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A novel low cost effective approach towards sustainable biodiesel production from *Sphingomonas* sp. EGY1 DSM 29616

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The remarkable decrease in the global reserve from fossil fuel along with the continuous increasing demand accompanying massive motors technologies addressed the urgent need for sustainable and renewable energy resources. In this context, present research highlights a low cost effective rapid and environmentally eco-friendly approach to produce biodiesel from an isolated oleaginous bacterium. MALDI-TOF–MS (Mass Assistant Laser Desorption Ionization - time of flight-mass spectrometry) analysis and molecular identification through 16S rDNA technique taxonomically designated this bacterium as *Sphingomonas* sp. EGY1 DSM 29616. One variable at a time approach (OVAT) was anticipated to delimit key determinants provoking significant influence on total lipid productivity from this bacterium. Data revealed that cheese whey upon its addition to mineral medium was the most preferable waste among seven tested agro-industrial wastes directing cell machinery towards achieving perceivable levels of accumulated total lipids. Ingredients of mineral medium had either significant inhibitory impact at $P<0.01$ (e.g., yeast extract) or non-significant influence at $P>0.05$ (e.g., $(NH_4)_2SO_4$, KH_2PO_4 and $MgSO_4$). On top and above, cheese whey solo does satisfy the nutritional requirements of the bacterium not only from carbon and nitrogen but also from mineral salts. As a consequence, the formulated medium prompting total lipid production contained only cheese whey (25%v/v) in distilled water. Furthermore, optimal conditions favoring lipid production (430 mg/L) were cheese whey based - distilled water medium, pH 7.0 at 30°C at 150 rpm, 10%(v/v) inoculum size and 36 hrs incubation time. Fourier Transform Infra-Red (FTIR) showed that the raw produced lipid had an almost quite similar pattern to that of Triolein standard (a typical triglyceride molecule). Lipid profile on Gas chromatography (GC) revealed the presence of appreciable levels of long chain C16-C18, mono-saturated fatty acids upon comparison with other fatty acids. Thin layer chromatography (TLC) revealed the presence of triglyceride – fatty acids in the raw produced lipid. MALDI-TOS – MS inferred the presence of both diglyceride fatty acids and triglyceride fatty acids. Promising characteristics of the present trans–esterified lipid along with the low cost effective rapid approach presented here in turn underpin the great potentiality of its utilization as renewable sustainable energy resource.

Biography

Amira M Embaby has completed her PhD from Alexandria University - Institute of Graduate Studies and Research (IGSR) and Postdoctoral study from Greifswald University, Germany in 2013. She is a Lecturer in the Institute of Graduate Studies and Research (IGSR)-Alexandria University. She published seven papers. She has been serving as a reviewer in some journals such as *Biochemical Engineering Journal*, *African Series Journals* and others.

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