Metabolic engineering and genetic tool development for production of agricultural chemicals using photosynthetic microbial platforms

Huw Hayman Zumpe, Jordi Perez-Gil, Claudia Vickers*

Building 75, Corner College Rd & Cooper Rd, Brisbane City, QLD 4072
University of Queensland
Australian Institute of Bioengineering and Nanotechnology (AIBN)
Brisbane, Queensland, Australia

Strigolactones are a large family of plant hormones with diverse biological functions. They have essential roles influencing plant morphology, as well as mediating symbioses with arbuscular mycorrhizal fungi. Root parasitic weeds have hijacked this signalling mechanism and use strigolactones as a germination stimulant. Their biological importance gives strigolactones potential as agricultural chemicals. They may be harnessed to manipulate crop architecture, promote beneficial symbioses and to trigger the suicidal germination of root parasitic weeds. Currently, there exists no natural source of strigolactones that is sufficient for research or industrial purposes. As an alternative to extraction from plant sources or chemical synthesis, the cyanobacterium *Synechococcus elongates* is being engineered as a platform for strigolactone production. The marine strain PCC 7002 has many advantages as a platform: it is photoautotrophic, fast-growing, naturally transformable and produces β-carotene, an intermediate of strigolactone biosynthesis. The availability of genetic tools for modifying PCC 7002 is currently a limiting factor for metabolic engineering efforts. To facilitate engineering and to advance cyanobacteria as a platform for production of industrially-relevant chemicals, genetic tools are being developed and characterised for the fast-growing marine strain, PCC 7002.

Biographic Details

Name: Huw Hayman Zumpe
Title: Mr
Affiliation, Country: Australian Institute of Bioengineering and Nanotechnology (AIBN), University of Queensland, QLD, Australia.
Phone: +61 7 3346 3489 Fax: +61 7 3346 3973E-mail: huw.haymanzumpe@uqconnect.edu.au
Research interests: Synthetic Biology, Molecular Biology, Metabolic Engineering, Industrial Biotechnology, Cyanobacteria