Algal Multipurpose Benefit

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Summary

Algae are the mass groups of photosynthetic agent that are able to contribute the variety food component and oxygen for the planet. The review emphasized on the benefits of algae for multipurpose. As a result, several research paper finding reviewed to be informed about algal benefit for different purposes. Many paper findings agreeing the algal potential to regulate the environment by reducing the concentration of corbondioxide, releasing the oxygen for organism's respiration and aeration to decompose the pollutant into usable nutrients. . And also several findings ascertain us the algae importance to increase the crop production by fixing the nitrogen biomass in agricultural fields and contribute to enhance high crop biomass production by change the nitrogen gas to utilizable form. They have also the potential to indicate the environmental pollution and have the potential to treat the wastes for reducing the pollutants concentration. Algae also contain all essential amino acids, Iodine, vitamins B1, B2, B6, niacin, carotene and minerals, while the presence of heavy metals is negligible. They are also used as extracts in food, cosmetics, and industrial uses. Moreover, they have been reported for their potential medicinal uses as antioxidant, anticancer, antiviral properties. Algal potential to produce biofuels production also has been many scholars' research findings. Generally algae are much important for ecology, economy, nutrition, health and production of fuels.

Introduction

Algae are the organisms found in both marine and freshwaters habitats. They are diverse group of single-cell photosynthetic organisms that include cyanobacteria and a wide range of eukaryotic algae and they offer the potential for rapid growth under photoautotrophic conditions, and they can grow in a wide range of habitats. (Gangl *et al*., 2015). They are the mass groups of photosynthetic agent that are able to contribute the variety food component and oxygen for the planet (Nivedita and Poonam, 2017). As a result, they are also regulating the world climate by reducing the concentration of corbondioxide for synthesizing sugar and release the most vital important oxygen gas as by product (Acevedo *et. al*.2017*)*.

Algae as bio indicators give early warning for pollution in an ecosystem to awake the concern body to sustain the natural resources and whole ecosystem (Dulcie *et.al*, 2003). Some groups of algae are crucial to increase the crop production by fixing the nitrogen biomass in agricultural fields. Due to the important characteristic of nitrogen fixation, the algae have a unique potential to contribute to enhance high crop biomass production *(*Alam *et al*, 2014*). Algae are the sources of* bioactive metabolites and considered for the pharmaceutical industry in drug development. A number of algae contain high-value compounds such as oils, colorants, and polysaccharides, which are used by the food additive, oil, and cosmetic industries, among others (Gangl *et al*., 2015). Algae have many convincing properties to make it stand out in front of synthetic drugs (Aditya *et. al*, 2016). Algae play a vital role in the life of human beings as food, fodder, medicine (Sakthinathan, 2018; Tang and Suter, 2011) and biofuels production (Wigmosta *et al*., 2011; Nivedita and Poonam, 2017).

Algal ecological benefits

Algae have different pathways to fix atmospheric carbon dioxide and to efficiently utilize the nutrients to convert it into biomass. These photosynthetic organisms fix the atmospheric nitrogen into utilizable form and make it available to the plants (Nivedita and Poonam, 2017). They also form symbiotic associations and provide nourishment to the host. There is growth enhance due to hormones like cytokinin, gibberellins and auxin which accelerated growth. The molecules from these organisms like peptides, vitamins, carbohydrates are reported to induce pathogenesis in plants. The exo-polysaccharide of cyanobacteria improves the soil quality and fertility (Monika *et. al*., 2015).

Algae are as Biological indicators (bioindicators) offer a signal of the biological condition in an ecosystem (Alkhalifa *et al*., 2012). Because of their short generation times, microalgae respond rapidly to environmental changes, and any effect on them will affect to higher trophic levels. In addition, microalgae offer the possibility to study the trans-generational effects of pollutant exposure, being a model of choice for the study of the long term effects of pollutant exposure at population level. Furthermore, micro algal tests are generally sensitive, rapid and

low-cost effective. For all these reasons, the use of microalgal toxicity tests is increasing, and today these tests are frequently required by authorities for notifications of chemicals and are also increasingly being used to manage chemical discharges (Cid *et. al*., 2012). Using these bioindicators as an early warning of pollution or degradation in an ecosystem it is possible to help sustain the natural resources and whole ecosystem (Dulcie *et.al*, 2003).

They are used to detect changes in the natural environment, monitor for the presence of pollution and its effect on the ecosystem in which the organism lives, monitor the progress of environmental cleanup and test substances, like drinking water, for the presence of contaminants. Alage are also used to treat the waste water. Algae are able to effectively remove a variety of pollutants and nutrients (Sukačová, Kand Červený, J., 2017; Acevedo *et. al*.2017)). The oxygen they produce by photosynthesis process is used as aeration to help aerobic bacteria to decompose the contaminants and convert into nutrients (Acevedo *et. al*.2017; *Ramaraj et. al., 2010)*. This is cost effective eco-friend treatment and reduces the volatile contaminants from the environment (Acevedo *et. al*.2017*)*

Algal Nutritional Benefits

Algae produce a great variety of biological active compounds which cannot be found in other organisms. All essential amino acids presence in algae. Iodine, the most important component of sea vegetables is present in high amounts (Barre *et.al*, 2010) as well as the vitamins B1, B2, B6, niacin, carotene and minerals were found high, while the presence of heavy metals was negligible (Kolb *et al., 2004*). Therefore, they have high potential as a source of functional ingredients. It will be also referred that seaweeds can be a source of new compounds for drug discovery (Figueiredo *et. al*., 2016).

The incorporation of algae biomass in food is a way to design attractive and healthy new products. Algae have been credited with improving the immune system, the increasing of weight, the number of eggs, reproductive performance, or reducing cholesterol levels. And also algae used as animal in order to improve the quality of meat and eggs. Also, their importance in aquaculture is not surprising since they are natural food for these organisms (*Dajana J. Kovač et al., 2013)*.

They are sources of nutrients like carotenoids and vitamin B12. Their health benefits as a complementary dietary source for macro and micro nutrients have been identified in various populations (Tang and Suter, 2011). High protein content of various algal species are alternative source of proteins, oils rich in some PUFAs seem particularly suitable for children, pregnant women, vegetarians and for different patients. Since algae also represent an important source of vitamins, minerals, antioxidants and natural colorants, the incorporation of the whole biomass in food and feed could be used to provide the color, increment nutritional value, and improve texture or resistance to oxidation (El-Baz, 2017).

Algal medicinal benefits

Certain beverages are prepared from sea algae. They are also used as extracts in food, dairy, cosmetics, and industrial uses. Mainly marine algae have been also used as medicine for many centuries. Moreover, they have been reported for their potential medicinal uses (Figueiredo *et. al*., 2016). Algae is used as one of important medical source due to its antioxidant, anticancer, antiviral properties. Therapeutic properties of algae is used for promotion of health .edible algae is recognized as complete foods which provides correct balance of proteins, carbohydrates ,vitamins ,and minerals (Pooja, 2014). Algae are also used for several vaccine antigens, antibodies, sources of enzymes (Gangl *et al*, 2015).

There has been an increasing demand for dietary interventions for the prevention of chronic inflammatory diseases, such as cardiovascular disease (CVD) and nonalcoholic fatty liver disease (NAFLD) (Siah *et.al*., 2013). Antioxidative, antihypertensive, immunomodulatory, anticancerogenic, hepato-protective, and anticoagulant activities have been attributed to some microalgae-derived compounds such as peptides (Caporgno *et.al*, 2018). Algae can be an effective natural product for improving blood lipid profiles and for preventing inflammation and oxidative stress.

They contain bioactive components, namely, carotenoids, c-linolenic acid, fibers, and plant sterols, which can be beneficial for preventing CVD and NAFLD (Siah *et.al*. 2013). They inhibit intestinal cholesterol absorption and decrease hepatic lipids, lowering plasma total cholesterol, and triglyceride concentrations and decrease oxidative stress due to their free radical scavenging activity and inhibition of lipid peroxidation. According to El-Baz (2017), consuming alga filamentous is also good for intestinal tract of human, because it serve as roughage in the human diets, preventing constipation. Moreover, alga can be used as ingredient of food items such as cake, cookies, snack and noodle. *Some species* of algae are considered to be an important source for diet and food additives because it has high content of protein and minerals (Dine Naw and Soe, 2011). Algae are rich-sources of metabolites, which can be used to fight against oxidative stress and hence skin aging (Jean *et. al*., 2017).

Algal Benefits for fuel production

Algae biomass could serve as a resource for the production of renewable transport fuels, such as biodiesel and bio-

ethanol (Voort *et. al*., 2015). Biodiesel has emerged as a promising substitute to petrodiesel because it is biodegradable, less toxic, and reduces greenhouse gas emission (Gumba *et. el*., 2016). Algae can produce large amount of cellular storage lipids in the form of triacylglycerols which can be readily converted to biodiesel via a simple chemical transesterification reaction with zero emissions of both air pollutants and greenhouse gases (Bisth *et. al*., 2015).

Algae have the potential to generate 220×109 L yr-1 of oil, equivalent to 48% of current U.S. petroleum imports for transportation (Wigmosta *et al*., 2011). In fuel industry algae biofuels have been emerged as a clean, nature friendly, cost effective solution to other fuels (Gumba *et. el*., 2016). They have significant potential as a renewable biofuels feedstock, but the success of global algal biofuels initiatives will depend upon our ability to produce algal crops in a reliable, cost-effective and sustainable manner (Nivedita and Poonam, 2017).

Conclusion

Generally, algae are very crucial photosynthetic organisms used for production of high nutritive food, different drugs or therapeutics ingredients and renewable biofuel which has no environmental negative effects. Algae have the potential to indicate the environmental pollution and regulate the environment by consuming and decreasing carbon dioxide and releasing oxygen for pollutants decomposition so algae have the potential to treat wastes. Algae are also the sources of renewable fuel which has no environmental negative effects during their etraction

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