Lipase production by *Yarrowia lipolytica*: Study of the effects of operating conditions by factorial design of experiments

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Lipases are one of the most important classes of industrial enzymes, having the ability to hydrolyze triglycerides at the interface between lipid and water in heterogeneous systems (Corzo and Revah, 1999). In recent times, lipases have emerged as key enzymes in swiftly growing biotechnology, owing to their multifaceted properties, which find usage in a wide array of industrial applications, such as food technology, detergent, chemical industry and biomedical sciences (Gupta et al., 2004).

A wide range of microorganisms (bacteria, fungi, yeasts) can produce lipases with different enzymological properties and substrates specificities (Domínguez et al., 2003). The nonconventional yeast *Yarrowia lipolytica* has been studied for many years for its aptitude to grow in hydrophobic substrates like oil, fatty acids and thus for its capacity to produce lipid-degrading enzymes (Fickers et al., 2003).

Lipase biosynthesis can be enhanced by optimisation of culture conditions. Factors such as pH, temperature, aeration and medium composition may affect extracellular lipase production. Moreover, the presence of some compounds (i.e. fatty acids, triglycerides, surfactants) has often been shown to induce lipase secretion (Corzo and Revah, 1999).

In the present work, the lipase production by *Y. lipolytica* W29 was studied. First, the composition of culture medium was selected by fractioned factorial design, 2^{4-1}, where the factors studied were pH, presence of aminoacids in YNB and emulsifying agents (Tween 80 and Arabic gum).

In order to evaluate the effect of oxygen transfer rate (OTR) in lipase production by the strain W29, a pressurized bioreactor was used, where OTR can be improved by air pressure increase (Pinheiro et al., 2003).

Impact of operational conditions (air pressure, stirring rate, OTR) on lipase production, cell activity and morphology will be presented and discussed.