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Joint Event on
7th Global Conference on
APPLIED MICROBIOLOGY AND BIOTECHNOLOGY
&
10th International Conference on
CLINICAL MICROBIOLOGY AND INFECTIOUS DISEASES
November 18-19, 2019 | Rome, Italy

Influence of nutrient formulations on growth, lipid yield, carbon partitioning and biodiesel quality potential of Botryococcus *sp*. and *Chlorella sp*

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Microalgae respond with physiological alterations to the nutrient composition where they grow. This behaviour can be viewed as a biotechnological attribute that can be manipulated in order to control the algae biochemical composition and growth focusing on specific compounds and higher productivity. Therefore, a cheap and promising media to improve microalgae production yield was selected. This study provides a future scope where algae can be cultivated in a minimal media or wastewater with desired components. The study was conducted to analyse the influence of three nutrient formulations namely, BG-11 medium, BBM and TAP medium on growth potential and lipid yield of two microalgal genera (Botryococcus sp. and Chlorella sp.) and to study the roles of N, P and other major nutrients. The study focussed on the general patterns of starch and lipid synthesis and storage and to further assess how photosynthetic carbon partitioning into starch and lipid is altered by conditions in growth media such as N and C presence as seen in BG11 medium which are known induce neutral lipid production and the lack of it in BBM and TAP medium. BG-11 medium performed better as compared to BBM and TAP medium in terms of biomass productivity and lipid yield. The lipid yield was highest in Botryococcus sp. (63.03% dry wt.) and Chlorella sp. (50.27% dry wt.) at 30th day of incubation. Mean biomass productivity was highest for Botryococcus in BBM medium (6.14 mg/L/d) and for Chlorella in BG-11 medium (4.97 mg/L/d). Mean lipid productivity (50.78% and 39.36%) was highest in BG11 medium for both Botryococcus and Chlorella species respectively. A sharp decline in sugar content was observed in the late stationary phase of growth from 30th day to 45th day. FAME profile of the extracted lipids, showed predominantly oleic acid, followed by palmitic acid, and stearic acid in both the strains when grown in BG-11 medium. The other biodiesel quality parameters were in accordance with the International standards. A complex relationship was found between chemical composition and biodiesel properties. Proximity analysis indicated that the fuel properties of biodiesels are determined by a number of parameters and by the combination of different chemical compositions. The results provide an insight into organic carbon partitioning into lipid compounds and how the organism's lipid metabolism changes due to N-deplete culturing in TAP medium and inorganic carbon source availability as seen in BG-11 and BBM medium.

Biography

Rashi Vishwakarma completed Ph.D. in 'Algal Biotechnology' from Banaras Hindu University, India in 2012 on the isolation and characterization of bioactive compounds from cyanobacteria and has since worked on different aspects of microalgae which include bioactive compounds; biofuels and value- added products in IIT Kharagpur, IARI, New Delhi, TERI and IIT Delhi. She is selected for the prestigious 'Pool Scientist' Scheme from CSIR and is currently working at Indian Institute of Technology, New Delhi. She has 9 publications including research articles and book chapters to her credit and is also an active reviewer in reputed journals. Current research interests include extraction of bioactive compounds from microalgae using green extraction methods and simultaneous production and extraction of high value products from algae through a biorefinery approach.

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