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# Metabolic Comparison of Wild-Type and Transgenic Synechocystis PCC 6803 Cyanobacteria

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## ABSTRACT

The Calvin-Benson (CBB) cycle is an essential part of nature. This phenomenon allows carbon molecules in carbon dioxide from the atmosphere to be converted into useful energy in the form of sugars. Cyanobacteria are single-celled organisms capable of utilizing energy from sunlight to drive this cycle and are also readily engineered. In hopes of improving this cycle, we compared a wild-type version of the Synechocystis PCC6803 cyanobacteria to an engineered version overexpressing the enzyme FBA, called 70 glpX, to deduce how the overexpressing strain is able to be more photosynthetically efficient. To do this, comparative metabolomics were done to compare metabolite concentrations in order to identify differences between the two. It was found that the FBA enzyme in the 70 glpX contained increased metabolite concentrations at certain points in the CBB cycle when compared to the wild-type, causing an increase in the rate of photosynthesis. We can see that the substrate was higher at certain points, which may suggest a higher metabolic rate, explaining how the engineered version is better at carrying out photosynthesis.

## KEYWORDS

Biotechnology, energy, sustainability, cyanobacteria, metabolic engineering