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Algae as a source of food

Rafiullah M Khan[1], Milind J Jadhav[2]
[1] Department of Botany, Kohinoor College, Khuldabad, Aurangabad, Maharashtra, India
[2] Department of Botany, Sir Sayyed College, Roshan Gate, Aurangabad, Maharashtra, India

Abstract
Algae a photosynthetic life form of an earth contains variety of nutrients. The use of algae as food is a old and widespread practice. In addition to their nutritional value algae are being marketed as functional foods that benefit health. World's problem of malnutrition can be solved by cultivation and utilization of edible algae. This review in brief gives an idea about role of algae as a human food.

Keywords: algae, food and malnutrition

Introduction

Algae comprises a large and heterogenous assemblage autotrophs. They occur in variety of habitats fresh water, marine water, on wet rocks, on or in soil, on snow, on tree trunk and house dust also. Majority of algae are aquatic. The use of algae as food is a very old and widespread practice. Algae contains protein, lipid, carbohydrates, vitamins and minerals (Jadhav 2019) [3]. Algae are cultivated and used in nutrition worldwide. Algae have been used as a human food since ancient times particularly in the region bounded by China, Korean Peninsula and Japan. According to legend, Hung Ge, an alchemist, physician and Taoist theoretician of Eastern Jin Dynasty (317-420 AD) used *Nostoc commune* as staple food during period of famine. Several parts of Asia are well known for consuming algae directly and some indigenous people in Africa, South America and Mexico consume small quantities of naturally occurring algae mostly because of vitamin and nutrients they provide. In addition to their nutritional value, algae increasingly are being marketed as functional foods that benefit health beyond the role of basic nutrition (Hafting *et.al.* 2012) [2]. Since algae are autotrophs, they use carbon dioxide from the atmosphere and convert it to organic matter and release oxygen as it grows. The more the amount of carbon dioxide, the more is its productivity. The first commercial large scale micro algal cultivation started in the early 1960, in Japan, with cultures of *Chlorella* (Richmond 2008) [5].

Edible Algae

Algae contains high value nutritional compounds such as protein, lipids, carbohydrates, vitamins, minerals and antioxidant. Algae also have high fiber content (Plaza et.al.2008) [4]. For the last couple of decades, nutritionist and food scientists have given much more attention on nutritional evaluation of edible algae. Commercial large scale culturing of microalgal species *Chlorella* started in 1960s followed by *Spirulina* in the 1970. Traditionally *Chlorella* and *Spirulina* are directly sold as dietary supplements, without any kind of processing except drying. *Spirulina* production is concentrated in Asia and the USA, *Chlorella* mostly in Asia. Besides the sale of whole dried algae know a days also specific high value components from algae are being produced. *Spirulina* has the highest protein about 65%. It is very rich source of β-carotene, thiamine, riboflavin and vitamin B_{13}. Pharmaceutical Preparation from *spirulina* are recommended as protein supplement. Protein is important in human nutrition and the lack of protein is one of the factor in malnutrition.

Chlorella is composed of 45% protein, 20 % fats, 20% carbohyderates, 10 % vitamins and minerals and 5% fiber (Belasco 1990)[1]. The colonies of *Nostoc* are boiled and used as food in Brazil. *Nostoc* is a common dietary supplements for the indigenous populations of Thailand, Peru, China, Ecuador, Fiji, Java, Japan, Mexico, Mongolia and Siberia. *Nostoc commune* has high amount of fiber with moderate protein and is considered as a new dietary fiber source. *Spirogyra* and *Oedogonium* are valuable genera, they are dried and made into soup.

The genus *Lemanea* is comprised of fresh water red algae which occur shallow rivers or streams and canal of cold environment. Algae *Lemanea manipurensis* is eaten as food by meiti community of Manipur state of India. *Spirogyra* is also used as food by meiti community. *Parasiola crispa* is used as a food by mohpa community of Arunachal Pradesh state of India. It is well known that algae content the proteins needed for life. Because of their value as a possible food source algae in particular have been well studied.

Conclusion

The search for sources of food is as old as man. Algae are rich source of protein, lipid, carbohydrates, vitamins, minerals, antioxidants and fiber. Problem of malnutrition can be solved by cultivation of edible algae. Use of edible algae is significant to combat hunger and malnutrition and helps to achieve sustainable development.

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