



ISSN : 0973-7057

Int. Database Index: 663 www.mjl.clarivate.com

Impact of phosphate concentration on toxin production by *Microcystis aeruginosa*

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Received : 18th January 2020 ; Revised : 28th February 2020

Abstract : Phosphate is an essential nutrient of cyanobacteria. In *M. aeruginosa* phosphate concentration in medium, effect toxin production. Higher concentration of phosphate in medium causes high production of toxin. Maximum toxin production was observed in 5mg/l of concentration of phosphate in 12 day old culture. Higher concentration above the 5mg/l reduces toxin production.

Key words: toxin, phosphate, *M. aeruginosa*

INTRODUCTION

Toxins produced by cyanobacteria are called cyanotoxins. Growing interest in the toxicological aspects of cyanobacteria and the advancement in several analytical and biochemical methods prompted the isolation and characterization of a number of toxic substances.^{1,2} Cyanotoxins fall into three broad groups of chemical structure: cyclic peptides, alkaloids and lipopolysaccharides (LPS). An overview of the specific toxic substances within these broad groups has been identified to date from different genera of cyanobacteria.

Globally the most frequently found cyanobacterial toxins in blooms from fresh and brackish waters are the cyclic peptide toxins of the microcystin and nodularin family. They pose a major challenge for the production of safe drinking water from surface waters containing cyanobacteria with these toxins. In mouse bioassays, which

traditionally have been used to screen toxicity of field and laboratory samples, cyanobacterial hepatotoxins (liver toxins) cause death by liver haemorrhage within a few hours of the acute doses. Microcystins have been characterised from planktonic *Anabaena*, *Microcystis*, *Oscillatoria* (*Planktothrix*), *Nostoc*, and *Anabaenopsis* species, and from terrestrial *Hapalosiphon* genera. Nodularin has been characterized only from *Nodularia spumigena*.

MATERIAL & METHOD

A local strain of *Microcystis aeruginosa* collected from local area of Saharsa district was cultured in BG11 medium. Axenic culture was prepared. 12 old cultures were further cultured in the same supplemented with different concentration of di-potassium hydrogen phosphate. The phosphate concentration was 0.5mg/l, 2.5mg/l, 5mg/l and 7.5mg/l. From each concentration colonies were isolated, cells were lypholysed and toxin was isolated. Isolated toxin was measured.

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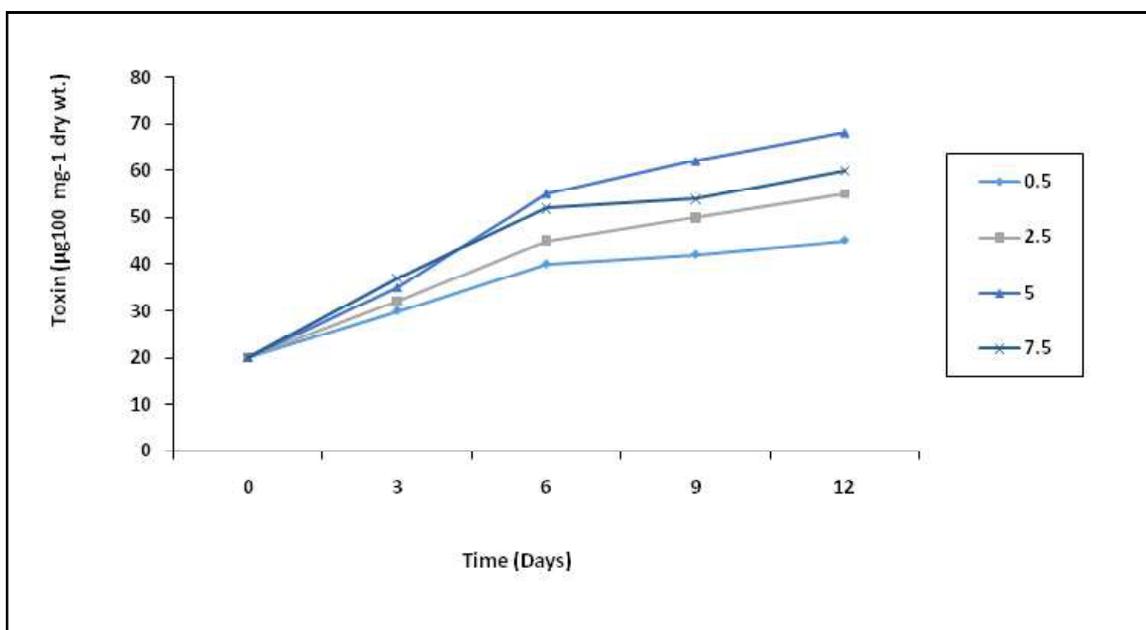
RESULT

Phosphate is an important nutrient for the cyanobacteria. The effect of phosphate (KH_2PO_4) on the toxin production was tested. With increase in phosphate concentration, the toxin production linearly increased at low concentration. Highest toxin production was observed in the cultures grown with 5 mg/L phosphate. The lowest production was seen in the cultures grown with 0.5 mg/L phosphate. The maximum toxin production was observed in the 12 day grown cultures.

CONCLUSION

Microcystis aeruginosa produces cyanotoxin which is a cyclic peptide known as Microcystin. Production of toxin by *Microcystis aeruginosa* increases with increase in phosphate concentration. Maximum toxin production was observed in 5mg/l concentration of phosphate in 12 day old culture. Further increase in phosphate concentration reversely affected toxin production.

Graph 1. Effect of different concentration of Phosphate on Toxin production by *M. aeruginosa*.



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