DECOLORIZATION-RELATED ENZYMATIC ACTIVITY OF EXTRA- AND INTRACELLULAR EXTRACTS FROM YEAST ISOLATED FROM TEXTILE WASTEWATER

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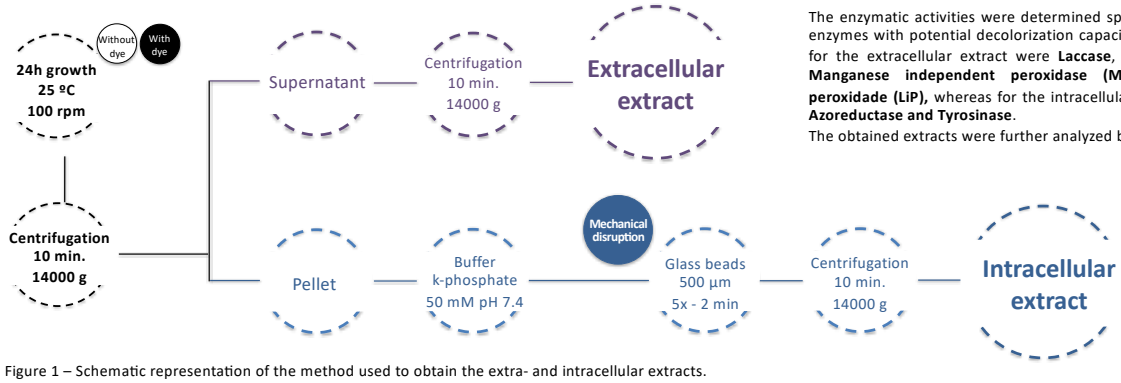
Scope and Objective

Textile industry generates a large amount of effluents, mostly composed by synthetic dyes, that are discharged in the environment [1]. Although wastewaters are usually treated before discharge some dyes are not properly degraded and can cause serious problems in aquatic ecosystems [2]. The existent chemical treatments are very costly and generate large quantities of sludge [3]. Thus it is important to find alternatives such as biological treatments to aid the decolorization of dyes in textile wastewaters.
This work aims to detect the activity of specific enzymes from a *Candida spp* yeast previously isolated from a textile wastewater that is capable of decolorization of dyes.

Methods



The enzymatic activities were determined spectrophotometrically for several enzymes with potential decolorization capacity. The enzymatic assays carried for the extracellular extract were **Laccase**, **Manganese peroxidase (MnP), Manganese independent peroxidase (MiP) and Lignin independent peroxidade (LiP),** whereas for the intracellular extract were **Oxidoreductase, Azoreductase and Tyrosinase**.
The obtained extracts were further analyzed by Bradford, SDS-Page, FPLC.

Figure 1 – Schematic representation of the method used to obtain the extra- and intracellular extracts.

Results

Analysis of the extracellular extract show that the protein is very low and the FPLC profile only shows peaks with low molecular weights. Activity was not detect for any of the enzymes assays tested.

The intracellular extract has higher protein content and it is possible to identify a peak in FPLC profile with a molecular weight possibly corresponding to enzymes with potential decolorization capacity. Enzyme activity was detected for oxidoreductase and tyrosinase.

PROTEIN YIELD

Table 1 - Means of the total protein (± standard deviation) in µg/ml from the extra- and intracellular extracts resulting from growth with and without dye.

Extract / Growth	Extracellular	Intracellular
Without dye	5.44 (± 1.77)	402.31 (± 33.04)
With dye	6.79 (± 0.88)	416.06 (± 11.65)

MOLECULAR WEIGHTS

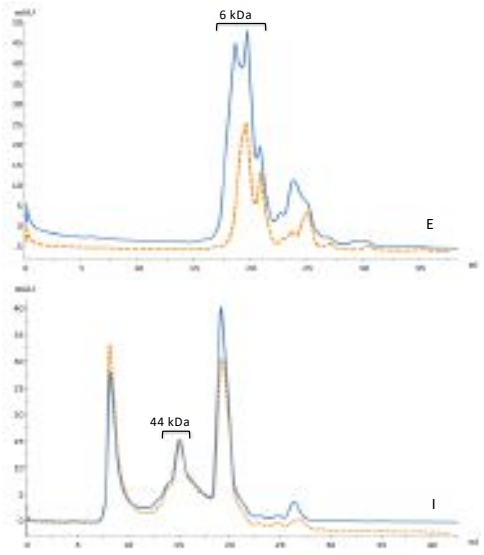


Figure 2 – FPLC profile of the extra- (E) and intracelular (I) extracts resulting from growth with and without dye. — without dye — with dye

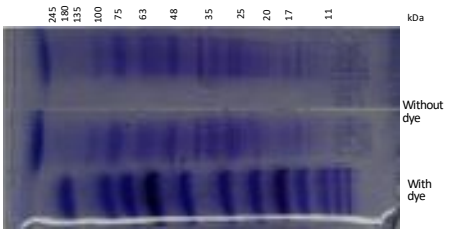


Figure 3 – SDS-Page profile of the intracelular extract resulting from growth with and without dye.

ENZYME ACTIVITY

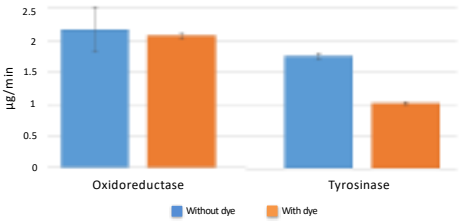


Figure 4 – Enzymatic activity of the intracelular extract for oxidorretuse and tirosinase, both resulting from growth with and without dye

Conclusions

The characterization of the enzyme extracts can help understand the possible metabolism involved in the biological decolorization process. This work suggest that oxidoreductase an tyrosinase might have a important role in decolorization capacity of the yeast isolate. The application of this yeast in the bioremediation of textile wastewaters is promising when used along with established methods, being environmentally friendly and cost-effective.

Bibliography

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