RESEARCH PAPER *Asian Science* (June & December, 2011) Vol. 6 Issue 1 & 2 : 41-47

# Deodar (*Cedrus deodara*) wood dust: An alternative substrate for amylase production in solid state fermentation by alkalophilic *Bacillus* spp. A1 isolated from mushroom compost

**ANJALI CHAUHAN*, PREETI MEHTA, RISHI MAHAJAN, ABHISHEK WALIA AND C.K. SHIRKOT**

Department of Basic Sciences (Microbiology Section), Dr. Y.S. Parmar University of Horticulture and Forestry, Nauni, SOLAN (H.P.) INDIA

Email: anjali_chauhan22@yahoo.co.in

## ABSTRACT

**Different agro-residues were evaluated as substrate in solid state fermentation for amylase production by alkalophilic *Bacillus* spp. A1 isolated from mushroom compost. Various fermentation parameters were optimized for enhanced amylase production under solid state fermentation (SSF). The organism was able to utilize all the lignocellulosic substrate giving maximum amylase activity (264.4 $ug^{-1}$) on deodar wood dust followed by wheat bran (233.0 $ug^{-1}$) and maize cob (168.5 $ug^{-1}$) at 48h of incubation period. Maximum amylase activity was found at pH 10.0 and temperature 35$^0$C. The production of the enzyme activity was found to be growth associated as maximum amylase activity corresponded to maximum viable count irrespective of the substrate used. The crude amylase preparation from alkalophilic *Bacillus* spp. A1 was partially characterized. Maximum amylase activity 288.2$Ug^{-1}$ DBD was observed when 1.5 per cent starch was used as substrate for amylase activity. The enzyme was stable up to 55$^0$C at pH 10.0 for 15 minutes. The study concludes that *Bacillus* spp. A1 under solid state fermentation using cheap and annually renewable substrate *i.e.* deodar wood dust can reduce the cost of enzyme production.**

Chauhan, Anjali, Mehta, Preeti, Mahajan, Rishi, Walia, Abhishek and Shirkot, C.K. (2011). Deodar (*Cedrus deodara*) wood dust: An alternative substrate for amylase production in solid state fermentation by alkalophilic *Bacillus* spp. A1 isolated from mushroom compost. *Asian Sci.*, **6**(1 & 2):41-47.

**Key Words :** Amylase, Solid state fermentation (SSF), *Bacillus* sp., Deodar wood dust

## INTRODUCTION

Among various microbial enzymes, the introduction of amylases for commercial purpose represents a milestone in the industries and are of great significance in present day biotechnology. Microbial amylases are very diverse in their enzymatic properties, behavior and substrate specificity which make them attractive for many industrial applications like starch processing, milling, brewing, paper, textile, food and feed industry (Pandey *et al.,* 1999). Two major classes of amylases have been identified in micro-organisms, namely alpha-amylase and gluco-amylase. Alpha-amylase (endo-1.4,α-D-glucon,EC 3.2.1.1) are extracellular enzymes that randomly cleaves the 1,4-α-D-glucose units in the linear amylase chain. Glucoamylase (exo-1,4-α-D-glucan glucanohydrolase, EC 3.2.1.3) hydrolyzes single glucose units from the non-reducing ends of amylase and amylopectin in a step wise manner (Pandey *et al*., 2000a). Most of the enzymes reported for mesophilic bacteria have activity optima in the acidic to almost neutral pH range. A few alkalophilic *Bacillus* spp. have their pH optima between 8.0 to 9.5 and display maximum catalytic activity at 40$^0$, 55$^0$ and 60$^0$C. Alkaline amylase is found to be more important commercially. The main areas where use of alkaline amylases has expanded are household laundary, automatic dish washers, and industrial and institutional cleaning (Hagihara *et al.,* 2001). To ensure the commercial utilization of hemicellulose residues, the production of large quantities of amylase at low cost will be required. The enzyme production by solid state fermentation (SSF) is gaining importance due to its potential advantages in production of enzyme in high yield at high concentration (Mamo and Gessesse,1999; Pandey *et al.,* 2001; Ramdas *et al.,*1996). Solid state fermentation process is significantly influenced by the nature of solid substrate. In this respect, the utilization of annually renewable agro industrial wastes as a substrate represents an essential step to reduce the cost of enzyme production. However, bacterial strains belonging to genus *Bacillus* are reported to produce extracellular enzymes in SSF (Shankaranand

* Author for correspondence.