CHARACTERIZATION OF LIPASES PRODUCED BY TWO STRAINS OF *THERMOMYCES LANUGINOSUS* BY SOLID STATE FERMENTATION

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Introduction. The lipases (E.C. 3.1.1.3) are enzymes catalyzing the hydrolysis of long-chain triacylglycerols. Lipase biocatalysts are widely used in the pharmaceutical, agrochemical, food and detergent industries; founding additional applications in biosensors, bioremediation, biodiesel production, paper manufacture and cosmetics [1, 2]. Lipases are produced at industrial scale by bacteria and fungi in submerged culture (SmF) or solid-state fermentation (SSF) systems.

Among eukaryotic organisms, few species of fungi have the ability to grow at temperatures above 45 °C [3]. *Thermomyces lanuginosus* is a thermophile fungus that grows at high temperatures (40 to 60 °C) and produces a variety of extracellular thermostable enzymes, such as xylanases, amylases, glycosidase, phytases and mannanases [4].

Objective. The objective of this work was to evaluate the activity and stability at different temperatures of lipases produced by two strains of *T. lanuginosus* in SSF.

Methods. The thermophile strains of *T. lanuginosus* 10aB and SS-2 were used for the production of lipase by SSF. The strains were propagated in medium PDA during 7 days, at 45ºC. For the production of biocatalysts, the inert support perlite was impregnated with inoculated Pontecorvo medium (concentrated 3x). Thermoactivtity and thermostability were evaluated in a range of 30 to 85 ºC by 4h with *p*- Nitrophenyl octanoate (*p*-NPO) and trioctanoin as substrates respectively.

Results. For both strains, lipase production started after 24 h reaching maximal production at 48 h with activities of 24±1.6 and 22±2.2 U/gdm. After that, lipase activity produced by strain 10aB decreased rapidly (loss of 100% at 120 h), whilst lipase activity produced by strain SS-2 was nearly constant up to 120 h of culture (Fig.1).

The thermal activity and stability of the lipases were evaluated from 30 to 85°C. Maxima activity was obtained at 60°C for both strains.

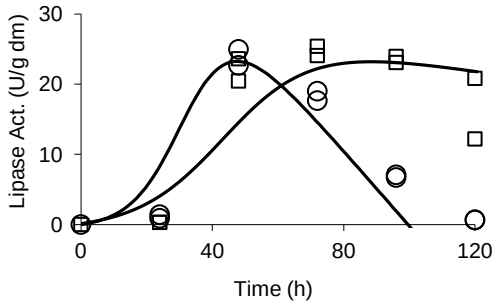

Fig.1 Lipase production from *T. lanuginosus* 10aB (○) and SS-2 (□) cultured on SSF at 40°C, using perlite support impregnated with culture medium.

The enzymatic activity was considerably enhanced when lipases were incubated from 30 to 60ºC (Fig 2). The produced enzymes showed high thermal stability. The enzyme produced by strain 10aB was thermostable during 4 h of incubation from 30°C to 70°C. For the enzyme produced by strain SS-2, the range of enzyme stability was from 30 to 60°C, with a half-life value of 30 min at 70°C. (Data not showed).

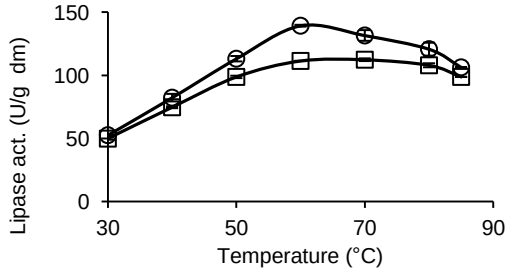

Fig. 2 Effect of temperature on lipase activity produced on SSF by *T. lanuginosus* 10aB (○) and SS-2 (□).

Conclusions. The enzymes produced by *T. lanuginosus* in SSF show high thermostability up to 80 ºC by 4h. Lipase activity was enhanced after incubation at 30 ºC to 60 ºC.

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