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Bioprospecting fungi for biodegradation of textile dyes

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Reactive dyes are widely used in the textile industry. Coloured effluents from dyestuff and textile industries, the major producers and users of *azo* dyes, not only produce visual pollution but can also be detrimental to life, as they are usually resistant to biological treatment. In addition, fungi, mainly white rot fungi (wrf), have shown the ability to degrade numerous aromatic organopollutants, including textile dyes, via oxidative mechanisms till their complete mineralisation, avoiding the formation of anilines as intermediates. In our work, textile *azo* dyes were synthesized using aminobenzoic and aminosulphonic acids as di*azo* components and bioaccessible groups such as 2-methoxyphenol (guaiacol) and 2,6-dimethoxyphenol (syringol) as coupling components. The bioaccessible groups are present in the lignin structure and seem to be access points to the ligninolytic enzymes produced by wrf. The fungal biodegradation of the *azo* dyes were studied in order to establish the relationship between the chemical structure of the dye and the extent of biodegradation. The rule of the non-specific fungal ligninolytic enzymatic system, lignin peroxidases, manganese peroxidases and laccases, as well as the enzyme glyoxal oxidase wich produce H_2O_2 for the activities of both peroxidases were studied. Reactive Black 5 and the anthraquinone-based polymeric dye Poly R-478 have been currently used to screen the fungal biodegradation under alkaline conditions (pH ≥ 8.0). In order to adapt the fungi to this alkaline condition a chemostat was used [1,2].

To perform this work the wrf used were supplied by the fungal culture collection Micoteca da Universidade do Minho (MUM). To overcome current limitations in fungal biodegradation performance is desired that new strains well adapted to high osmotic pressure and alkaline conditions can be bioprospected preferentially from extreme environmental conditions worldwide.

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