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Qatar University culture collection: A source of biodiversity and numerous applications

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ABSTRACT

Microalgae are photosynthetic microorganisms that can grow in different environments (sea water, fresh water, waste water soil, rocks....) and under various conditions (Light, pH, temperature, salinity....). During their phases of growth, they produce a variety of metabolites such as lipids, proteins and carbohydrates in large amounts over a short period of time. These metabolites can be processed into both biofuels and other useful bioproducts. Microalgal lipids can be converted to biodiesel via process called transesterification. The use of biodiesel will decrease the emission of harmful gases, which can help in reducing the greenhouse effects and global warming. It is nontoxic, biodegradable and has the potential to replace the conventional diesel fuel. The isolation of autochthonous microalgae, with high lipid-contents and biomass productivities, is a crucial aspect of the development of commercial production of microalgae-based biodiesel as well as food security. This is especially important for deployments in climates such as are found in Qatar, a peninsula in the west Arabian Gulf, which is characterized by an extreme desert climate. 53 autochthonous strains of microalgae were isolated from various freshwater, marine and terrestrial environments in Qatar that led to the establishment of the Qatar University Culture Collection of Cyanobacteria and Microalgae (QUCCCM). Strains were identified via ribotyping and characterized in terms of growth rate and lipid production. The molecular identification of the isolated strains showed a biodiversity and 13 different known genera were identified. Among them, *Chlorella* is the most abundant freshwater known genus (22.64%), followed by *Chlorocystis* (13.21%). Growth rate study evidenced a thermo and halotolerant *Nannochloris* isolate QUCCCM31. The strain is able to tolerate 45°C and wide salinity range 35–100 ppt. Determination of lipid content and lipid profiling indicated the presence of promising strains for biodiesel production such as *Nannochloris* sp. (strain QUCCCM31) with a promising FAME profile for biodiesel production. This study proved a biodiversity inside the Qatar University Culture collection with strains having different applications such as Biofuel as an environmental friendly alternative to the fossil fuel, and/or source of food and feed.

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