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# Enhancement of laccase activity in semi-solid culture of *Pleurotus ostreatus* by Cordyceps extract supplementation

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Laccases are multinuclear copper-containing proteins that catalyze the oxidation of aromatic and non-aromatic compounds in presence of molecular oxygen. Laccases are naturally produced by higher plants, insects, bacteria, and fungi. Nevertheless, white-rot mushrooms are currently desirable for the biofuel industry because of their diversity and versatility. From this group, the edible mushroom *Pleurotus ostreatus* (oyster mushroom) has been recently, widely studied due to its capacity to colonize several lignocellulosic substrates, among other properties. A previous research study showed the metabolomic profile and bioactivity potential of the raw extracts from *Cordyceps nidus*. Based on the biochemical nature of these extracts, we aimed to evaluate their effect in the laccase activity of *P. ostreatus*. We used a semi-solid-state system, using rice husk as substrate and a cupric-ion stimulant supplementation, as is previously recommended. A complete experimental design was implemented for metabolites extracted from *Cordyceps* mycelium growth in four different culture media, with three different solvents. Measurements of 2,2'-azino-bis (3-ethylbenzothiazolin-6-sulfonic acid) oxidation and extracellular glucose-content were performed as response variables. Peaks of enzymatic activity were found reaching over 8.000 U $L^{-1}$ within the studied time. However, only water-fractioned extracts were found significantly different from experimental controls (p-value<0.05), without *Cordyceps* extracts addition. In conclusion, aqueous extracts of *C. nidus* cultured in Sabouraud dextrose agar with yeast extract and brown rice medium significantly enhanced the laccase activity of *P. ostreatus* in the pre-stablished culture system. This study is the first report of the application of *Cordyceps* extracts in the enhancement of recycling treatment processes for lignocellulosic wastes. Studying opportunities by using *P. ostreatus* in the pre-treatment of lignocellulosic biomass for biofuel production is necessarily increasing. Accordingly, we need to deeply understand the mechanisms by which we could enhance laccase activity of white-rot fungi. A characterization of the bioactive compound is also recommended for future researches.

## Biography

Juan S Chirivi-Salomon is a Chemical Engineer and Microbiologist, who has acquired expertise in basic Mycology throughout his careers. His work on entomopathogenic fungi, in collaboration with Dr. Tatiana Sanjuan, revealed two new species of *Cordyceps* with notorious potential in pharmaceutical and biofuel industries. In his Master of Science project, he has acquired huge knowledge about metabolomics of fungi, focusing his work in the industrial potential of fungal metabolites. He is researching on the effect of *Cordyceps* metabolites in the laccase production for lignocellulosic biomass treatment. In collaboration with Dr. Rocio Sierra, he is exploring new opportunities in the application of fungi and their metabolites in bioenergy industry. His work hope is to link different academic institutions and social foundations.

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