International Journal of All Research Education and Scientific Methods (IJARESM), ISSN: 2455-6211
Volume 10, Issue 8, August-2022, Impact Factor: 7.429, Available online at: www.ijaresm.com

Basic Studies on Cyanobacteria and Micro algae: A Review

Dr. Radhika Ikkurti [1], Arathi Choppakatla[2]

[1,2]Department Of Basic Sciences, G.Narayanamma Institute Of Technology & Science(Autonomous), Shaikpet, Hyderabad

----------**********----------

ABSTRACT

Cyanobacterial lipids and profiling have become a tremendous demand due to its applicability for production of biofuels. They also acts as maker for identification of isolates. Cyanobacteria possess different photosynthetic pigments like chl-a, phycobili proteins and carotenoids which have substantial commercial applications. Phycobili proteins are the major photosynthetic adjunct pigments of cyanobacteria.

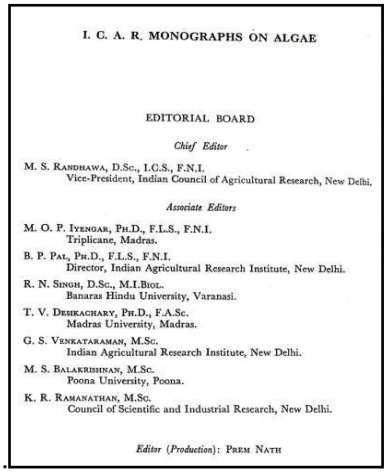
Keywords: phycobilli, cyanobacteria, algae

I. INTRODUCTION

Chlorophyll –a is a pigment commonly found in cyanobacteria that participates directly in the light requiring reactions of photosynthesis. Chlorophyll-a has one of the functional groups bonded to the porphyrin (CH_3 group). Chlorophyll a is a large molecule that has a "head" called a porphyrin ring with a magnesium atom at its center. Chl-a is generally used as an index of phytoplankton biomass (Falkowski *et al*., 1998). The phycobiliproteins have been classified into several groups viz. phycoerythrin, phycocyanin and allophycocyanin. Phycocyanin and allophycocyanin are universally present in cyanobacteria, while allophycocyanin B apparently occurs in most cyanobacteria (Glazer & Bryant, 1975; Ley *et al*., 1977). Many reports are available on the importance of carotenoids related to prevention of health disorders (Henneckens, 1997; Moeller *et al*., 2000). They are also being used as a natural colorant and for cosmetic properties (Vonshak, 1986). Its Collection , Isolation and Identification of Cyanobacteria has been well explained in a paper by Dr. Yadvinder Singh and Gurdarshan Singh . Simple plants which lack root, stems and leaves; mainly aquatic Thallophytes having Chl a as primary photosynthetic pigment is considered as algae. Commonly called blue-green algae .It has been evolved about 3.5 billion years ago.

It Has Chl *a*, (some also have *b* or *d*), phycobili proteins, glycogen as storage products. Its Cell wall containing amino sugars and amino acids which involves in Oxygen evolving photosynthesis.

The identification of the taxa was done by observing the morphological features and comparing these features with the literature. Desikachary,1959 Komárek and Anagnostidis,1998, 2005


I. C. A. R. MONOGRAPHS ON ALGAE

EDITORIAL BOARD

Chief Editor

M. S. Randhawa, D.Sc., I.C.S., F.N.I.
Vice-President, Indian Council of Agricultural Research, New Delhi.

Associate Editors

M. O. P. Iyengar, Ph.D., F.L.S., F.N.I.
Triplicane, Madras.

B. P. Pal, Ph.D., F.L.S., F.N.I.
Director, Indian Agricultural Research Institute, New Delhi.

R. N. Singh, D.Sc., M.I.Biol.
Banaras Hindu University, Varanasi.

T. V. Desikachary, Ph.D., F.A.Sc.
Madras University, Madras.

G. S. Venkataraman, M.Sc.
Indian Agricultural Research Institute, New Delhi.

M. S. Balakrishnan, M.Sc.
Poona University, Poona.

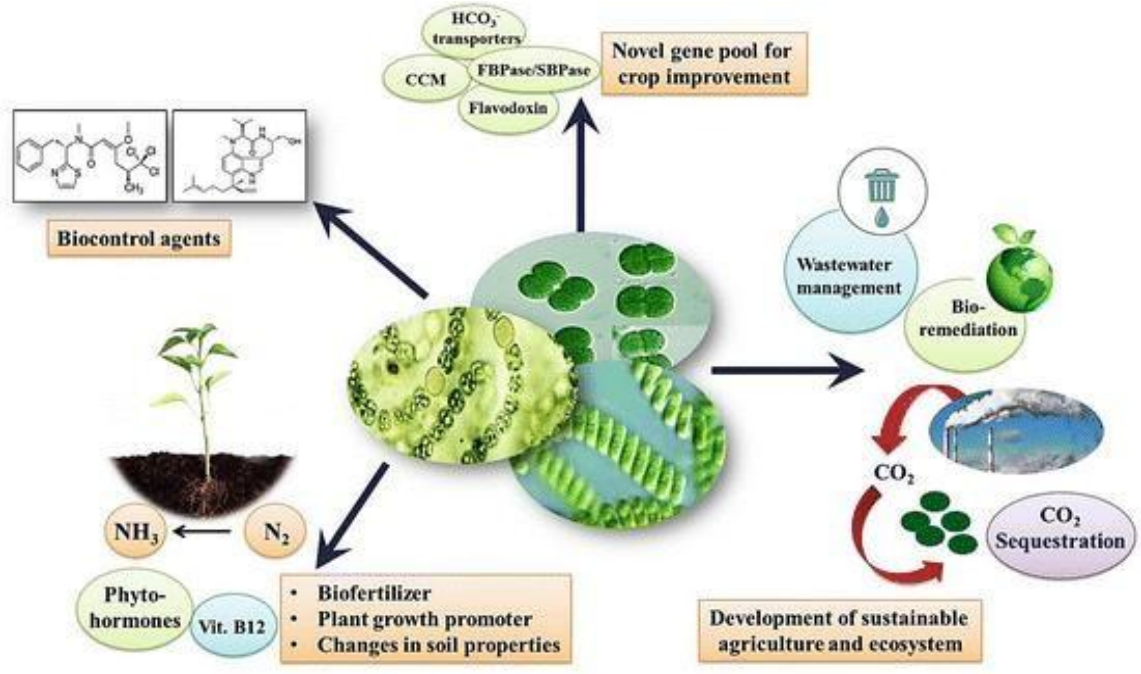
K. R. Ramanathan, M.Sc.
Council of Scientific and Industrial Research, New Delhi.

Editor (Production): Prem Nath

Features of Cyanobacteria: The Important features include filaments shape; cell dimensions; presence/absence of sheath, thickness; shape, size and position of akinetes/heterocyst, if present etc were observed under the microscope.

Importance and Industrial value of cyanobacteria:

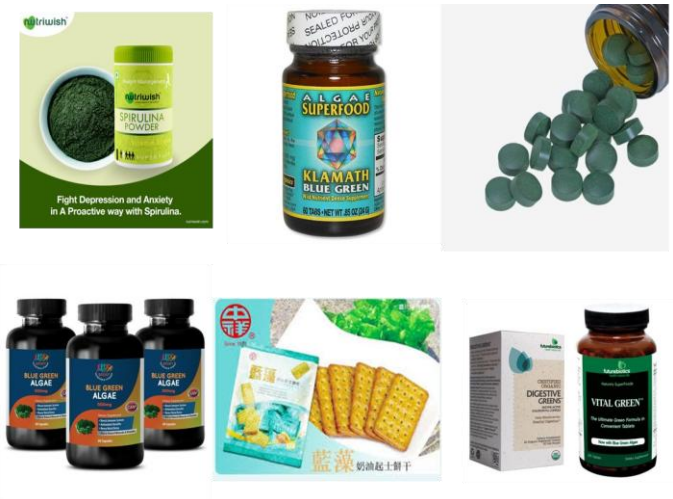
1. **Agriculture:** Biocontrol agents, Novel gene pool for crop improvement, Development of sustainable agriculture and ecosystem, Biofertilizer, Plant growth promoter.



2. **Food**: *Spirulina* has been eaten for centuries by *Kanembu* people, wholive along the shores of Lake Chad in northcentral Africa.It has the highest protein of any natural food (65%).It is of current world algal production, 30% is sold for animal feed applications and over 50% of *Spirulina* is used as feed supplement.

Spirulina is used as feed in the diet of sheep, horses, Canary, finch, parrot, love bird. It is used by ostrich and turkey breeders to increase fertility.

Species of *Nostoc, Anabaena and Calothrix* increase body weight of *Telapia* hybrid fish with excellent food conversion ratio.



3.**Pigments and Natural Colours:** Apart from chlorophyll, cyanobacteria produce two major groups of pigments (phycobiliproteins and carotenoids).From them, Phycocyanin and Phycoerythrin are commercially valuable.

Phycocyanin has been extracted and purified from *Spirulina sp., Synechococcus sp., Oscillatoria quadripunctulata, Aphanizomenon flosaquae, Anabaena sp.*Dainippon Ink & Chemicals (Sakura, Japan) has developed a product called "Lina blue" (PC extract from *Spirulina platensis),* which is used in chewing gum, candies, soft drinks, dairy products.

Use of Phycobilins in cosmetics (lipstick, eyeliners etc.) is also gaining momentum.

4. Medicinal Properties:

a) *Phycocyanin is able to scavenge alkoxyl, hydroxyl and peroxyl radicals in vitro.*

Phycocyanin has also been reported to reduce the levels of tumor necrosis factor (TNF-a) in blood serum of mice treated with endotoxin. Phycocyanin from *Aphanizomenon flos-aquae is reported as a strong* antioxidant. Carotenoids present in CB protect cells from damage by reactive oxygen molecules, hence, act as antioxidants. *Spirulina,* a rich source of b-carotene, has been used in aquaculture and poultry to improve colour of fishes and egg yolks respectively. Chlorophyll-a extracts from *Spirulina* having iron oxide and higher alcohols (cetyl and stearyl) is patented as strong deodorant.

b) *Cosmetics: A protein-rich extract from Spirulina platensis repairs signs of early skin aging, exerts a tightening effect and prevents stretch mark formation (Protulines, Exsymol S.A.M., Monaco).*

Spirulina Firming Algae Mask by ODA (Optimum Derma Aciditate) improves moisture balance of skin.

Spirulina Whitening Facial Mask by Ferenes Cosmetics contains proteins from *Spirulina* and herbal extracts, which improve skin complexion, and reduce wrinkles without anyallergic effect.

Spirulina Facial Scrub by Ferenes Cosmetics contain quality ingredients from *Spirulina* and other herbs that remove dead skin cells and act as a cleanser to energize the face.

5. Antibiotics & Drugs: *BGA like Anabaena, Nostoc and Oscillatoria produce a great variety of secondary metabolites. Nostoc species were used to treat gout, fistula and several forms of cancer.Noscomin, a diterpenoid from N. commune, showed antibacterial activity against Bacillus cereus, Staphylococcus epidermidis, and Escherichia coli. Natural products of Nostoc sp. are effective against Cryptococcus sp. as a causal agent of secondary fungal infections in patients with AIDS.Fibre extracted from N. commune, possesses hypocholesterolemic effect in rats.Lyngbya majuscula, a marine CB, produces a wide variety of polyketides, lipopeptides, cyclic peptides and many others.*

Fischerella ambigua and Haplosiphon hybernicus produce Ambiguines, which show anti-fungal activity on *Aspergillus oryzae* and *Candida albicans.*

An anti-cancer factor has been identified in *Scytonema sp.,Phormidium tenue and Anabaena variabilis.*

6. Enzymes: *Microcystis aeruginosa possesses a large capacity to mineralize organic per unit of biomass due to alkaline phosphatase activity. A number of studies report detection of enzymes (phosphatase, arylsulfatase, chitinase, L-asparaginase, L-glutaminase, amylase, protease, lipase, cellulase, urease and lactamase) produced by CB. An anti-fertility enzyme, elastase,has been purified from Oscillatoria sp..*

Biofuels Some unicellular non-diazotrophic CB Gloeocapsa alpicola (shows increased H2 production under sulphur starvation), Spirulina platensis (can produce 1 mmole H2/12 h/mg cell dry wt in complete anaerobic and dark condition), diazotrophic CB Anabaena variabilis etc are reported for H2 production.

Bioremediation:Phormidium ambiguum and Chroococcus minutus have the efficiency to remove lignin from the waste waters of the paper mills (S. G. Bharati 1992).

Phormidium valderianum BDU 30501 is able to remove and degrade phenol (S Shashirekha et. Al. 1997).

Fifteen strains of cyanobacteria including *Anabaena* sp. PCC7120, *Nostoc ellipsosporum* are known to degrade lindane (T. Kuritz 1999).

Coir waste containing cellulose and lignin content can be degraded by three marine cyanobacterial strains namely *Phormidium* sp., *Oscillatoria* sp. and *Anabaena azollae* sp. having different rate of degradation (Anbuselvi, S and Jeyanthi Rebecca 2009).

Negative Value:

The contaminate water supplies by producing colour, odour and giving a fishy taste to the drinking water. Growth can be checked by addition of very small quantities of copper sulphate and dichlorophen to the water.Chacko(1970) reported that thick blooms caused by *Microcystis*, *Nostoc*, *Anabaena*, *Oscillatoria* and some other BGA bring about depletion of oxygen resulting in large scale death of fish and other aquatic animals.

Preparation methods:

There are many methods of molecular extraction for cultured algae and they include, DNA extraction, purification and gel loading Cells are usually cultured in liquid medium and then collected by centrifugation .This process is called as Lyophilization. After this purification of amplified products takes place and we get Cyanobacteria, Eukaryotic algae with their base pair.

Further sequence the product accordingly to set reaction for PCR amplified product for forward and reverse primer. Thereafter isolate intact total RNA with minimal contamination from DNA, proteins and lipids (ultimate goal to study the level of gene expression) which also involves RNA gel electrophoresis.

CONCLUSIONS

There are many standardization techniques for Eco friendly cultivation at low cost cultivation, processing of pharmacologically active traditional and aromatic plants which we will be discussing in our next paper.

Acknowledgements: Authors sincerely thank G. Narayanamma Institute of Technology & science for their encouragement, and Co-operation for publishing this paper.

REFERENCES

[1] Physico- chemical characterization of cyanobacteria & microalgaeby M. Indira, Anjani Ch., Md. Nazneen Bobby & O.N. Tiwari.

[2] Collection, Isolation and Identification of Cyanobacteriafrom Varied Habitats for Industrial Value Addition by Dr. Yadvinder Singh and Gurdarshan Singh.