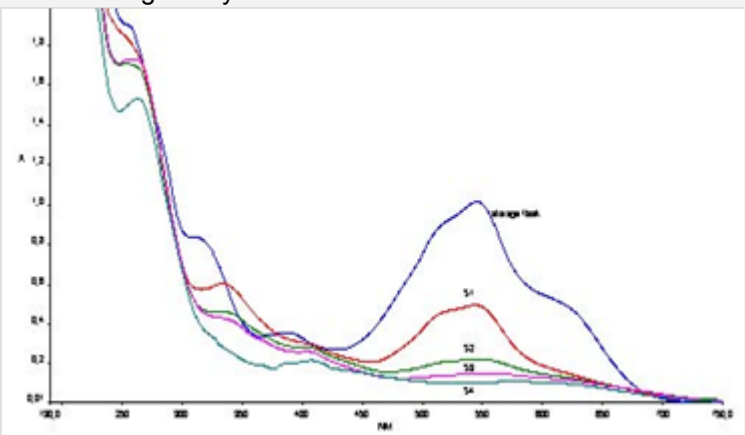

Fig. 1: absorbance curves for original dye mix and after each treatment reservoir at a turnover time of 56.8 h, with 2 gl^{-1} at 20ºC.

Epifluorescence microscopy displayed several bacterial forms (fig. 1 and 2), together they

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constitute a mixed bacterial community. Previous molecular fingerprinting have revealed several interesting species, with representatives mainly from *Firmicutes, Bacteroidetes, Beta and Gamma-proteobacteria* inhabiting rice husks and forest residues. Several of these bacteria possess key features important for degrading azo dyes.

During the experiments the filters worked very robust and there were no interruptions in the biological treatment capacity.

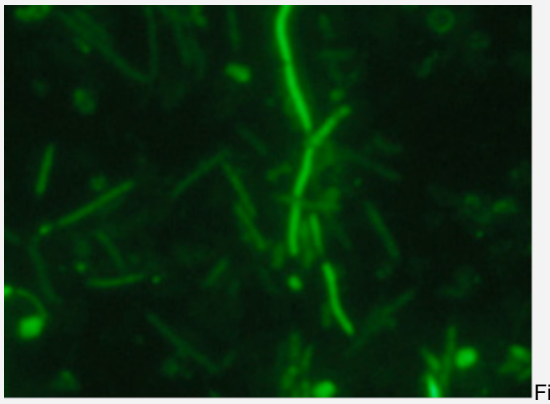

Fig. 2: microscopic image of microbial composition in biofilter.

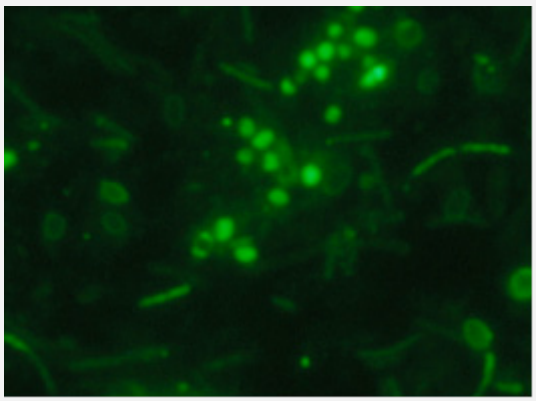

Fig. 3: microscopic image of microbial composition in biofilter.

Our results suggest that a cost-efficient treatment can be developed from natural biomaterials. The biofilters supported mixed communities of microorganisms which performed an efficient and robust degradation, even at high concentration of dyes.