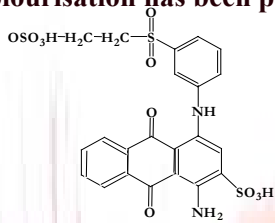


Remazol Brilliant Blue R decolourisation by the fungus *Pleurotus ostreatus* and its oxidative enzymatic system

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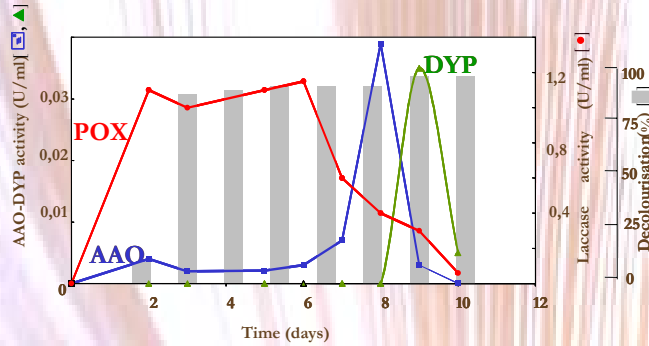
Synthetic dyes are extensively used for textile dyeng and other industrial applications. The total world colorant production is estimated to be on the order of 800,000 tons/years and at least 10% of the used dyestuff enters the environment through wastes.

Synthetic dyes often are not degraded and/or removed by conventional physical and chemical processes. These treatment result in the production of toxic by-products and/or require high levels of energy. Microbial decolourisation has been proposed as a less expensive and less environmentally intrusive alternative.



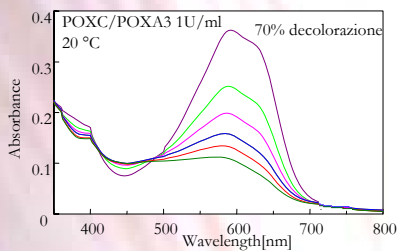
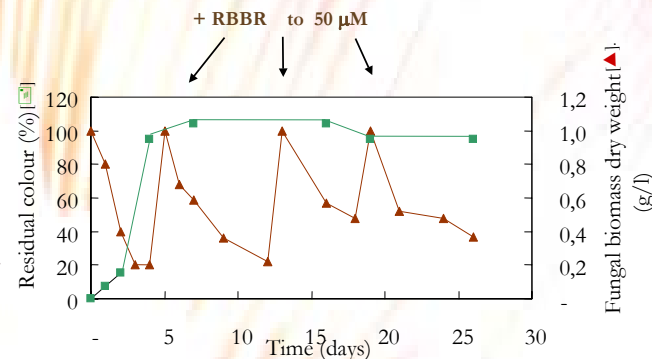
Remazol Brilliant Blue R (RBBR) is an anthracene derivative and it is frequently used as starting material in the production of polymeric dyes. It represents an important class of toxic and recalcitrant organopollutants

Pleurotus ostreatus, a white-rot basidiomycete fungus, is able to degrade several chemically different dyes, such as azo, diazo, heterocyclic, triphenylmethane, phtalocyanine and indigo dyes.

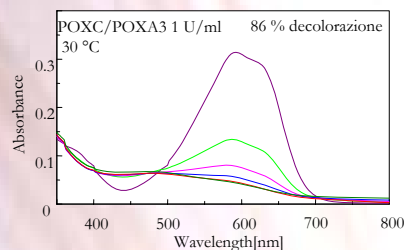
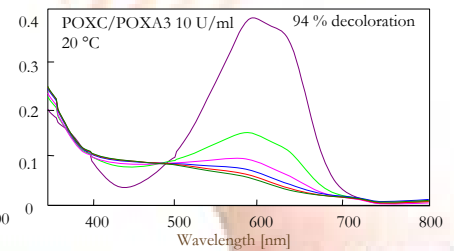
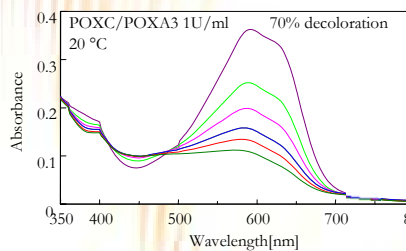


A rapid transformation of RBBR was obtained in optimised liquid culture of *P. ostreatus*. Total colour removal was achieved after nine days. In these conditions, the fungus produces laccases (POX), veratryl alcohol oxidase (VAO) and dye-decolourising peroxidase (DYP) but only laccases seem to be responsible of RBBR transformation

The same mycelium was reused for 4 cycles of dye decolourisation in liquid culture. In figure arrows indicate the time of each consecutive dye addition. The mycelia biomass production reaches the maximum at the 7th day. In these conditions, 0.15 g of dye/g of fungal biomass are transformed in 25 days of growth.



RBBR spectra after laccase treatment. Each overlay scan corresponds to 20 min



Purified laccase isoenzymes, POXC and POXA3, are able to perform *in vitro* dye transformation. POXA3 shows higher decolourisation efficiency with respect to POXC. A mixture of both laccases, determine a remarkable improvement in the decolourisation rate and final level. Enhancing incubation temperature and enzyme concentration, increases the extent of RBBR decolourisation.

Treatment of RBBR with the laccase mixture reduces the dye toxicity by 95 %. These results show a strict correlation between decolourisation and detoxification and indicate that dye degradation products, after enzymatic treatment, may not be toxic.

