

## Synthetic Biology - Sesquiterpenes Production via Microbial Fermentation

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Terpenes, a large and structurally diverse class of plant secondary metabolites, are economically important flavor and fragrance (F&F) ingredients. Terpenes have unique olfactory properties but they are found in low concentrations in their native host and are often produced in a non-sustainable way. Because of this, the supply of a number of plant-derived terpenes is unstable, resulting in shortages and price fluctuations. In addition, given their structural complexity, they represent very challenging targets for the synthetic chemist.

The newly established field of Synthetic Biology has created opportunities for developing sustainable and cost-effective manufacturing processes for various natural products, including terpenes. Using genomics and transcriptomics, the biosynthesis of strategic F&F terpene ingredients in various aromatic plants has been investigated. We have successfully isolated and characterized the key enzymes that control the structural diversity of the terpene backbones and their subsequent functionalization. We have also transplanted these biochemical pathways into engineered microbial cells in order to optimize the biological production of the targeted products. Some of our latest results in terpene biosynthetic pathway discovery and engineering will be presented [1]. Moreover, recent achievements in the industrial production of F&F ingredients such as Clearwood<sup>®</sup> and Ambrox<sup>®</sup> Super will be discussed.

[1] M. Schalk, L. Pastore, M. A. Mirata, S. Khim, M. Schouwey, F. Deguerry, V. Pineda, L. Rocci, L. Daviet, *J Am Chem Soc*, 2012, 134, 18900-18903.