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Scaling-up evaluation of the biological lignin-degrading treatment of rice husk by Pleurotus ostreatus

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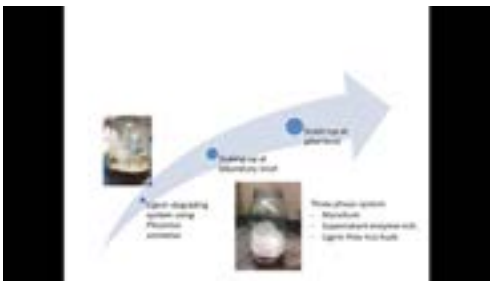
Pleurotus ostreatus is a white-rot fungus able to produce a lignin-degrading enzymatic complex system. This fungus can be used in the biological pre-treatment of lignocellulosic biomass for biofuel production. We previously defined a semi-solid in- vitro system using rice husk as substrate and given its difficulty of recycle in Colombian agricultural wastes. In this study, we aimed to evaluate the scaling-up of this system by increasing 5-times the mass used as substrate, and subsequently the volume of the whole system was increased. The inoculum size was also evaluated. The fungal biomass weight, the 2, 2'-azino-bis (3-ethylbenzothiazolin-6-sulfonic acid) oxidation, the extracellular glucose-content, and delignification degree were measured to compare both systems. The maximum laccase activity obtained was 44,095 U L-1 at day 19 of cultivation in the studied system. The scaling-up was not significantly affected by the inoculum size, but a direct-proportion tendency was observed. In the other hand, the glucose concentration in the react medium decreased from 500 mg dL-1 to 71.13 mg dL-1, in the same system which indicates rapid consumption by the fungus through the time. In addition, we observed that our system maximizes the laccase activity in comparison with previous scale levels. We suggested that phase separation could be strongly related with this result. Nevertheless, the oxygenation conditions could enhance the system, so is widely recommended to be performed in future for a complete experimental design testing different oxygenation systems by bubbles and simple-agitation. This is the first study where a semi-solid culture system for lignin degradation using fungi is applied.



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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