ABSTRACT

Microalgae appeared an emergent source of biodiesel that is potent to supplant the fossil fuel. Microalgae proved itself a truly renewable, sustainable and environment friendly source with great potential to fulfill the global energy demands. Present study was carried out to explore biodiesel prospective from Lahore algal flora. Indigenous seven algae species *Navicula radiosa* Kützing, *Fragilaria construens* (Ehernberg) Grunow, *Euglena polymorpha* P.A. Dageard, *Euglena convolute* Korshikov, *Euglena gracili* Klebs, *Chara vulgaris* L., *Nitizschia linearis* Kützing were selected to evaluate their lipid contents and biodiesel harnessed ability. It was seen that *Chara vulgaris* L. had high ratio of oil to dry biomass (2.24g) whereas *E. Polymorha* stood second. Densities of extracted biodiesels were with in range of 0.896-0.885g/cm^3 which leveled the EN 14214 and Petro-diesel standards. The tested microalgae produced Variety of saturated, unsaturated methyl esters in their lipid profile but with different range of productivity. About sixteen saturated fatty acid methyl esters along with five different unsaturated fatty acid methyl esters had been procured from studied lag. Altogether sixteen parameters were evaluated and equated with EN 14214, ASTM D6751-02 and petro-diesel standards. The characterization of the algal biodiesel was centered on fatty acid methyl profiles of the specimen. The ranking of species was brought about by using Preference Ranking Organisation Method for Enrichment Evaluation (PROMETHEE) and Graphical Analysis for Interactive Assistance (GAIA). Fatty acid methyl ester (FAME) profiles were used to calculate the key chemical and physical properties, Cetane number (CN), Iodine value (IV), Cold filter plugging point (CFPP), High heat value (HHV), density, kinematic viscosity (KV), Polyunsaturated Fatty acid, Diunsaturated fatty acid and Saturated Fatty acid methyl esters from seven selected species. PROMETHEE-GAIA on the basis of equal criteria ranked *E. gracilis* at top and *F. construens* at bottom. In summary, this study derived biodiesel quality parameters from FAME profiles and showed that CN, IV, C18:0 and double bond limits were the strongest drivers in equal biodiesel parameter-weighted in PROMETHEE analysis. Application of PUFA weighting to saturation proved important, as it led to a lower ranking of species exceeding the double bond EN14214 thresholds.