Lignocelullose degrading enzyme production from *Irpex lacteus* and *Fusarium solani*

Brigita Dalecka*[1]

Riga Technical University, Faculty of Civil Engineering, Research Centre for Civil Engineering, Water Research Laboratory
Email: brigita.dalecka_1@rtu.lv

Linda Mezule[2]

Riga Technical University, Faculty of Civil Engineering, Research Centre for Civil Engineering, Water Research Laboratory
Email: linda.mezule@rtu.lv

Abstract —In order to reduce the dependence on fossil fuels, there has been a great interest in lignocellulose conversion to fermentable sugars and subsequent biofuel production. The main advantages of lignocellulosic biomass are its renewability and worldwide availability. Generally, biomass pre/treatment and hydrolysis processes that convert lignocellulose to fermentable sugars may be the most complex steps in the conversion process due to the specific biomass structure, required process parameters and their interactions. However, fungal enzyme hydrolysis shows a great potential as an alternative to thermal/chemical pre-treatment due the ability to decreased energy requirements, simplicity and reduced amount of waste streams.

Microorganisms, including white-, brown-, soft-rot fungi, and some ruminant bacteria, are capable of degrading lignocellulosic biomass. In general, the most effective lignocellulose enzyme systems have been mainly investigated in white-rot fungi such as *Phanerochaete chrysosporium*, *Stereum hirsutum, Ceriporiopsis subvermispora, Pleurotus ostreatus, Coriolus versicolor, Irpex lacteus* etc. On the other side, not only white-rot fungi are known to be capable of degrading lignocellulose. Previous reports have showed that *F. solani* might be promising candidate for production of lignocellulose-degrading enzymes.

The aim of this work was to study fungal production of lignocellulose degrading enzymes to promote enzymatic hydrolysis of biomass. Two different fungi *Irpex lacteus* (white-rot fungi) and *Fusarium solani* (*Sordariomycetes* filamentous fungi) were used. The obtained enzymes were compared with commercially available cellulolytic enzyme mixture (Viscozyme L, Sigma, Aldrich). 3,5-dinitrosalicylic method was used for sugar yield measurements. The results demonstrated that not only *I. lacteus*, but also *F. solani* was capable of forming lignocellulose-degrading enzyme mixture. However, the highest average sugar yields after enzymatic hydrolysis were obtained from commercial enzyme mixture and *I. lacteus* (respectively 297 mg g^{-1} and 176 mg g^{-1} of fermentable sugars).

References

1. Albalasmeh A. A., Berhe A. A., Ghezzehei T. A. A new method for rapid determination of carbohydrate and total carbon concentrations using UV spectrophotometry. 2012. Carbohydrate Polymers; 97: 253-261
2. Chunyan X., Fuying M., Xiaoyu Z. Lignocellulose degradation and enzyme production by *Irpex lacteus* CD2 during solid – state fermentation of corn stover. 2009. Journal of Bioscience and Bioengineering; 5: 372-375
3. Obruca S., Marova I., Matouskova P., Haronikova A., Lichnova A. Production of lignocellulose-degrading enzymes employing *Fusarium solani* F-552. 2012. Folia Microbiol; 57: 221-227