OPEN ACCESS Freely available online

Current Synthetic and Systems Biology

Commentary

Role of Synthetic Biology in Biodiesel Production

Mariliyan Rohan*

Department of Biotechnology, Federal University of Lafia, Lafia, Nigeria

DESCRIPTION

Around the year 2000, synthetic biology resulted in new biological science, and many different terms have been presented to this field. One widely accepted definition of synthetic biology, on the other hand, is the design and manufacturing of novel biological functions not found in nature. Synthetic biology is a science that covers contributions from many fields, but this study concentrates on the development of microbes to allow efficient biodiesel synthesis, either through modification of existing pathways or through heterologous expression of natural pathways

In this regard, the use of microorganisms in biodiesel synthesis has developed as a very promising alternative to conventional technology. The production of microbial biodiesel has been approached from two perspectives: indirect synthesis from microbial oils, which are produced and harvested for use in the traditional *in vitro* transesterification process, and clear biodiesel conversion using redesigned cell factories to increase the production of alcohols and FFAs, which are then used for *in-vivo* biodiesel. Many microorganisms, including microalgae, bacteria, filamentous fungi, and yeasts, may store internal lipids, specifically TAGs, which contribute significantly to their biomass. These oleaginous bacteria's oils are intriguing raw materials for biodiesel extraction *via* plant-based trans esterification.

When compared to plant-derived oils, the use of microbial oils has various advantages. Oleaginous microbes, on the other hand, have different prospects in the biodiesel economy. Microalgae, for example, are photoautotrophic microorganisms that can convert CO_2 straight to lipids, which can then be utilized to produce biofuel, particularly biodiesel. In the presence of exogenous FFAs, endogenous ethanol can be utilized to create Fatty Acid Ethyl Esters (FAEE's). Similarly, microbial FFA's can be used as a feedstock for *in vivo* biodiesel production instead of TAG's derived from vegetable oils. As a result, essential features of metabolic engineering and synthetic biology are applied to optimize ethanol and FFA biosynthesis and subsequent biodiesel production. In the brewing business, the yeast *Saccharomyces cerevisiae* and the bacterium *Zymomonas mobilis* have long been employed to make ethanol from 6-C sugars(glucose, galactose, and mannose), however, these microorganisms are unable to ferment 5-C glucose (arabinose and xylose). Other microorganisms, such as the germs *Escherichia coli* and *Klebsiella oxytoca*, as well as the yeast *Pichia stipitis*, can make ethanol from pentose sugars, but not at high enough yields and productivity levels However, metabolic engineering and synthetic biology technologies have been applied successfully to increase ethanol production in two unique methods. However, metabolic engineering and synthetic biology technologies have been used effectively to improve ethanol production in two independent ways. The presence of pentose catabolic pathways in ethanologenic microorganisms like *Saccharomyces cerevisiae* and *Zymomonas mobilis* is the first. There are two natural enzymatic routes for xylose catabolism that have been separately transferred to *S. cerevisiae*. One process involves the conversion of D-xylose to D-xylulose by a bacterial heterologous xylose isomeras. This strategy, however, was largely unsuccessful because xylose isomerase is strongly inhibited by xylitol, promoting isomerization equilibrium toward xylose production certain fungi and yeast have been revealed to have a second natural pathway for xylose catabolism that involves a Xylose Reductase (XR) and a Xylitol Dehydrogenase (XDH). After being developed from the xylose-fermenting yeast *P. stipitis*, *S. cerevisiae* can now ingest xylose. However, this technique failed since it also resulted in the excretion of xylitol, which encourages the synthesis of xylose.

CONCLUSION

Microalgae oil production mainly ranges from 15 and 70% by dry biomass weight. The scaling-up process for autotrophic microalgae is challenging, however, because the light is required during production. Although it is known that algae may be cultivated in specialized artificial ponds to produce biodiesel, harvesting miles and miles of algae growth is necessary to produce significant volumes of biodiesel. As a result, while the microbiological parts of this technique are extremely promising, the engineering aspects are the most difficult. Synthetic biology tools have been successfully used to turn certain autotrophic microalgae into heterotrophic microorganisms Methanol, which is commonly used *in-vitro* trans esterification, is mostly derived from nonrenewable natural gas and is therefore toxic and destructive. On the contrary, ethanol can be produced entirely from renewable resources with low toxicity and high biodegradability.

Correspondence to: Dr Mariliyan Rohan, Department of Biotechnology, Federal University of Lafia, Lafia, Nigeria, E-mail: marirohan@edu.com

Received: 03-May-2022, Manuscript No. CSSB-22-18201; **Editor assigned:** 06-May-2022, PreQC No. CSSB-22-18201 (PQ); **Reviewed:** 20-May-2022, QC No. CSSB-22-18201; **Revised:** 27-May-2022, Manuscript No. CSSB-22-18201 (R); **Published:** 03-Jun-2022, DOI: 10.35248/2332-0737.22.10.002.

Citation: Rohan M (2022) Role of Synthetic Biology in Biodiesel Production. Curr Synth Syst Bio. 10: 002.