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RESEARCH PAPER

Asian Journal of Bio Science Vol. 6 Issue 1 (April, 2011) : 128-130

Biobleaching and biopulping of bagasse fiber using co-culture of *Trichoderma viridae* and *Aspergillus glaucus* fungi

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(Received: March, 2011; Accepted: April, 2011)

The world's second largest population is in India and hence, provides a challenging task for the government and organizations to various issues. Chemical pulping and bleaching are used to increase the paper yield and quality; however it leads to release of pollution and hazardous to ecological health (Bajpai and Kondo, 1999).Therefore, an alternative method are sought and worked out by different scientists. The Microfungi such as *Aspergillus glaucus*, *Trichoderma viridae* were selected and their co-culture resulted in a significant performance.

Key words : Biobleaching, Biopulping, Bagasse fiber

Ananth, G. Ranadive, Arun, N. and Lalitha, P. (2011). Biobleaching and biopulping of bagasse fiber using co-culture of *Trichoderma viridae* and *Aspergillus glaucus* fungi. *Asian J. Bio. Sci.*, **6** (1) : 128-130.

INTRODUCTION

Pulp and papers are manufactured from raw materials containing cellulose fibers generally wood, recycled paper and agriculture residues (Santhosh Kumar *et al.,* 2009). In developing countries about 60% of cellulose fibers originate from non-wood materials such as bagasse, cereal straw, bamboo, reeds, esparto grass, jute, flax and sisal. These fibers could be supplied from wood and non-wood plant materials (Kirkpatrick, 1991). Mostly non-wood fibers are preferred for paper making, since they are eco-friendly and more sustainable. Hence, felling of trees could be arrested. Biopulping and biobleaching are promising cost effective alternatives involving the use of microbes or their enzymes to reduce and/or replace the harmful chemical extraction of hemicelluloses and lignin without affecting the cellululose and fiber strength of paper products (Kanmani, 2009; Irfan *et al.,* 2010; Mishra and Thakur, 2010). Lignin is a multifunctional natural polymer that has the potential to be developed into a major industrial raw material for a multitude of applications. After cellulose and hemicelluloses, lignin is considered to be the most abundant natural polymer present on planet earth contains 300 billion metric tons of lignin, with an annual biosynthetic rate of production of 20 billion metric tons. This can be removed by microbial enzymes for getting higher quality paper.

Bagasse as raw material:

Bagasse is the fibrous residue left after sugarcane is crushed for extraction of juice and is therefore, a by-product of the sugar industry. Bagasse has been established as a successful raw material for the manufacture of a wide range of paper and paperboard. India is the world's largest producer of sugarcane producing about 150 million tons of sugarcane per annum. Bagasse obtained from sugar mills is known as mill wet Bagasse is approximately one-third of the total sugarcane crushed, and the yield of paper from Bagasse is about one sixth (Rao, 1989). Bagasse has low lignin content, and lends itself to easy pulp ability with high yield.

Biological pulping:

Pre-treatment of wood chips with lignolytic fungi to decrease the energy requirement for subsequent mechanical pulping and to increase the strength of the pulp produced has been the most successful approach in bleaching (Nair *et al.,* 2010). These lignolytic fungi produce lignin modifying enzymes (LME) such as,