conferenceseries.com SciTechnol

Expert Opin Environ Biol 2017, 6:4
DOI: 10.4172/2325-9655-C1-018

4th International Conference on
GREEN ENERGY & EXPO
&
6th International Conference on
RECYCLING: REDUCE, REUSE & RECYCLE November 06-08, 2017 | Las Vegas, USA

Biosynthesis of long-chain α, ω-dicarboxylic acids by engineered *Escherichia coli* from renewable fatty acids and plant oils

Sathesh Prabu Chandran and **Sung Kuk Lee**
Ulsan National Institute of Science and Technology, Republic of Korea

Long-chain α, ω-dicarboxylic acids (LDCAs, ≥ C12) are widely used as raw materials for preparing various commodities and polymers. DCAs can be produced in two ways: chemical synthesis and biosynthesis. The latter process gains huge attention because of its advantages of cost-efficient and greener process alternative. Fatty acids (FAs) are considered as one of the most abundant renewable resources found in nature. Metabolic engineering and synthetic biology offer an innovative way to overcome the limitations and disadvantages of the chemical processes to make DCA from renewable raw materials such as FAs by whole cell biotransformation. In the present study, an *Escherichia coli* strain was engineered to produce α,ω-dicarboxylic acids (C12 and C14) directly from fatty acid substrates through heterologously expressed ω-oxidation pathway. By whole cell biotransformation, the resulting engineered *E. coli* produced a maximum of 41 mg/L and 163 mg/L of C12 DCA and C14 DCA, respectively from respective fatty acid substrates. In addition, the production of DCAs was increased (159 mg/L of C12 DCA and 410 mg/L of C14 DCA) by the addition of a heme precursor and the hydroxyl radical scavenger in shorter culture duration than that of the corresponding controls. The constructed biocatalytic system was used to synthesize DCAs of various chain lengths from coconut oil hydrolysate. Furthermore, it has been suggested that the inefficiency of cofactor regeneration by the resting cells may limit the biocatalytic reaction and reduce the final concentration of DCA. We circumvent this limitation by co-synthesis of a sugar alcohol along with a DCA. The resulting strain finally achieved about 99% conversion of the substrate in to the product with at least 4 fold increased product concentration than a control system. This novel synthetic biocatalytic system could be served as an efficient platform for the industrial production of α, ω-dicarboxylic acids.

immunesathesh@yahoo.co.in