Production of Protocatechuic Acid by *Burkholderia sacchari* via Synthetic Biology

Poster

Biotecnología y Bioprocesos

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Protocatechuic acid (PCA) is an aromatic compound derived from the shikimate pathway, with growing interest due to its antioxidant and antimicrobial properties, as well as its potential as a monomer for biopolymer synthesis. In this study, it was employed a constructed plasmid pJN101, designed to express a synthetic pathway for the biosynthesis of gallic acid, PCA, and related metabolites in *Pseudomonas* species. *Burkholderia sacchari* was evaluated as an alternative microbial chassis for PCA production, due to its metabolic versatility and industrial relevance. The pJN101 plasmid was introduced into *B. sacchari* LFM 422 by electroporation, and the recombinant strain was evaluated in shake flasks with defined medium containing glucose. The expression of the heterologous pathway resulted in the accumulation of PCA, validating the functionality of the plasmid in the new host. To further characterize the system, two glucose fed-batch bioreactor cultivations were performed under controlled conditions. Transformants were cultivated in shake flasks using a defined medium supplemented with glucose as the sole carbon source. This cultivation was designed as a proof of concept to verify whether the synthetic pathway remained functional in the new host. Metabolite production was assessed through high-performance liquid chromatography (HPLC). The engineered strain of *B. sacchari* successfully expressed the heterologous pathway, leading to the production of PCA after 48 hours of growth. The ability to express complex metabolic pathways in *B. sacchari* opens new perspectives for its application in industrial

biotechnology, particularly in the biosynthesis of aromatic compounds from renewable feedstocks. Ongoing work aims to optimize this production by genetic modification to ensure greater yield and scalability in future bioprocesses.

Palabras Clave

(1) Synthetic biology, (2) Protocatechuic acid, (3) Burkholderia sacchari, (4) Microbial production.

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