Abstract

CO₂ sequestration has been found as one of the effective way to reduce the carbon footprint in the atmosphere. Amongst three types of carbon sequestration, Biological method using micro and macro algal species have several advantages as they can fix CO₂ directly from flue gas and do not require further disposal of recovered CO₂. Therefore, research have been carried out to screen micro algal strains which can capture carbon dioxide from the source and produce high value products. Carbon fixed by microalgae is converted to carbohydrates and lipid, thus the byproducts can be used for food and alternate clean energy. In order to gain an optimal productivity of micro algal biomass, it is necessary to supply the culture with adequate amount of carbon dioxide. These findings open up a new research topic to use algae in general and microalgae in particular for the biofixation of carbon dioxide. The present studies revealed that green microalgal species such as *Chlorella protothecoides*, *Chlorococcum granulosum* and *Scenedesmus obliquus* are more robust and suitable species which can grow in high concentration of carbon dioxide. The study revealed that they can not only grow much faster in 12% CO₂ for prolonged time at different temperature (25°C, 30°C and 35°C) but also multiply can grow faster in short duration treatment with same concentration. However, *Chlorella protothecoides* showed rapid specific growth rate even with 1% CO₂ both for short (30min) and long (12h) treatment time while *Scenedesmus obliquus* showed faster growth rate with 550ppm, 1% and 4% CO₂ treatment for 30min at 25°C and 35°C. In *Chlorococcum granulosum*, 550ppm and 1% CO₂ treatment was found to be best for its growth. The present findings also conclude that *Kappaphycus alvarezii* a red seaweed of commercial importance did not show any variation in the amount of total polysaccharides and proteins in the cells and there was no major structural damage to the tissue after high CO₂ treatment. Thus, it can withstand elevated CO₂ and low pH and is a potential candidate for CO₂ sequestration in ocean ecosystem. This knowledge can be applied for further studies in direct capture of CO₂ from power, steel, cement and other high carbon dioxide emitting industries.