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Enzymatic degradation of sugarcane bagasse: Biotechnology route to renewable biofuels

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Cellulosic ethanol has gain the attention as a potential option of renewable fuel. One of the most favorable routes for the conversion of cellulosic materials into ethanol is the enzymatic hydrolysis followed by fermentation. Hydrolysis of lingo-cellulosic materials by cellulases and hemi-cellulases are the efficient method for the release of fermentable sugars. Xylanases are valuable enzymes that degrade xylan, the most abundant hemicellulose present in both hardwoods and Pulp. Most industrial enzymes are produced by bacteria, yeasts and fungi that are able to ferment specific substrates. A number of fungi from the genus *Penicillium* are effective decomposers of lingo-cellulosic biomass and efficient producers of xylanases. The present study deals with the evaluation of xylanase production using different agro biomasses. Three extracellular xylanase was observed to be the major protein in the culture filtrate of Penicillium chrysogenum when grown in 1% agriculture biomass (sugarcane bagasse, straw, orange peel). One xylanase of 38kDa completely and another (20kDa) was partially purified after three steps of Purification: Ultrafiltration, molecular exclusion, anion-exchange chromatography. Physical characteristics of purified enzyme represent its optimal pH.5.0 ad 40oC temperature best suited conditions for the fermentation. The enzyme retained 85%activity in the presence of Tannic acid and Gallic acid two main phenolic compounds mainly produced during lignin degradation, making it desirable for application of second generation bioethanol industries. With its low temperature activity the enzyme can also be used in baking industry. The study assesses the route could enhance performance on inexpensive biomass like bagasse and reduce the cost of enzyme production using cellulolytic strains, *Penicillium chrysogenum*.

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