P5.15 - MICROBIAL PRODUCTION OF THE BUILDING BLOCK P-COUMARIC ACID: UNLEASHING THE POTENTIAL OF *KLUYVEROMYCES MARXIANUS*

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ABSTRACT

The interest in several plant secondary metabolites, such as naringenin or resveratrol, for their known biological functions, is growing at a fast pace. These properties encompass antioxidant, anti-inflammatory, and anti-microbial, among many other activities. The phenolic acid *p*-coumaric acid is naturally produced by plants, being a key precursor of many of these secondary metabolites. Nevertheless, *p*-coumaric acid is currently extracted from plants, which poses several drawbacks for its industrial production including low efficiency and dependence on plant availability. On the other hand, microbial production of *p*-coumaric acid has been emerging as a sustainable and economically viable alternative.

The unconventional yeast *Kluyveromyces marxianus* is garnering increasing interest as an alternative cell platform to produce ethanol and high-value compounds with a span of applications across industries [1]. This is due to its distinctive attributes, such as rapid growth rate, thermotolerance, and the capacity to metabolize different sugars [2]. Due to its Crabtree-negative metabolism, this yeast produces acetyl-coenzyme A in the presence of oxygen and high sugar concentration. As such, it could be an interesting chassis to produce aromatic compounds derived from *p*-coumaric since some of them require malonyl-CoA (derived from acetyl-CoA) as a precursor. For that, in yeast, the expression of heterologous enzymes involved in the conversion of aromatic amino acids into *p*-coumaric acid is required.

Building upon this knowledge, here, two *K. marxianus* strains were engineered and screened for their capacity for *p*-coumaric acid production. Initially, a heterologous enzyme, tyrosine ammonia lyase (TAL), which converts tyrosine to *p*-coumaric acid, was integrated into both strains. Further, the effects of different carbon sources and agitation conditions on *p*-coumaric acid production and yeast primary metabolism were evaluated. Overall, this work shows the potential of *K. marxianus* for *p*-coumaric acid production and its derivatives through an integrated process.

References:

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