The Effect Of Copper Ions On The Production Of Ligninolytic Enzymes By White Rot Fungus *Pleurotus ostreatus*

*Seyma Ozcirak, Raziye Ozturk Urek*

*Dokuz Eylul University, Graduate School of Natural and Applied Sciences, Chemistry Department, Izmir*

*Dokuz Eylul University, Faculty of Science, Chemistry Department, Biochemistry Division, Izmir seymaozcirak89@gmail.com*

**Objectives:** White-rot fungi secrete one or more of the three extracellular enzymes that are essential for lignin degradation: lignin peroxidase (LiP), manganese peroxidase (MnP), and copper-containing laccase (Lac) and aryl alcohol oxidase (AAO). The effect of different concentrations of copper ions on the synthesis of ligninolytic enzymes by the white rot fungus *Pleurotus ostreatus* was studied in submerged fermentation (SF) to determine the optimal conditions for the impression of activity of these enzymes.

**Materials and Methods:** *P. ostreatus* HK-35 was used in this experiment. It was cultured on potato dextrose agar for 1 week at 25°C. For production of enzymes on SF in stationary conditions, three plugs were transferred to 100 ml erlenmayer flasks containing 10 ml basal medium. CuSO₄·H₂O as a regulator of laccase activity was initially added at concentrations 0.5; 1.0; 2.5; 5.0 mM. Lac, MnP, LiP and AAO activities were assayed spectrophotometrically in aliquots taken on incubation days 3, 5, 6, 7, 10, 12 and 15. Also, pH, extracellular protein, reducing sugar and nitrogen levels were determined.

**Results:** Copper is an important microelement for the majority of living organisms. In this study, the highest Lac and MnP activities were obtained in the presence of 0.5mM Cu²⁺ as 2900 U/L and 2637.5 U/L on day 10 and 12, respectively. The addition of 0.5 mM Cu²⁺ led to an increase of Lac activity; however at Cu²⁺ concentration 1.0, 2.5 and 5.0 mM, the increase was not considerable according to others. Also, LiP and AAO activities were determined negligible levels. In addition, decreases in reducing sugar, nitrogen levels and extracellular protein were observed dependent-incubation time.

**Conclusion:** As a result of these, at 0.5 mM Cu²⁺ concentration was obtained highest ligninolytic enzyme activities by *P. ostreatus* in SF. The regulatory effect of copper is apparently due to structure of the Lac enzyme, which contains four ions of this metal. Besides, since copper is a biogenic metal present in the environment, its concentration may have an important role in enzyme performance and stability.

**Key words:** *Pleurotus ostreatus*, ligninolytic enzymes, submerged fermentation, copper.