3-HYDROXYPROPIONIC ACID PRODUCTION FROM CRUDE GLYCEROL WITH *LACTOBACILLUS DIOLIVORANS*

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Biodiesel consists of fatty acid methyl esters and is produced via transesterification of long chain fatty acids, derived from vegetable oil, with methanol. The principle by-product of this process, which makes up to 10% of the biodiesel production, is crude glycerol. Since its purification is rather unsustainable, the microbial upgrading to value-added products opens new opportunities. *Lactobacillus diolivorans* metabolizes glycerol to balance its electron household by reducing the intermediate 3-hydroxypropione aldehyde to 1,3-propanediol or oxidizing it to 3-hydroxypropionic acid. This species of *Lactobacillus* is a very effective natural producer of 1,3-propanediol, with titers up to 90 g/L, but as well shows potential for the production of 3-hydroxypropionic acid, which is considered as one of the top twelve value-added platform compounds from biomass according to the US Department of Energy.

In this study, it was shown, that process engineering to manipulate the redox household of *L. diolivorans* is a valuable tool to shift the product pattern. By switching to an aerobic process, the production of 3-hydroxypropionic acid could be improved to titers up to 40 g/L compared to 27 g/L in the anaerobic process. Another target is the feeding strategy, since *L. diolivorans* is not able to use glycerol as sole energy source. The metabolization of sugars like glucose generates excess electrons which favor the reductive pathway for glycerol utilization. Different molar ratios of glucose to glycerol as well as other carbon sources were tested to study their impact on the product pattern. These process engineering approaches together with the relatively high robustness of *L. diolivorans* towards this toxic product are promising steps towards the optimization of 3-hydroxypropionic acid production and render *L. diolivorans* a future host for metabolic modeling targets.