Biotechnological production of 3-hydroxypropionic acid: bioconversion of glycerol by three strains of *Lactobacillus reuteri*

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The tremendous growth of biodiesel manufacturing industries has resulted in a large production of available glycerol. Therefore, development of biotechnological processes to convert this by-product into high-added value chemicals has become economically viable and needed to use this surplus. Moreover, this strategy could lead to the substitution of petroleum-sourced molecules. 3-Hydroxypropionic acid (3-HP) is a platform chemical from which several specialty products can be synthesized. This top-value added molecule is currently produced by chemical methods, but its biotechnological production is not well established and need to be enhanced to meet the increasing expectations of the market. *Lactobacillus reuteri,* also known for its probiotic properties[1], can be used for the synthesis of valuable chemicals such as 1.3 propanediol (1.3 PDO)[2], 3-hydroxypropionaldehyde (3-HPA)[3] or 3-HP[4], for example from glycerol or glucose.

To our knowledge, the characterization of *L. reuteri* growth has not been studied in detail. The present study focuses first on the characterization of the growth and physiological state of *L. reuteri*. To this aim, the growth and acidification kinetics of three strains of *L. reuteri* (DSM 20016, DSM 17938 and ATCC 53608) were studied and compared. In parallel, the physiological state of growing bacteria was evaluated through determination of cell cultivability and enzymatic activity by plate counting and flow cytometry. The evolution of the growth medium composition was determined by HPLC. Furthermore, the ability of the three strains to convert glycerol to 3-HP was assessed.

Results showed glycerol consumption concomitant to the production of 3-HP and several products of the biosynthesis pathway (1.3 PDO, 3-HPA). They confirm the ability of *L. reuteri* to convert glycerol in 3-HP and showed significant differences between the three strains both in terms of growth and production. A major loss in cultivability together with a decrease in enzymatic activity were observed. Because of low conversion yield, further work will be performed to understand the metabolic determinants of this bioconversion and to explain the observed mechanisms of inhibition.

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