PURDUE INNOVATES | Office of Technology Commercialization

Utilizing Cyanobacteria for the Increased Production of Phenylalanine

Real-time fluorescence polarization assay for SidE-catalyzed ubiquitination enables high-throughput discovery of Legionella infection inhibitors.

Purdue researchers have developed a method for producing phenylalanine (Phe) at a higher level on production by utilizing cyanobacteria when compared to wild-type bacteria. Researchers have also developed further methods for isolating the Phe, which they confirmed through the use of liquid chromatography tandem mass spectrometry (LC-MS/MS). Mutagenesis and selection of cyanobacteria colonies showed improved Phe over the parent strain, increasing production by 100-fold. Further comparisons indicate that the developed method substantially outperforms traditional heterotrophic processes in terms of land-use efficiency, potentially at a near 5-fold increase in productivity. This strategy shows potential not only for the production of Phe but also for large-scale, sustainable production of other valuable amino acids and small molecules.

Technology Validation:

-High-performance liquid chromatography (HPLC) with mass spectrometry was utilized for detection and quantification of phenylalanine

-Random mutagenesis was performed using chemical and ultraviolet (UV) irradiation, followed by isolation of cyanobacteria strains

-Production of Phe at 400 mg Phe L-1d-1 under a three-day cultivation cycle was reported

-Phe production rates reached approximately 1.24 g Phe Lâ »Â¹ within a three-day cultivation period under optimized conditions (240 Âµmol photons mâ »Â² sâ »Â¹ and 3% COâ‚‚)

Advantages:

-Increased production of Phe over traditional methods

-Greater efficiency in land usage over traditional processes

Technology ID
2025-MORG-70934

Category
Biotechnology & Life Sciences/Bioprocessing & Biomanufacturing
Biotechnology & Life Sciences/Synthetic Biology & Genetic Engineering
Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

Authors
Arnav Deshpande
John Morgan

Further information
Joe Kasper
JRKasper@prf.org

Nathan Smith
nesmith@prf.org

View online

-Sustainable production of Phe

Applications:

-Production of phenylalanine for pharmaceutical, food or feed industries

-Production of essential amino acids

-Production of small molecules

Publications:

https://onlinelibrary.wiley.com/doi/10.1111/tpj.70129

TRL: 4

Intellectual Property:

Provisional-Patent, 2024-11-25, United States | Utility Patent, 2025-10-29, United States