

Production of Pectinase by *Aspergillus* spp. A6 Using Solid State Fermentation of Agricultural Waste for Use in the Enzymatic Retting of Pepper

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ABSTRACT

An indigenous fungal isolate of *Aspergillus* spp. A6 was selected for the production of pectinase using solid substrate fermentation (SSF) of agricultural waste for use and application in trial enzymatic retting of pepper. Pectinase crude preparation was harvested and applied in the retting of pepper berries for the removal of peppercorn pericarp to produce white pepper. Banana peels, pineapple, orange and pepper waste were selected as the fungal carbon source together with sugarcane bagasse as inert solid support and used in the production of pectinase. Banana peel waste produced the highest pectinase enzyme activity of 6.9 U/ml after 4 days of fermentation at room temperature and subsequently used in the trial retting experiments. Laboratory scale enzymatic retting trials revealed that the crude pectinase produced had successfully removed the peppercorn pericarp up to 90% by day 5 as compared to the conventional water retting which took between one to two weeks to produce the equivalent yield.

Keywords: pectinase, banana peel, solid-state fermentation, enzymatic retting.

INTRODUCTION

Pectin-degrading enzymes or pectinase are produced by bacteria, fungi, higher plants and animals. Pectinase degrade pectin which is vital in the structural integrity of plant tissues as pectin acts like glue that hold different cells together (Zhang, 2006). Pectin is a family of complex variable polysaccharides presence in the primary cell wall of higher plants. These complex polysaccharides or pectic substances are high molecular weight glycosidic macromolecules which are common in plant's structure that formed the major component of the middle lamella which actually act as the adhesive extracellular material between primary walls of adjacent plant cells (Alkorta *et al.*, 1998). The pectinase enzymes can be classified based on their site on the galacturonan backbone and basically divided into esterase, depolymerase and protopectinase (Alkorta *et al.*, 1998). Pectinase have been applied industrially in fruit juice clarification as well as plant fibre retting and recently enzymatic retting of pepper (*Piper nigrum* L.) in white pepper production.

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