

Algae and duckweed offer sustainable solutions to mitigate impacts of water and food insecurity

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Abstract

Earth is losing massive chunks of the freshwater reserves at unimaginable scales. Additionally, conversion of evergreen forests into monoculture farmlands, for feed crops is eroding the soil ecosystems. Therefore, two crucial natural resources namely water and soil are getting polluted and irreversibly lost; consequently leading to worldwide food and urban water insecurities. In this regard, algae and duckweed play marvelous roles in nutrient recycling and wastewaters transformations as well as directly and indirectly supporting the food pyramid. Due to cosmopolitan distribution, microalgae can be grown worldwide. Some of the characteristic microalgae, such as the mat forming cyanobacteria or the blue green algae are potential scavengers of inorganic nutrients, which play crucial roles in urban wastewater management. We have isolated mat forming blue green algae called *Oscillatoria* that showed above 90% removal rates for both nitrogen and phosphorous, when grown in the synthetic wastewater medium. Other species of microalgae such as *Desmodesmus*, *Scenedesmus*, *Ankistrodesmus* and *Botryococcus* which are also rich sources of lipids and fatty acids are being tested for their nutrient recovery potential from different types of wastewaters. We also cultivate and conduct R & D on various species of duckweed such as *Lemna minor*, *Spirodella* sp and *Wolffia globosa* with particular focus on later specie. The *W. globosa* grown in indoors under the uncontrolled natural sunlight and temperatures achieved growth productivity of 33 gm/m²/day. The biomass of *W. globosa* consists of 30.09%, 41.2% and 6.25% of carbohydrates, proteins and fats respectively. Owing to high nutritional value, we promote *W. globosa* as nutritional alternative to soybean for the livestock feed and as protein rich non-conventional nutrient source for humans. We have discussed the need to adopt algae and duckweed as two urgent and relevant solutions to mitigate the issues related to water and food insecurity.

Keywords: Algae; Duckweed; Spirodella, Wastewater; Wolffia globosa.