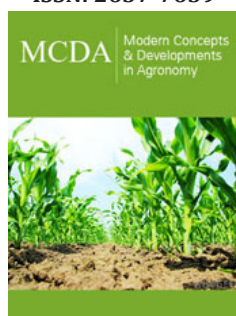


Spirulina: The Future Food

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Introduction

Spirulina is a microscopic, free-floating filamentous, spiral shaped phycocyanin containing blue green microalga which grows in warm alkaline water bodies and surprisingly doubles its biomass every 2 to 5 days. It has extraordinary ability to grow and survive under unfavorable conditions as compared to other algal species. It is extensively utilized all over the world due to high protein and vitamin contents as a nutraceutical food supplement. People who live close to the alkaline lakes where it is naturally found have long utilized it as a nutritional supplement. Spirulina has been used as an additional dietary component in fish, shrimp, and poultry feed. The blue green alga *Spirulina platensis* has garnered more attention among the numerous Spirulina species since it has a high nutritional value marked by a 70% protein content and the presence of minerals, vitamins, amino acids, and important fatty acids [1]. The quality of spirulina protein is found to be excellent as compared to egg proteins and contain all essential amino acids useful for human and animal development.

It also possesses high levels of anti-inflammatory and antioxidant compounds, phycocyanin, phycocyanobilin, carotenoids and β -carotene therefore extremely utilized in pharmaceutical companies. It is richest source of provitamin A (β -carotene), vitamins B1 (thiamine), B2 (riboflavin) and B3 (niacin), vitamin E and Gamma Linoleic acid (GLA) [2,3]. GLA is the most important amino acid which can stimulate master hormone, prostaglandins which control each and every cell of body including musculature, circulation and heart. GLA plays an important role in enhancement of human body functions including diabetes, cancer, heart disease, alzheimer, arthritis etc. It also contains minerals like iron, magnesium, calcium, potassium, zine and selenium. It also contains an abundant number of carotenoids, polysaccharides, glycosides, omega 3 and 6 poly unsaturated fatty acids.

Spirulina also possesses beta carotene, phenolic acids, and tocopherols which exhibit antioxidant properties and neutralize free radicals. Phycocyanin pigments have potential to inhibit lipid oxidation in the kidneys and liver. Phycocyanin is able to scavenge the very dangerous hydroxy radical and inhibit the oxidation of lipids in the liver and kidneys. It has been utilized as animal feed to increase meat output and as a protein-rich food due to its low cost and high nutritional content. This product was commercially produced in well-controlled outdoor pools. The cellulose lacks flexible cell walls of this microalgae make it simple to digest.

Spirulina has the ability to control immunological functions by inhibiting the release of histamine from mast cells and shows anti-inflammatory properties. It also shows positive effects in allergic rhinitis. β -carotene contains exhibited antioxidant properties [4]. Various scientific reports concluded that spirulina have potent applications against several pathologies like obesity, hypertension, cardiovascular diseases, hypercholesterolemia, hyperglycaemia, inflammatory diseases and carcinoma [5-7]. Due to the presence of various bioactive components, it is used as immune-stimulants, antibacterial, antiviral, antiallergic, antidiabetic and metalloprotective agents (prevention of heavy-metal poisoning against Cd, Pb, Fe, Hg).

Therefore, National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA) recommended it as main food for astronauts during their long space missions because its small quantity are able to provide different nutrients and protective effects [8,9]. Astronauts are exposed to a variety of stress issues during long stays in space which can cause negative health impacts. It is a safe natural superfood which provides instant energy and nourishment. Dry Spirulina powder can be added to a variety of food products like sauces, pasta, soups, snack foods, drinks and other recipes. Spirula biscuits, cake, tablets, capsule and papad are very popular in India as protein supplement. It can also be used in jelly, cakes, noodles, puddings, milk shakes, ice-cream, soft cheese, Yogurt and Acidophilic Milk.

Therefore, Spirulina is considered as one of the most potent natural superfoods due to high nutrients contents which do not have any toxicological effect. As a natural by-product a huge amount of algal biomass can be produced at a low cost with strong, safe and high nutritional value. Because of the unique features and richness of proteins, vitamins and minerals, it recommended as the best supplement and used in formulation of variety of medicinal foods, nutritional and functional foods. The World Health Organization (WHO) also recommended spirulina as the best food rich in iron and protein and can be administered by children without any adverse side effects. Spirulina is essential for early children's growth and provides a number of advantages. It is also a great option for adults and teenagers whose bodies are still growing. Spirulina is helpful in conditions of general weakness and poverty since it is high in Ca and Fe and contains a little quantity of selenium.

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