X SEMINÁRIO BRASILEIRO DE TECNOLOGIA ENZIMÁTICA – ENZITEC
7 a 10 de outubro de 2012
Blumenau - SC

Expression of manganese peroxidase by *Lentinulaedodes* and *Lentinulaboryana* in submerged and solid-state systems

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Keywords: basidiomycetes; enzyme; ethanol.

INTRODUCTION

The production of ethanol from lignocellulosic biomass is referred as a second generation biofuel, which processing is one of the most promising technologies under development. Although there are few available studies on the use of enzymes produced by fungi as active for the biodegradation of lignocellulosic biomass, the manganese peroxidase (MnP) enzyme presents high potential to degrade lignin. Therefore, this study aimed at evaluating the ability of fungi *Lentinulaedodes* and *Lentinulaboryana* to produce this enzyme when cultivated in submerged fermentation system (SS) and also in solid-state fermentation system (SSF).

RESULTS AND DISCUSSION

L. edodes and *L. boryana*were both cultivated in the absence of lightfor30 days in a B.O.D chamber, at 25 °C[1] and 20 °C[2], respectively. The MnP activity was determined in the extracts using a spectrophotometric method[3].

For SS, a modified SOCAREAN medium[4] was prepared, in which corn cob meal was added. The enzymatic extracts were obtained by vacuum filtration and centrifugation.The average growth rateof *L. edodes*(0.14 $g.L^{-1}.day^{-1}$) was greater than that of *L. boryana* (0.08 $g.L^{-1}.day^{-1}$).Maximum levels of enzyme activity occurred on the 25th day for both species, and as for *L. boryana* this value was much higher (Figure 1).

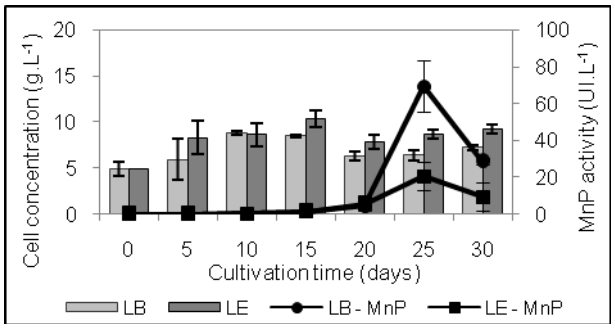

Figure 1. Cell concentration and MnP activity during the SS of *L. boryana* (LB) and *L. edodes* (LE). (The vertical bars represent standard deviation).

For SSF, two culture medium were used: one (T1) containing sawdust of *Eucalyptus benthamii*, soybean meal and water, and other (T2) containing sawdust, soybean meal, cassava bagasse, corn cob meal andwater. In this system, the enzymatic extracts were obtained by shaking the substrate with distilled water, then the mixture was vacuum filtered and the liquid portion was centrifuged.The best results were obtained on the 10th day for *L. edodes*, while for *L. boryana* it happened between the 20th and the 25th days, despite both species presented values close to 110 $UI.L^{-1}$ (equivalent to 0.66 $UI.g^{-1}$) (Figure 2). Also, the supplementation of culture medium with cassava bagasse and corn cob showed no significant differencefor the species of *Lentinula*.

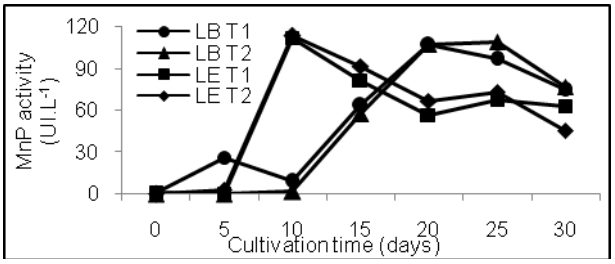

Figure 2. MnP activity during the SSF of *L. edodes* (LE) and *L. boryana* (LB) in the different medium (T1 and T2).

CONCLUSION

The studied fungi expressed the enzyme of interest and its production is enhanced when cultivated in solid system. Thus, considering the importance of eucalyptus in the energy matrix to obtain bioethanol, studies on how to optimize the production processes of enzymes able to degrade lignocellulolytic compounds should be encouraged.

ACKNOWLEDGEMENTS

The authors are thankful to FURB, Embrapa Florestas, CAPES, CNPq and FAPESC.

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