

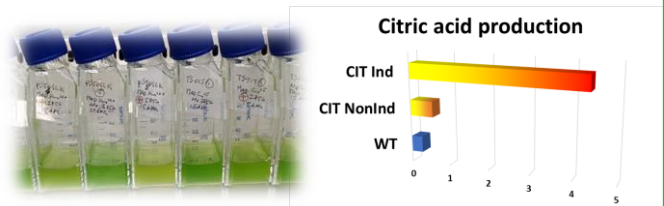
Engineering sustainable citric acid production in cyanobacteria

AIMS:

This project aimed to develop a platform for sustainable production of citric acid, an organic acid used in a variety of industrial processes, from lead acid battery recycling to food flavouring, currently produced mostly from carbohydrate fermentation. Cyanobacteria are promising sustainable biotechnology chassis, using CO₂ and (sun)light as sole carbon and energy sources. Hence, we aimed to engineer strains able to convert CO₂ into citric acid, in an environmentally-friendly manner, paving the way for a sustainable route to the production of this important compound.

OUTCOMES:

Current citric acid production is mostly based on fermentation of carbohydrate feedstocks. The wide range of uses for this organic acid make it imperative to find sustainable routes of production. Through the use of metabolic engineering strategies, we have generated marine cyanobacterial strains that are able to accumulate and excrete citric acid into the growth medium, exclusively from CO₂, paving the way towards the development of a renewable citric acid production process.



OUTPUT:

This project laid the foundation towards the development of a renewable, photosynthetically-driven process for citric acid production from (sea)water, sunlight and waste CO₂. We have successfully demonstrated that rerouting the metabolism of marine cyanobacteria towards the production of this important organic acid is feasible. Further engineering efforts are currently under way, to maximize production yield. The project has also allowed us to establish a successful working collaboration with our industrial partners which we will use to secure further funding through Innovate UK and BBSRC.