449f The Properties of a Series of Isolated Low Molecular Weight Peptides from *Phanerochete Chrysosporium* in Decomposition of Lignin

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Lignin is known as one of the most recalcitrant biomaterials on earth. Previous studies indicated that lignin biodegradation can not be accomplished efficiently only by the ligninolytic enzymes. Wood-rot-fungi might employ some small, diffusible active agents to initiate the breakdown of lignin. Some glycopeptides (1-5kDa) had been partially purified from Phanerochaete chrysosporium, which could catalyze a redox reaction between electron donors and O2, to produce hydroxyl radical and reduce Fe3+ to Fe2+. But there was no report on further purification and function of these glycopeptides in lignin degradation.

In our study, a series of low-molecular-weight peptides named Pc factor was purified from P. chrysosporium, which could oxidize phenolic lignin-model compound and reduce Fe3+ to Fe2+. The redox property of Pc factor might play an important role in the early stage of wood degradation.

Isolation and purification of Pc factor

The crude extracellular enzyme solution of P. chrysosporium ME-446 ATCC 34541 was ultrafiltered (cut off 5kDa). The filtered components (<5kDa) were lyophilized, and applied to a Sephadex G-10 column for purification. The redox activity fractions were pooled and further purified on HPLC TSK-GEL G2500PW column.

Structure detection

The purified Pc factor was identified as a series of peptides with similar structures by MALDI-TOF (matrix assisted laser desorption ionization - time of flight) and amino acid analysis. The molecular mass of Pc factor varied 0.5 to 1kDa. According to MALDI-TOF, and the molecular weight margins between the components were 113.04 (Ile/Leu) and 150.77 (Cysteine oxidized). Cysteine was probably correlative with the redox activity of Pc factor. These results indicated Pc factor was a series of analogical peptides.

Properties of Pc factor

Pc factor could oxide phenolic lignin-model compound 2,6-DMP (2,6-dimethoxyphenol) in the absence of Mn2+ and H2O2 (Figure), and reduce Fe3+ to Fe2+. Pc factor could chelate Fe3+. No hydroxyl radical had even been detected with Pc factor by TBA (thiobarburic acid) and KTBA (2-keto-4-thiomentylbutyric acid) method. Pc factor had very high thermostability. No obvious redox activity was lost at 100°C for 30 min.

Conclusion

Our research showed that Pc factor was a series of analogical peptides with distinct redox property. It was quite different from other LMW (low molecular weight) factors described previously on the low molecular weight, special oxidative activity and high thermostability. Further investigation on the interaction between Pc factor and ligninolytic enzymes and the function of Pc factor in lignin biodegradation are currently in progress.

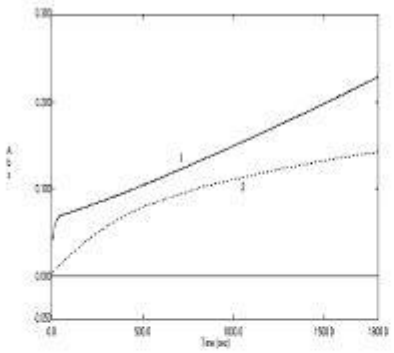

Fig.3 2,6-DMP oxidation by Pc factor and MnP (1.Pc factor 2. MnP)