



Production and Characterization of Chitinases from Thermophilic Bacteria Isolated from Prataan Hot Spring, East Java

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Abstract. Thermophilic bacteria producing chitinase were collected from Prataan hot spring, East Java, Indonesia and screened. The isolated bacterium was analyzed using 16S rRNA gene sequencing analysis and identified as *Paenibacillus* sp. The molecular identification was confirmed through morphological and physiological analyses. The production of chitinase was conducted at various incubation times, temperatures, pH and concentrations of colloidal chitin. The optimum condition of the isolate to produce the highest chitinase was 0.9% (w/v) of colloidal chitin (pH 7.0) at 48 °C for 24 hours. The obtained chitinases were optimally active at 55 °C and pH 6.0-7.0. The chitinases were gradually purified by ammonium sulfate precipitation, Sephadex G-100 gel filtration, followed by DEAE-cellulose ion exchange chromatography (IEC). The purification method gave a purification factor of 9.43 and a yield of 2.68%. Two protein fractions were obtained from sodium dodecyl sulfate-polyacrylamide gel electrophoresis (SDS-PAGE) with molecular weights of 68 and 82 kDa.

Keywords: *chitin; chitinase; Paenibacillus sp.; Prataan hot spring; thermophilic bacteria.*

1 Introduction

Chitinases (EC 3.2.1.14) are a group of enzymes capable of degrading chitin, a long-chain linear polymer of N-acetyl glucosamine (GlcNAc), into its derivatives by hydrolyzing the β -1,4-glycosidic bonds. Chitin is assumed to be the second most plentiful polysaccharide on earth [1]. In general, the enzymes responsible for chitin degradation are divided into endochitinases and exochitinases [2]. Endochitinase catalyze chitin degradation into (GlcNAc)₂ or other chitoligosaccharides (COS). Exochitinases degrade chitin into GlcNAc. Chitoligosaccharides have been shown to have anti-tumor effects [3], anti-microbial effects [4], anti-fungal effects [5], anti-inflammatory effects [6] as well as the ability to increase bone strength [7]. Moreover, chitin derivatives such as GlcNAc and D-glucosamine (GlcN) have been applied as nutraceutical

Received March 26th, 2015, 1st Revision October 6th, 2nd Revision February 15th, 2016, 3rd Revision May 16th, 2016, Accepted for publication May 19th, 2016.

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