

ABSTRACT

Fresh water algae are rich source of bioactive phytochemicals. These are therapeutic agents as they can serve the purpose with lesser side effects that are often associated with synthetic chemicals. In the present study, fresh water filamentous algal species viz. *Spirogyra*, *Cladophora* and *Microspora* were subjected to growth optimization. It was noted that Bristol's soil medium was best suited for maximum biomass production of algal species under fluorescent light at 25°C having pH 8. After optimization of cultural conditions, the biotechnological applications like biodiesel production, antioxidant and antibacterial activities were also studied. Biodiesel production was noted using transesterification method for the studied algal species. A considerable amount of biodiesel was produced from *Cladophora* among the studied algal species. Alcoholic, ketonic and aqueous extract of the respective algal species were there made and their phytochemical analysis shown positive results for reducing sugars, amino acids, alkaloids, flavanoids, tannins and saponins. *In vitro* antioxidant activity was evaluated with DPPH assay. Maximum free radical scavenging activity (61.18%) was noted in the acetone extract of *Cladophora*. While, total phenolic content were found maximum in the acetone extract of *Spirogyra*. Disc diffusion assay was employed to study antibacterial activity of the algal extracts against various strains of gram positive (*Bacillus subtilis*, *Streptococcus aureus*) and gram negative (*Escherichia coli*, *Pseudomonas aeruginosa*) bacteria. Methanolic extract of *Spirogyra* showed maximum zone of inhibition i.e. 13±0.19 mm. While maximum zone of inhibitions for *Cladophora* and *Microspora* were noted as to be 12±0.24 mm, 10±0.19 mm respectively for the acetone extracts. The study showed that the filamentous algae could have the potential to produce a considerable amount of biodiesel and they can be act as a strong candidate for source of antioxidants and antibacterial agents.