

A novel laccase from *Trametes polyzona* with high performance in the decolorization of textile dyes

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Abstract

Laccases are multicopper oxidases able to oxidize several phenolic compounds and find application in numerous industrial applications. Among laccase producers, white-rot fungi represent a valuable source of multiple isoforms and isoenzymes of these multicopper oxidases. Here we describe the identification, biochemical characterization, and application of laccase 2 from *Trametes polyzona* (TP-Lac2), a basidiomycete fungus emerged among others that have been screened by plate assay. This enzyme has an optimal temperature of 50 °C and in acidic conditions it is able to oxidize both phenolic and non-phenolic compounds. The ability of TP-Lac2 to decolorize textile dyes was tested in the presence of natural and synthetic mediators at 30 °C and 50 °C. Our results indicate that TP-Lac2 most efficiently decolorizes (decolorization rate >75%) malachite green, orange G, amido black and bromocresol purple in the presence of acetosyringone and 2,2'-Azinobis(3-Ethylbenzthiazoline-6-Sulfonate) - ABTS. Overall, the laccase mediator system consisting of TP-Lac2 and the natural mediator acetosyringone has potential as an environmentally friendly alternative for wastewater treatment in the textile industry.