

24TH BIOTECHNOLOGY CONGRESS: RESEARCH & INNOVATIONS

Annual Congress on & CRISPR CAS9 TECHNOLOGY AND GENETIC ENGINEERING

October 24-25, 2018 | Boston, USA

Ligninolytic enzymes and their possible role in future sustainable waste management of non-recyclable paper

Gabriela Kalcikova and Andreja Zgajnar Gotvajn
University of Ljubljana, Slovenia

Statement of the Problem: With the improvement of paper quality by various coating and additives the waste management is facing many difficulties regarding recycling of this new type of waste. Particular problems cause laminated paper where polyethylene is used as a coating. Recycling and/or recovery of plastic-coated paper are considerably difficult and unprofitable and thus such waste is usually aimed to be disposed in a landfill or incinerated. The aim of our work was to develop an environmentally friendly method for delamination of plastic-coated paper by extracellular ligninolytic enzymes of white rot fungus *Dichomitus squalens*. Such enzymes as laccase (Lac) and manganese peroxidase (MnP) are involved in the degradation of lignin and their natural lignocellulosic substrates and are even capable to degrade various pollutants.

Methodology & Theoretical Orientation: Plastic-coated waste paper was obtained from a front and back page of an ordinary journal and was degraded by enzyme filtrate obtained by *Dichomitus squalens*. Various ratios between the amount of plastic-coated paper and enzyme filtrate were tested. The best results were applied to set up laboratory bioreactor.

Findings: Enzymes were very efficient for delamination of plastic-coated paper. The paper part was partially dissolved and partially stayed in bulk form while foils were free-floating. The efficient delamination proceeded already after one day of the experiment, the final delamination efficiencies after 15 days were from 88.6% to 91.5%. An activity of Lac and MnP enzymes reached up to 1000U/L and 300U/L, respectively and stayed active during the whole experiment. The treatment of plastic-coated paper in a laboratory bioreactor was also very efficient reaching about 90% of treatment efficiency. Results showed, that ligninolytic enzymes can be very effective for delamination of plastic coated paper and enzymatic treatment could become an environmentally friendly alternative to current disposal option.

Biography

Gabriela Kalcikova has her expertise in waste management, landfill leachate treatment and using of white rot fungi in bioremediation. Her interest is to introduce new biotechnological approaches for treatment of so-called non-recyclable and non-biodegradable waste. She has also particular specialization in plastic waste - microplastics and their impact on the environment. She is an assistant professor and researcher at University of Ljubljana in Slovenia.

Gabriela.Kalcikova@fkt.uni-lj.si

Notes: