Extraction of B-galactosidase Enzyme from Lacticacid Bacteria

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Abstract. The dairy industry has employed the B-galactosidase enzyme (EC 3.2.1.23) to reduce lactose intolerance. The ability of probiotic Lactobacillus spp. to produce B-galactosadase enzyme and hydrolyze 5-bromo-4-chloro-3-indolyl-D-galactopyranoside (X-Gal) and ONPG was investigated. Through the use of sontication to lyse the cell, crude enzyme extract was produced. Ortho-nitrophenyl-beta-D-galactopyranoside (ONPG) was used as an enzyme substrate in order to measure the B-galactosidase enzyme activity. B-galactosidase activity is demonstrated by blue-colored colonies of Lactobacillus spp. on X-Gal plates. The ideal temperature and pH for the synthesis of B-galactosidase were pH 7 and 40 °C. People who are lactose intolerant may benefit from Lactobacillus spp., which produces B-galactosidase enzyme as a probiotic for dairy products.

Keywords. Lacticacid bacteria, B-galactosidase, Optimization, X-Gal.

1. Introduction

Enzymes play a crucial role in various industries, including food, pharmaceuticals, and biotechnology. Among them, β-galactosidase, an enzyme capable of hydrolyzing lactose into glucose and galactose, has garnered significant attention due to its wide-ranging applications [1]. Lactobacillus plantarum, a well-known lactic acid bacterium, is recognized as a potential source for the production of β-galactosidase due to its ability to efficiently metabolize lactose [2]. The extraction of β-galactosidase from Lactobacillus plantarum involves several steps, starting with the selection and cultivation of a suitable strain. Subsequently, cell disruption techniques are employed to release the enzyme from the microbial cells. Various extraction methods, such as mechanical disruption, enzymatic lysis, and sonication, have been investigated to maximize the yield and activity of β-galactosidase [3]. Additionally, optimization techniques, including response surface methodology and statistical experimental designs, have been employed to enhance the efficiency of extraction processes [4]. The potential applications of β-galactosidase extend beyond the food industry, with emerging uses in the production of prebiotics, functional foods, and the pharmaceutical sector [5]. In conclusion, the extraction of β-galactosidase from Lactobacillus plantarum holds immense promise in various industries. For three specific reasons, lactic acid bacteria have turned into a focus of scientific research. Some fermented dairy products can be consumed by lactose intolerant people with little to no