FACTORS AFFECTING THE PRODUCTION OF PROTEINASE FROM AEROBIC SPORE-FORMERS

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By

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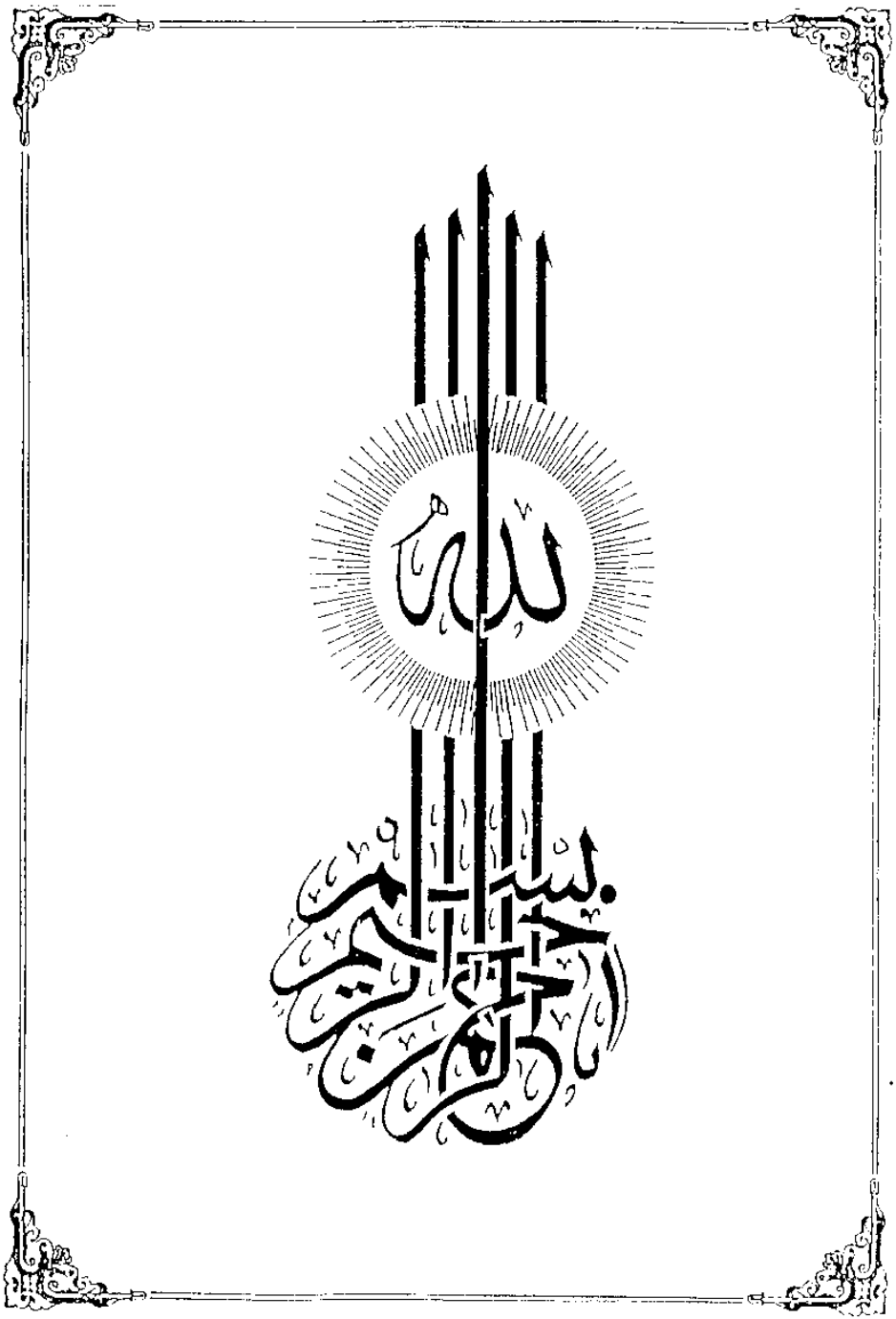

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INTRODUCTION

Introduction

Enzymes are organic catalysts produced by living cells, which govern the chemical reactions for life processes. Once elaborated by a cell, an enzyme can act independently of the cell if proper conditions are maintained.

In refering to production of enzymes, one is thus, dealing with the manipulation of living cells to obtain the maximum yield of the desired enzyme. Once synthesized by the cell, the enzyme may then be subjected to a variety of biochemical procedures for its recovery and purification in a diversity of forms suitable for many applications of economic importance.

Bacterial proteases are group of hydrolytic enzymes, overshadows all others in industrial significance and utilization. Bacterial proteolytic enzymes have the greatest commercial applications, especially in the field of technology, because the great part of the published work is of a fundamental nature and the companies interested in producing and making enzyme products, seldom publish their techniques except for general principles or the mentioning of some patents. At present, bacterial proteases are extensively used in many industries such as

enzymatic tanning, spot removing, soft finishing, soaking, dust, leather, silk and wool industries, pharmaceutical products and in medical treatment of burns and ulcers.

In recent years, it has been increasingly demonstrated that bacterial proteases can be used to good purpose in furthering numerous industrial processes. Leather constitute one of the largest and most diversified industries. The leather industry in A.R.E. consumed high quantities of animal skins, in producing about 20 million sq. feet of light leather and 5 million sq. feet of heavy leather. Bacterial proteases is extensively used in baiting either in alkali or acid media. It is used in baiting box calf, clothing, softy, fancy gloving and all types of leathers.

In the A.R.E. high quantities of bacterial proteases of Bacillus subtilis origin are imported from foreign countries, such as France, Germany, and Denmark, amounting to approximately one thousand tons per annum. The production of this enzyme in Egypt will evidently save more than 100.000 pounds in foreign currency.

Therefore, it was found valuable to study its production from different raw materials using highly active locally isolated Bacillus subtilis.

Investigations were also focused on nutritional and environmental factors for maximum production of proteinase. The extraction, purification and chemical composition of an enzyme were also investigated.

REVIEW OF LITERATURE

Introduction

The application of enzymes to the production of leather appeared from the very early observation that animal feces applied to the flesh side of hide, resulted in removal of non collagenous material and the softening of the leather. Hundreds of years passed before the active ingredients in the excreta were identified as proteases, hence making it possible to substitute pancreatic or mold enzymes for the bating of hides, (Gustavson, 1956).

From these early beginnings in fermentation, cheese making, and the tanning of leather, the application of enzymes has spread to the textile (desizing), paper (starch modification) industries as well as to nutrition, foods, also to pharmaceuticals and medicine.

Applications of bacterial proteolytic enzymes :

With few exceptions, enzymes which have found industrial application are hydrolytic. This is primarily because they are much simpler to deal with and historically have been easier to prepare.

1- Making of leather :

It was common practice to eliminate hairs and flesh and noncollagenous material by steeping them with dog. It was a long time before the active ingredients were identified as proteolytic enzymes from the pancreas. For economic reasons, microbial proteases are used to-day for the bating of hides instead of a pancreatic powder. Enzymic treatment of hides is an indispensable step in the preparation of pliable and attractive leather of fine grade (Gustavson,1956).

2- Food Industry :

The application of proteases to the f od industry is rapidly becoming one of their major uses. Pure proteins are quite tasteless while some of the amino acids and certain peptide produced by protein hydrolysis are highly flavorful. Hence the treat with proteases of many foods rich in proteins may be expected to increase their flavour. Even more important is the softening, conditioning, increased digestibility, increased solubility and shortened cooking time.
For economic reasons, B. subtilis enzymes have been cleared for food use. The largest food use of enzyme

purification

chill

3- Food Industry :

A relatively new application of proteases is to the treatment of stock feeds. For example enzymic attack on barley can improve its nutritional value in poultry feed. Similarly the enzymic digestion of whole fish powder can increase the nutritional value of animal feeds.

4- Baking Industry :

It is sometimes difficult to provide flour of sufficiently low protein content for the manufacture of biscuits. As a consequence, the doughs tend to become elastic and difficult to work. These difficulties can be remedied to a large extent by the addition of bacterial proteases.

5- Enzymatic laundering :

By using bacterial enzymes most laundering heavily soiled clothes, on which protein containing substances such as blood and mucus form a considerable part of the

[illegible] to hydrolyze [illegible] which is [illegible] readily soluble.

6- Silk industry :

The fibres in raw silk are surrounded by layer of silk gelatin, sericin, which is a protein. The sericin can be removed by treatment with bacterial proteases, which does not affect the silk fibres consisting of keratin.

7- Medical treatment of burns and ulcers :

Bacterial proteases have been tried on burns and ulcers with variable success, (Spier, Ross and Cliffton, 1956).

8- Anti-inflammatory agents :

Inflammation in various parts of the body can often be relieved by anti-inflammatory agents which are mainly proteolytic enzymes, (Anonymous, 1952).