Asian J. of Bio Sci. (2007) Vol. 2 No. 2 : (177-179)

A Review :

Enzymatic properties of bacterial protease

SANGEETA KUMARI*, KALPANA SAHU AND SHRUTI SHUKLA
Dept. of Botany, Lab of Microbiology, Faculty of Life Sciences, Dr. H. S. Gour University, SAGAR (M.P.) INDIA

(Accepted : August, 2007)

Enzymes are macromolecules, with highly specialized catalytic functions produced by all living organisms. Enzymes are responsible for many essential biochemical reactions in microorganisms, plants, animals and human beings. Their existence was associated with the history of ancient Greece where they were using enzymes from microorganisms in various processes. Modern genetic engineering techniques have made it possible to produce relatively rare enzyme with many of industrial and medical applications in large quantities. Although enzymes derived from a range of organism are being used commercially, certain properties of these proteins can be further improved. For example, it may be advantageous to increase the heat stability or alter the pH optimum of an enzyme thus improve the efficiency of a defined process. The present article reviews some environmental effects on bacterial strains which are producing proteases.

Key words : Bacterial protease, Environmental conditions, Enzymatic properties.

INTRODUCTION

Many of the goals of industrial protein engineering are to design and construct novel enzymes by modifying the properties of existing enzymes. For example, it may be desirable to alter the kinetic properties K_{cat} and K_m, the substrate specificity, the pH optimum, the temperature stability, the stability in the presence of chemical reagent and the isoelectric point of an enzyme (Singh, 1999).The stability of an enzyme can be defined as its ability to retain its activity under various conditions (Missal, 1993). The enzymes are inherently unstable.

These enzymes are important in a number of diverse and crucial biological processes; they are involved in the regulation of metabolism and gene expression, enzyme modification, pathogenicity, and the hydrolysis of large proteins to smaller molecules for transport and metabolism. The extracellular proteases are of commercial value and find multiple applications in various industrial sectors.Proteinases are found in several microrganisms such as viruses, protozoa, bacteria, yeast and fungi.

Recent studies document the production of hydrolytic enzymes from thermophilic bacteria (Antranikian *et al.*, 1990). So far, however, few thermophilic *Bacillus sp.* that produce proteases have been isolated, the earliest isolate being *Bacillus stearothermophilus* (Salleh *et al.*, 1977) which is found to be stable at 60°C. Enhancement of protease activity excreted from *Bacillus stearothermophilus* had also been possible using economical, chemical additives in the protease reaction involved in water activated sludge (Kim *et al.*, 2002).Protease production by *B. licheniformis* S-40 was reduced to half its maximum level when glucose was present as the carbon source (Sen and Satyanarayana, 1993). Battiaglino *et al.* (1991) reported that glucose repressed protease synthesis while Gomaa *et al. (1990)* reported glucose to be the best carbon source for protease production by *B. subtilis*. Effect of incubation period on protease production.

It is well known that bacterial proteases are extracellular enzymes the synthesis of which depends on the environment conditions. As inductors, in addition to the substrate, the metabolism end products can be effective too. Madan *et al.* (2000) investigated the enzyme production of *Bacillus polymyxa* in modified Reese's medium under stationary and submerged conditions at 50 ^{0}C after different time intervals.

Effect of incubation time on protease activity :

An increase in enzyme production with increase in incubation time after attaining certain peak value there is gradual decrease in the enzymatic activity. Kaur *et al.* (1998) reported that incubation of isolated *Bacillus polymyxa* at 70 ^{0}C for 10 min in modified Reese medium gave about 3 times more protease enzyme activity compared to that in the seed medium. Gajju *et al.* (1996) characterized protease enzyme of thermophilic *Bacillus coagulans* PB-77 at different time intervals (10-50 min)and found that increase in incubation time denaturates the enzyme. Madan *et al.* (2000) investigated the enzyme production of *Bacillus polymyxa* in modified Reese's

* Author for Correspondence