



ABSTRACT

Fatty acids are vital constituents that help in regulating the metabolic processes of our bodies. So, there is a need to find out the sources that provide us these important fatty acids. The present research is concerned with the isolation and screening of algal strains for the production of oil and their fatty acid profiling. Collection of different samples of algae was done from different areas of Pakistan followed by the isolation and screening of the algal strains for the accumulation of oils. Ten different algal isolates were obtained and out of these, four were found to accumulate oils in their cells. Among these four, the best oil producers were isolate IIB-9 and IIB-8 showing 24.69% and 22.84% (w/w) oil yields, respectively. The optimum conditions for the growth of these two strains (IIB-9 and IIB-8) were 25°C temperature, medium pH of 7.5, 14 days of incubation, 16 hours light and 8 hours dark cycle with 0.4% glucose as carbon source, and phosphorus starvation along with the limited amount of nitrogen in BG-11 medium. Different physico-chemical parameters of *Chlorella* oil i.e., density ($0.87 \pm 0.02 \text{ mg/dm}^3$ at 40°C), viscosity ($4.11 \pm 0.11 \text{ mm}^2/\text{s}$), peroxide value ($0.58 \pm 0.08 \text{ meq/kg}$), acid value ($0.49 \pm 0.02 \text{ mgKOH/g}$), iodine value ($87 \pm 0.17 \text{ gI}_2/100\text{g}$), saponification value ($188.56 \pm 1.11 \text{ mgKOH/g}$), unsaponifiable mass (1.7%) and that of *Scenedesmus* oil i.e., density ($0.88 \pm 0.04 \text{ mg/dm}^3$ at 40°C), viscosity ($4.20 \pm 0.09 \text{ mm}^2/\text{s}$), peroxide value ($0.70 \pm 0.01 \text{ meq/kg}$), acid value ($0.56 \pm 0.025 \text{ mgKOH/g}$), iodine value ($91 \pm 0.15 \text{ gI}_2/100\text{g}$), saponification value ($191.25 \pm 1.45 \text{ mgKOH/g}$) and unsaponifiable mass (1.9%) were carried out to check the quality of oil. These values showed that both algal oils were of good quality. Transesterification of these oils to their respective FAMES was done to analyze the fatty acid profile through GC-MS. This profile showed that EPA, DHA and Linoleic acid were the most significant fatty acids found in the algal oils. These fatty acids have antioxidant, anti-cancer and anti-aging properties. So, the algal oils can be used as a source of these valuable fatty acids.