Method For Production Of Fatty Acids In Blue-Green Algae

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BACKGROUND

Currently, renewable fatty acids are obtained solely from plant oils. Medium chain fatty acids (C8-C14) are typically sourced from coconut and palm oil, whereas longer chain saturated and unsaturated fatty acids are typically sourced from tallow, soy, corn or sunflower oil. Fatty acids are widely used for food, personal care products, industrial applications (e.g., lubricants, adhesives, detergents and plastics), as well as increasingly as biofuels. The demand for renewable fatty acids is rising and expanding.

Given the current understanding of biological pathways it becomes possible to utilize other organisms, especially microorganisms, for the production of renewable chemicals such as fatty acids.

TECHNOLOGY DESCRIPTION

Researchers at UC San Diego have developed a method for the production of renewable fatty acids from a photosynthetic prokaryotic microorganism, Anabaena PCC7120. Specifically, the engineered Anabaena strains described below can generate medium chain saturated fatty acids with narrow chain length specificity whereby the fatty acids are secreted into the culture medium thus allowing for separation of fatty acid product from cell mass.

APPLICATIONS

RThis invention can be used to produce high levels of renewable fatty acids using carbon dioxide and sunlight as an energy source. The fatty acids can be subsequently used as chemical feedstocks or can also be converted to biodiesel with superior fuel properties.

ADVANTAGES

Expression of plant thioesterase genes in cyanobacteria allows for the production of fatty acids in a prokaryotic photosynthetic organism as opposed to heterotrophic bacteria or plants. Whereas high level production of medium chain fatty acids in *E.coli* requires inactivation of the fatty acid beta oxidation pathway, similar measures are not required in cyanobacteria. The chain length specificity of the produced fatty acids is tightly controlled allowing for the generation of highly pure fatty acid feedstocks. Moreover, the high levels of secretable fatty acids were obtained following modification of the plant thioesterase genes, specifically removal of the N-terminal membrane signaling sequences significantly improved yield of fatty acids

STATE OF DEVELOPMENT

The researchers have demonstrated production and secretion of fatty acids in two species of cyanobacteria. Both saturated and unsaturated fatty acids can be produced, moreover, fatty acids of C8-C18 chain length can be produced. Further development will be geared toward yield improvement of the fatty acid titer and productivity.

INTELLECTUAL PROPERTY INFO

A patent has been issued for this invention. https://patents.google.com/patent/US9359623

The technology is available for licensing.

PATENT STATUS

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United States Of America	Issued Patent	9,359,623	06/07/2016	2009-242

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OTHER INFORMATION

KEYWORDS

Cyanobacteria, secretable fatty acids, chemical feedstocks

CATEGORIZED AS

- **Agriculture & Animal Science**
  - Other
- **Biotechnology**
  - Industrial/ Energy
- **Research Tools**
  - Other

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