Iraqi Journal of Scientific and Industrial Research
Volume 4, Issue (1), January-March 2025, pp. 1-3

Effect of Soybean Components at Fermentation Media on Microbial Lipases Enzyme by *Candida tropicalis*

Muhannad Muhammad Nouri

Department of Biology, College of Education, Al-Iraqia University, Baghdad, IRAQ

Abstract

The effects of fermentation media on microbial lipases enzyme by *Candida tropicalis* were investigated in this work. Soybean oil and soybean meal media were used to produce the Microbial lipases enzyme from this isolate. The soybean oil medium is better than soybean medium in production microbial lipases enzyme by *Candida tropicalis.* It was found that soybean oil medium is in development Microbial lipases production.

Keywords: Proteolytic activity; Soybean oil; Soybean meal; Enzyme activity

Received: 1 September 2024; **Revised:** 1 October 2024; **Accepted:** 1 November 2024; **Published:** 1 January 2025

1. Introduction

The components of soybeans in fermentation media significantly influence microbial lipase production by *Candida tropicalis*. Soybean oil, proteins, and carbohydrates serve as essential nutrients, enhancing microbial growth and enzyme synthesis. The lipase enzyme production is often optimized by adjusting the concentration of soy-derived ingredients, as they provide the necessary carbon and nitrogen sources. Soybean oil, in particular, acts as an inducer, promoting the secretion of lipase enzymes. Additionally, the amino acids and peptides from soybean proteins can stimulate microbial metabolism, leading to higher enzyme activity. Variations in the fermentation medium composition, such as the type and concentration of soy components, can thus impact lipase yield and efficiency.

Microorganisms are an ideal source for enzymes production that are reproductive very quickly and in a short time [1]. Microbial lipases is one of the most Worthwhile enzymes for biotechnology and its global market has been growing significantly. Microbial lipasess are the efficient executioners of a common chemical reaction: the hydrolysis of peptide bonds [2]. Microbial lipases is obtained mainly from *Aspergillus* and *Penicillium*. The different hydration rates were used in material fermentation Solid, the humidity effect on Microbial lipases production of *A. flavus* was ranged between 35-80% while the effect on *A. oryzae* was at 50% [3]. The soybean oil medium is better than soybean medium in production microbial lipases enzyme by *A. flavus*. It gives a productivity higher than that of soybeans by approximately a half times [4]. Also It was found that soybean oil medium is in development microbial lipases production by *A. oryzae* was the best among solid fermentation media [5]. This study evaluate the effect of agro-waste for potential Microbial lipases product by *Candida tropicalis*.

2. Experimental Part

The Candida tropicalis was used to produce Microbial lipases. Two waste materials were used: bran and soybean meal as basic materials for the production of microbial lipases enzyme. Available solids of 10 gm/flask were used. The above-mentioned solids are moistened using them including phosphate at a concentration of 0.2 molar and pH = 7, with a hydration ratio of 1:5 by volume/weight by adding 50 ml of buffer phosphate to 10 g of solid and binder. Wet the oil with solids and sterilize the flasks. It is sealed with a temperature resistance of 121 °C and a pressure of 15 psi for 15 minutes. The flasks were inoculated with the suspension spores: 610 spores/10 g and incubated for 72°C. Murachi method [6] was applied to evaluate Microbial lipases using casein %0.0 with different types of basic materials and defines the unit enzymatic as the amount of enzyme that is amplified in optical wavelength at wavelength 220 nm/min under standard conditions. Protein concentration can also be measured by strength loss according to the method described by Bradford [7].

3. Optimal Conditions of Microbial Lipases Production

Determine the optimal conditions for Microbial lipases production in the medium solid fermentation. A study was conducted that affects some factors as a percentage hydration and nutritional value of the medium vary temperature and duration of fermentation affect the production of microbial lipases by local isolation of *Candida tropicalis* at medium bran, 10 g per flask and the use of phosphate buffer in humidification. All the circumstances referred to above were recorded in the judgment. The required factor has a message and its effect. For determine the optimal temperature for enzyme production, inoculate soybean oil medium with spore extraction 1×10^6 spore/10 g is a very hot substance and was incubated at various high temperatures (25, 28, 30, 32 and 35°C) for 72 hours, then the enzyme was extracted and estimated enzymatic activity.

Fig. (1) A photograph of soybean seeds

4. Results and Discussion

For the purpose of study the efficiency of selected local isolate *Candida tropicalis* to produce the microbial lipases enzyme using fermentation technology. When planting hardwood, waste of plants were used as a culture media to test the best solid fermentation medium to produce the Microbial lipases enzyme from this isolate. Soybean oil and soybean meal A (solid media, separately). It turns out that the center of soybean oil is better fermentation medium for enzyme production compared to another medium. With soybean oil medium the enzymatic activity was at 1600 units/ml and effectiveness was at 1300 units/mg protein. While the enzymatic activity with soybean meal medium was at 350 units/mL and effectiveness 290 units/mg protein. The reason for the superiority of soybean oil over another medium (soybean meal) was may be to class A (for the high content of planets, as its protein content 14.62% compared while soybean meal contains 9.93 of protein. Also, the physical properties of materials that used in the fermentation of solid culture effects the production of various enzymes such as the size of particles. The surface area exposed to the action of living organisms microstructure and porosity of the medium [8,9]. Previous study found that the soybean oil medium is better than soybean medium in production microbial lipases enzyme by *A. flavus*. It gives a productivity higher than that of soybeans by approximately a half times [4]. Also, it was found that soybean oil medium is in development microbial lipases production by *A. oryzae* was the best among solid fermentation media [5].

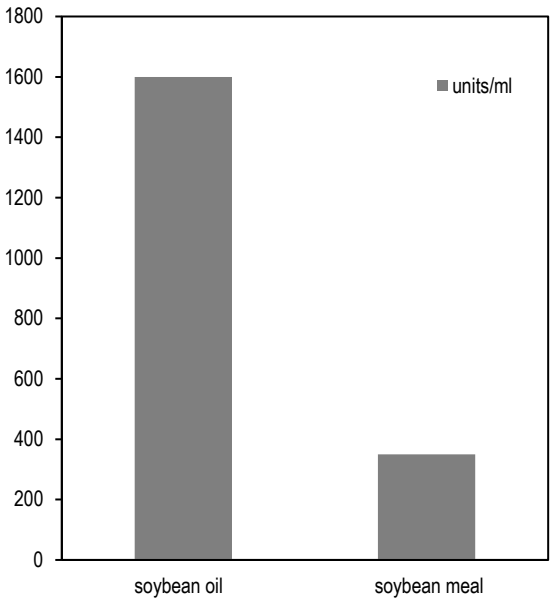

Fig. (2) Effect of formation media on microbial lipases enzyme activity

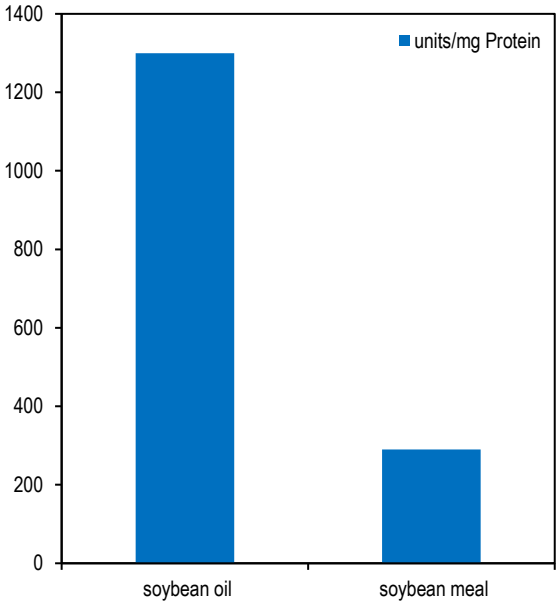

Fig. (3) Effect of formation media on microbial lipases enzyme activity

Microbial lipases enzyme productivity from *Candiada tropicalis* elevated when temperature increase from 25 to 30 °C and also won an award in both enzymatic activity and specific activity at temperature rises above 30°C. For a long time, the optimum temperature for enzyme production was 30°C, at enzymatic activity is 1610 units/mL and is effective 1500 units/mg protein and varies, changes in both the enzymatic activity and specificity of the enzyme at temperature rises above 30°C. The drop in temperature below the optimum level. It leads to slow growth and delayed enzyme synthesis. This temperature is suitable for mushroom growth. On the other hand enzyme stability on the other hand, the optimum temperature for the production of microbial lipases enzyme. This study is 30 m in length, along with the results of other studies. It dealt with the production of microbial lipases enzymes by species where *Aspergillus* temperatures rise 30°C. The optimum for the production of these enzymes between 28°C. These studies indicated a decrease in the effectiveness of the enzyme.

5. Conclusions

The effects of fermentation media on Microbial lipases enzyme by *Candida tropicalis* were investigated in this work. Soybean oil and soybean meal media were used to produce the Microbial lipases enzyme from this isolate. The soybean oil medium is better than soybean medium in production microbial lipases enzyme by *Candida tropicalis.* It was found that soybean oil medium is in development Microbial lipases production.

References

[1] H.J. Rehm and G. Reed, "Biotechnology", 2nd ed., VCH Verlag, GmbH (1995).
[2] R. Beynon and J.S. "Proteolytic enzymes: a practical approach", vol. 247, Oxford University Press (Oxford, 2001).
[3] S. Malathi and R. Chakraborty, "Production of alkaline Microbial lipases by a new Aspergillus flavus isolate under solid-substrate fermentation conditions for use as a depilation agent", *Appl. Environ. Microbiol.*, 57 (1991) 712-716.
[4] A. Bhumiratana, T.W. Flegel, T. Glinsukon, and W. Somporan, "Isolation and analysis of molds from soy sauce koji in Thailand", *Appl. Environ. Microbiol.*, 39 (1980) 430-435.
[5] H. Bai, S. Ge, and J. Zhang, "Total hydrolysis of food proteins by the combined use of soluble and immobilized Microbial lipases", *Int. J. Food Sci. Technol.*, 34 (1999) 95–99.
[6] T. Murachi, "Bromelain enzymes", in *Methods in Enzymology*, vol. 45, Elsevier (1976) pp. 475-485.
[7] M.M. Bradford, "A rapid and sensitive method for the quantitation of microgram quantities of protein utilizing the principle of protein-dye binding", *Anal. Biochem.*, 72 (1976) 248–254.
[8] P. Kumar and B.K. Lonsane, "Gibberellic acid by solid state fermentation: consistent and improved yields", *Biotechnol. Bioeng.*, 30 (1987) 267–271.
[9] P. Nigam and D. Singh, "Solid-state (substrate) fermentation systems and their applications in biotechnology", *J. Basic Microbiol.*, 34 (1994) 405–423.

 ISSN (print) 2079-4630 (online) 3079-2371 Printed in IRAQ