

Thematical course: Use of biopulping for pretreatment of wood in bioethanol production. Part 2.

Effect of biopulping on reactivity of wood substrates during fermentative hydrolysis

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Abstract

The research focused on the study of strains of basidiomycetes and micromycetes in terms of prospects of their use for pretreatment (biopulping) of different wood substrates along with physical and chemical treatment methods. We have assessed the growth of selected strains of fungi during solid state fermentation on aspen sawdust within 7, 14 and 23 days with and without steam explosion treatment (T = 187-240 °C), as well as on softwood sawdust with and without alkaline hydrolysis treatment. Untreated aspen sawdust autohydrolysed at T = 187 °C was found to be the most adapted substrate for biopulping of lignocellulosic materials for strains of micromycetes (*Penicillium sp.*, *Trichoderma lignorum* (F-98), *Beauveria bassiana* (F-145)) and basidiomycetes (*Panus tigrinus* (F-8/18), and oyster mushroom (*Pleurotus eryngii*)). Reactivity of different softwood and hardwood substrates subjected to biopulping using strains of fungi during solid phase fermentation within 7, 14 and 23 days, was assessed. Strain of *Trichoderma lignorum* was found to be the most promising for pretreatment as it demonstrates increase in reactivity by day 7 of treatment. It was found that combination of biopulping and physical and chemical treatment of wood pulp, including poorly hydrolysable softwood, allows to increase reactivity of substrates. It was established that reactivity of wood substrates can be increased during solid state fermentation using mixed culture based on strains of micromycetes *Beauveria bassiana* and *Penicillium sp.*

It was demonstrated that maximum positive effect of biopulping on reactivity of lignocellulosic substrates caused by the complex of lignocellulolytic enzymes synthesized by fungi, was during solid phase fermentation of hardwood samples. For the most poorly hydrolysable softwood pulp, it looks promising to combine alkaline pretreatment and biopulping with basidiomycetes.

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