

# PYFF8

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## Abstract Book



# Enhanced lactone de novo biosynthesis using recombinant *Ashbya gossypii*

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Lactones are volatile organic compounds that derive from lipid metabolism and have a wide range of applications. Their use as fragrances and flavours generates the highest demand and commercial interest. The most valuable lactones for these purposes,  $\gamma$ -decalactone and  $\gamma$ -dodecalactone, are naturally present in fruits, such as peach and strawberry, and contribute largely to their taste and smell. Microbial production of lactones can be attained by biotransformation of hydroxylated fatty acids. Nonetheless, the production of a specific lactone depends on its precursor's availability, which generally comes from limited sources such as fish or vegetable oils. The filamentous fungus *Ashbya gossypii* was recently shown to naturally synthesise  $\gamma$ -lactones de novo from carbon sources [1], being a well-known example of an industrial cell factory for, e.g., the production of riboflavin (vitamin B2). In this study, different strains of *A. gossypii* were engineered to enhance lactone de novo biosynthesis in this host. By fine-tuning different steps of the lactone biosynthetic pathway a significant increase in  $\gamma$ -lactone titres was attained, namely through the overexpression of a native desaturase. Additionally, other steps of the fatty acid biosynthetic pathway were engineered to study the effect of increasing the lipid content in *A. gossypii*, and also to boost the  $\beta$ -oxidation, a crucial step in lactone biosynthesis. Lactone production in the best-performing recombinant strain increased over 4-fold when compared with the parent strain. This study aids in the establishment of novel lactone production processes, opening perspectives for new rising and imminent applications.

## References:

[1] Silva, R. et al. Metabolic engineering of *Ashbya gossypii* for deciphering the de novo biosynthesis of  $\gamma$ -lactones. *Microb Cell Fact* 18, 1–11 (2019)