TITLE: TESTING ENDOPHYTIC FUNGI CELLULASE POTENTIAL FOR THE PRE-TREATMENT OF SUGARCANE BAGASSE AND COCONUT FIBRE IN ETHANOL SECOND GENERATION PROCESSES

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ABSTRACT:

The production of second generation biofuels depend on the hydrolysis of complex lignocellulosic residues. Endophytic fungi is showing the ability to produce hemicellulases and related enzymes, which can be suitable for lignocellulosic biomass decomposition. In this way, this process would be capable of providing significant amounts of hydrocarbon for ethanol fermentation process. However, such a process cannot be easily achieved using only one enzyme during pretreatment procedure. Endophytic fungi can produce a variety of cellulases and hemicellulases at the same time during lab cultivation. The aim of the work was to test the produced microbial broth, which is obtained during culturing of cellulolytic and hemicellulolytic fungi, for its potential to hydrolise sugarcane bagasse or coconut fiber. Enzymatic activity was assessed using the 3,5-dinitrosalicylic acid (DNS) assay (1U=1 Mproduct/min). A non-identified fungal strain isolated from the semi-arid Brazilian ecosystem that showed significant cellulose activity was used for the generation of such enzymatic broth. A series of sugarcane bagasse or coconut fiber concentrations were incubated with similar portions of free-cell culturing broth. Apart from the best incubating period for harvesting the broth with the highest cellulase activity, the influence of pH and temperature were also investigated. The results showed that the highest enzymatic activity was achieved at the temperature of 60ºC. Thus, enzymatic kinetics calculations of sugarcane bagasse or coconut fibres were carried out during 240 min at 60ºC. The preliminary results showed that the highest activity was observed with 1% sugarcane bagasse (31.9 U) and coconut fiber (3.32 U). Therefore, the constitution of cellulosic coconut fibre is significantly protected from the activity of such enzymes, but the results are promising for the sugarcane bagasse. In addition, the possibility of carrying out enzymatic treatment at high temperature (60ºC) can be of significant industrial interest once heat pre-treatment is often used for speeding cellulosic material degradation.

Keywords: endophytic fungi, cellulase, DNS, sugarcane bagasse and Coconut Fibre

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