

## ABSTRACT

The study for the production of protease from *Aspergillus flavus* using wheat bran as substrate under Solid State Fermentation was conducted in University of Abuja, Department of Microbiology. *Aspergillus flavus* was isolated from spoilt bread and was identified on the basis of the morphological assessment such as macroscopic and microscopy. Among the characteristics used includes: colonial characteristics such surface appearance, texture and colour of the colonies. The protease activity increased with increase in the fermentation periods. The quantities of the protease enzyme produced by the *Aspergillus flavus* in the basal medium were measured using UV-Spectrophotometer and the result is shown in Table 5. The protease activity was found to be higher at day 7 than day 5 and 3 with  $4.51 \pm 10.06$  protease Unit/mL,  $8.63 \pm 0.12$  U/mL and  $18.93 \pm 1.20$  AU/mL respectively. the extracellular protease produced by *Aspergillus flavus* isolated from spoilt bread in Gwagwalada were not significantly different at  $P = 0.05$  level of significance. The study demonstrated that *Aspergillus flavus* was able to produce extracellular protease enzymes important in the decomposition of protein materials.

## CHAPTER ONE

### 1.0

### INTRODUCTION

#### 1.1 Background of the study

Protease constitutes a large and complex group of enzymes that plays an important nutritional and regulatory role in nature. Proteases are (physiologically) necessary for living organisms; they are ubiquitous and found in a wide diversity of sources. Protease is the most important industrial enzyme of interest accounting for about 60% of the total enzyme market in the world and account for approximately 40% of the total worldwide enzyme sale (Godfrey and West, 1996; Chouyyok *et al.*, 2005). They are generally used in detergents (Barindra *et al.*, 2006), food industries, leather, meat processing, cheese making, silver recovery from photographic film, production of digestive and certain medical treatments of inflammation and virulent wounds (Rao *et al.*, 1998; Paranthaman *et al.*, 2009). They also have medical and pharmaceutical applications.

Microbial proteases are degradative enzymes which catalyze the total hydrolysis of proteins (Raju *et al.*, 1994; Haq *et al.*, 2006). The molecular weight of proteases ranges from 18 – 90 kDa (Sidney and Lester, 1972). These enzymes are found in a wide diversity of sources such as plants, animals and microorganisms but they are mainly produced by bacteria and fungi. Microbial proteases are predominantly extracellular and can be secreted in the fermentation medium.

In the production of protease, it has been shown to be inducible and was affected by the nature of the substrate used in fermentation. Therefore, the choice of an appropriate inducing substrate is of great importance. Different carbon sources such as wheat bran, rice straw, rice bran, cotton and bagasse have been studied for the induction and biosynthesis of protease. However, wheat bran is a superior carbon source for the production of protease by *Aspergillus flavus*. So the further studies were carried out by using wheat bran as carbon source.

The use of agro-industrial residues as the basis for cultivation media is a matter of great interest, aiming to decrease the costs of enzyme production and meeting the increase in awareness on energy conservation and recycling (Singh *et al.*, 2009). Major impediments to the exploitation of commercial

enzymes are their yield, stability, specificity and the cost of production. New enzymes for use in commercial applications with desirable biochemical and physiochemical characteristics and low production cost have been focus of much research (Kabli, 2007). Solid state fermentation (SSF) was chosen for the present research because it has been reported to be of more graded productivity than that of submerged fermentation (Ghildyal *et al.*, 1985; Hesseltine, 1972). Economically, SSF offers many advantages including superior volumetric productivity, use of simpler machinery, use of inexpensive substrates, simpler downstream processing, and lower energy requirements when compared with submerged fermentation (Paranthaman *et al.*, 2009).

### **1.2 Aim of the study**

The aim of this study was to produce protease from *Aspergillus flavus* using wheat bran as a substrate under Solid State Fermentation.

### **1.3 Objectives of the study**

The objectives of the study include:

To isolate *Aspergillus flavus* from spoilt bread in Gwagwalada.

To determine the frequencies of occurrence of the isolated *Aspergillus flavus* from spoilt bread using simple percentages.

To determine the proteolytic potential of the isolated fungi using basal medium.

To determine the quantity of the protease enzyme produced by the isolated fungi using spectrophotometer.

## **PRODUCTION OF PROTEASE BY ASPERGILLUS FLAVUS IN SOLID STATE FERMENTATION**

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