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# Initial water activity effect on radial growth rates and manganese peroxidase produced by species of *Lentinula*

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## INTRODUCTION

Many research studied the enzymes from fungi, such as manganese peroxidase (MnP), to obtain fermentable sugars by industrial lignocellulosic biomass for ethanol production. However, to produce cellulosic ethanol from wood like eucalyptus, technical barriers must be overcome in the foreseeable future and the lignocellulose degradation is a central step. Thus, this study aimed to evaluate the influence of water activity ($a_w$) on mycelium growth and MnP expression by *Lentinulaedodes* and *Lentinulaboryana*.

## RESULTS AND DISCUSSION

Two culture medium were used for solid state fermentation (SSF): medium *a* (95% sawdust of *Eucalyptus benthamii* and 5% soybean bran) and medium *b* (80% sawdust, 5% soybean bran and 15% cassava bagasse). The influence of $a_w$ was evaluated by adding five different amounts of water reaching $a_w$ between 0.800 and 1.000, resulting in five treatments. To simulate SSF in normal conditions the $a_w$ levels were not controlled or maintained fixed. The media were sterilized and then transferred to Petri dishes.*L. edodes* and *L. boryana* were both cultivated in the absence of light for 14 days in a B.O.D chamber, at 25 °C[1] and 20°C[2], respectively. Mycelium growth was determined by daily monitoring hyphae formation in and MnP activity was measured in the end of growth. 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 MnP activity was determined in the extracts using a spectrophotometric method[3].The enzyme was expressed by both fungi in both culture media, although the higher MnP activities were obtained in *b* medium. It indicates that cassava bagasse supplementation together with the decrease in sawdust concentration might have increased MnP expression by these fungi. The higher MnP activities were expressed in the treatment number 5, which had the higher initial water activity.In this condition, the activity expresses by *L. boryana* (110.87 $IU.L^{-1}$, equivalent to 0.67 $IU.g^{-1}$) was 50% greater than that expressed by *L. edodes*(73.17 $IU.L^{-1}$, equivalent to 0.44 $IU.g^{-1}$).Mycelium growth was also observed only in the treatments with higher initial $a_w$, above 0,993, as can be seen in Figure 1. Thereby, it was indicated that water is a limiting factor for both growth and MnP expression.

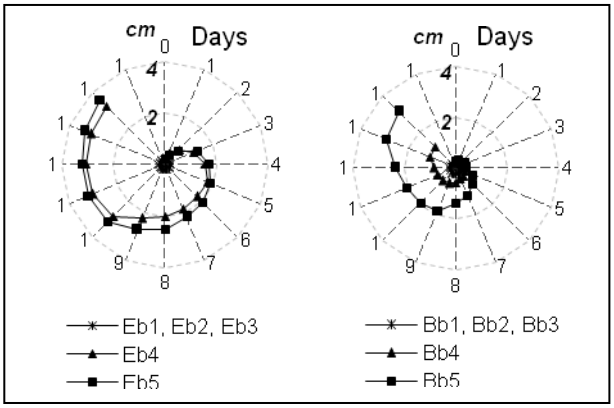


**Figure 1.** Radial mycelial growth for *L. edodes* (indicated by E) and *L. boryana* (indicated by B) in *b* media, for the different treatment used (1 to 5).

## CONCLUSION

The sawdust supplemented by carbon and nitrogen sources was effective on providing the fungi capability to develop its mycelium and to produce MnP. High initial $a_w$ values provided the best mycelial growth rates and the highest MnP expression for both species studied. Therefore, it was noticed that water is a determinant factor in enzymeexpression for use in the production of fermentable sugars from lignocellulosic biomass in order to obtain second generation bioethanol.

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