

Title: LACCASE PRODUCTION BY MARINE-DERIVED FILAMENTOUS FUNGUS *Peniophora* sp. CBMAI 1063 IN DIFFERENT BIOREACTORS

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Abstract:

Laccases (EC 1.10.3.2, p-diphenol) are oxidoreductase enzymes that use molecular oxygen to oxidize phenolic and non-phenolic compounds. A variety of applications can be found in the literature, such as the synthesis of new molecules, as biological compound in biosensors, and mainly in the bioremediation of environmental pollutants (e.g. catechol-derived compounds, hormones, dyes, insecticides, herbicides). In this context, scientists have been putting efforts in the isolation of new laccases' producer strains, optimization of its production media, and definition of the best conditions for obtaining high amounts of these enzymes. This study had as main objective to evaluate the production of laccases by the fungus *Peniophora* sp. CBMAI 1063 isolated from a marine sponge (Brazil) in two different types of bioreactors: stirred tank reactor (STR) and air-lift. Laccase activity was measured spectrophotometrically by monitoring the oxidation of ABTS (pH 5.0 and 37°C). The STR bioreactor used was the Fermac 320 (Electrolab Limited, UK) under 150 rpm of agitation and 1,0 vvm of aeration. The air-lift bioreactor used was a modified BioFlo 115 (New Brunswick, US) under 1,0 vvm of aeration. Both bioreactors had the respective total and working volume of 5,0 L and 3,5 L. The bioprocesses were carried out under batch mode and in the same operation conditions of medium and temperature (28°C). *Peniophora* sp. CBMAI 1063 showed ability to produce 2.700 U/L of laccase using STR. When cultivated in air-lift bioreactor, the activity obtained was around 4.000 U/L. Results showed that there was a clearly evidence of lower mycelial damage when the fungus was cultured in air-lift, suggesting a relation with the highest production of laccase. However, under air-lift cultivation was observed enzymatic degradation after its peak. In conclusion, marine-derived fungus *Peniophora* sp. CBMAI 1063 was able to produce laccase in bioreactor conditions and can be considered as a promising genetic resource for biotechnological applications.

Keywords: Laccase, Air-Lift, STR, Bioprocess, Bioreactor, Marine biotechnology.

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