

Enzymatic Degradation of Lignin–Carbohydrate Complex (Part I)

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ABSTRACT

Initial steps in an early metabolic pathway of biodegradation of lignin by white-rot fungus are very important for application of biotechnology to the utilization of biomass; for example, enzymatic pretreatment for ethanol production from plant resources and biological pulping.

Lignins in woody plants exist as giant high molecular weight compounds bounded with carbohydrates, mainly hemicelluloses at middle lamella and in secondary cell wall, and show resistance against the invasion of general microorganisms other than wood-rotting fungi and also against enzymatic digestion of cellulose.

We assumed that white-rot fungi first attack the lignin–carbohydrate complex (LCC) and then decompose to some degree into oligomers of lignin and hemicellulose by an unknown enzymatic reaction. The study began with a screening of the fungus, which grew well on the LCC medium.

LCCs were prepared from wood meal of *Picea jezoensis* that had been extracted MWL, by the method of Koshijima (1).

Six fungi (2) that grew well on the media containing decayed lignin were inoculated on agar media of LCC. After 3 d cultivation, the fungi *Ganoderma* sp. and *Poria subacida* showed most growth on the medium.

Crude enzyme preparations were made from decayed wood meal media with each fungus. Chromatographic detection of decomposed compounds from LCC, which is soluble in hot water, by each enzyme and Meicelase from *Tricoderma viride*, suggest that the wood-rotting fungus may contain another enzyme able to liberate a phenolic compound from LCC besides the enzymes of *Tricoderma viride*.

REFERENCES

1. Yaku, F., Yamada, Y., and Koshijima, T. (1976), *Holzforshung* **30** (H. 5), 148.
2. Fukuzumi, T., and Hayashi, Y. (1983), Screening wood-rotting fungi for bio-pulping. Conference on Biotechnologie in the Pulp and Paper Industry, London.