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## **P5.36 - ENHANCING LACTONE BIOSYNTHESIS IN *ASHBYA GOSSYPII*: TOWARDS SUSTAINABLE PRODUCTION FROM DIVERSE CARBON SOURCES**

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### **ABSTRACT**

Lactones are volatile organic compounds sourced from lipid metabolism, with diverse applications, especially fragrances and flavours, being naturally present in fruits such as strawberries and peaches. Traditional lactone production is attained by biotransformation of hydroxylated fatty acids, which relies on limited precursor resources, such as vegetable or fish oils. However, the filamentous fungus *Ashbya gossypii* can naturally synthesize  $\gamma$ -lactones *de novo* from varied carbon sources [1]. This extended range of substrates can enable its production from several renewable resources. This study aims to enhance lactone biosynthesis by improving its biosynthetic pathway in *A. gossypii* strains and optimising production conditions. Different *A. gossypii* strains were genetically modified to intensify lactone biosynthesis, with emphasis on the enzymes like desaturases, involved in fatty acid synthesis. The fermentation conditions were optimized considering factors like C/N ratio, different carbon sources, nutritional supplementation, and oxygenation levels. These optimal conditions were then evaluated in a bioreactor configuration, which increased total lactone content over 2-fold. Finally, we successfully demonstrated the feasibility of using different wastes for lactone production. This study not only underscores the potential of recombinant *A. gossypii* strains in elevating lactone production but also introduces sustainable avenues for lactone synthesis using waste products. These findings provide promising insights for commercial lactone production and future 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).

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