

Lipase-mediated hydrolysis of castor oil on its biotransformation into γ -decalactone by *Yarrowia lipolytica*

Adelaide Braga, Nelma Gomes, Isabel Belo; IBB-Institute for Biotechnology and Bioengineering, Centre of Biological Engineering, University of Minho, Braga, Portugal

γ -Decalactone is a peach-like flavour compound that can be obtained biotechnologically by the biotransformation of ricinoleic acid. Castor oil is the substrate most usually used in the biotechnological production of γ -decalactone and it needs to be hydrolyzed in order to release ricinoleic acid. That biotransformation can be carried out by various microorganisms, such as the non-conventional yeast *Yarrowia lipolytica*, considered as non-pathogenic and as GRAS by the FDA.

In order to increase the availability of the substrate to the cells for the production of γ -decalactone, castor oil previously hydrolyzed can be used. This hydrolysis may be promoted by enzymatic action, more specifically by lipases.

The purpose of this work is to study the influence of the lipases-mediated castor oil hydrolysis, in aroma production, using different commercial lipases and a lipase produced by the yeast.

Firstly, the enzymatic hydrolysis of castor oil by different commercial lipases (CALB L, Lipozyme TL IM and Lipolase 100T) was studied, under different operating conditions (pH and temperature) and Lipozyme TL IM was the most adequate enzyme to hydrolyze castor oil, at the optimal operating conditions of pH 8 and 27 °C (95.4%).

Furthermore, different strategies for γ -decalactone production in flask experiments were also investigated, namely the addition of previously hydrolyzed castor oil to the culture medium, the addition of an immobilized lipase to the biotransformation medium and finally, the pre-addition of an inducer of lipase production (olive oil) to the biotransformation medium. As result, the process was faster when lipase was involved in any form, since the maximum of aroma concentration was attained at 140 h and 185 h of batch process with lipase and without lipase addition, respectively. However, no significant improvements in the γ -decalactone global yields and productivities were obtained (productivities varied from $8 \pm 1 \text{ mg L}^{-1} \text{ h}^{-1}$ to $9 \pm 1 \text{ mg L}^{-1} \text{ h}^{-1}$ in all conditions tested).