Biological control of toxic cyanobacteria

UNIVERSITEIT STELLENBOSCH UNIVERSITY

Luyanda Ndlela, Paul Oberholster and Johannes Van Wyk
CSIR Natural Resources and the Environment, 11 Jan Celliers Road, Stellenbosch 7599
E-mail: LNdlela@csir.co.za - www.csir.co.za

Introduction

With the effects of climate change, harmful algal blooms (HABs) have become a global concern, with serious implications in water scarce countries such as South Africa.

There is a specific lack of information in the African continent regarding harmful algal blooms and their impacts in **over 30 countries**.
Biological control is a method of introducing natural enemies to control an organism and has been more successful using microorganisms

Bacterial isolates have been previously indicated in the control of cyanobacteria and although predatory, limited studies have been done on the eco-toxicity resulting from biocontrol as well as the changes to cyanotoxins, if any.

Research Plan

The study will be conducted at whole cell level and with specific metabolites and toxins, with eco-toxicity studied at three trophic levels.

Selected predatory bacterial isolates (*Bacillus*)

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Competition assays against toxic cyanobacteria (Can *Bacillus* outcompete an established bloom?)

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Resulting impacts on cyanotoxins (Toxin conformation changes, ELISA detection)

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Ecotoxicity studies: is toxicity reduced? (Testing on daphnids, fish and human cell lines)

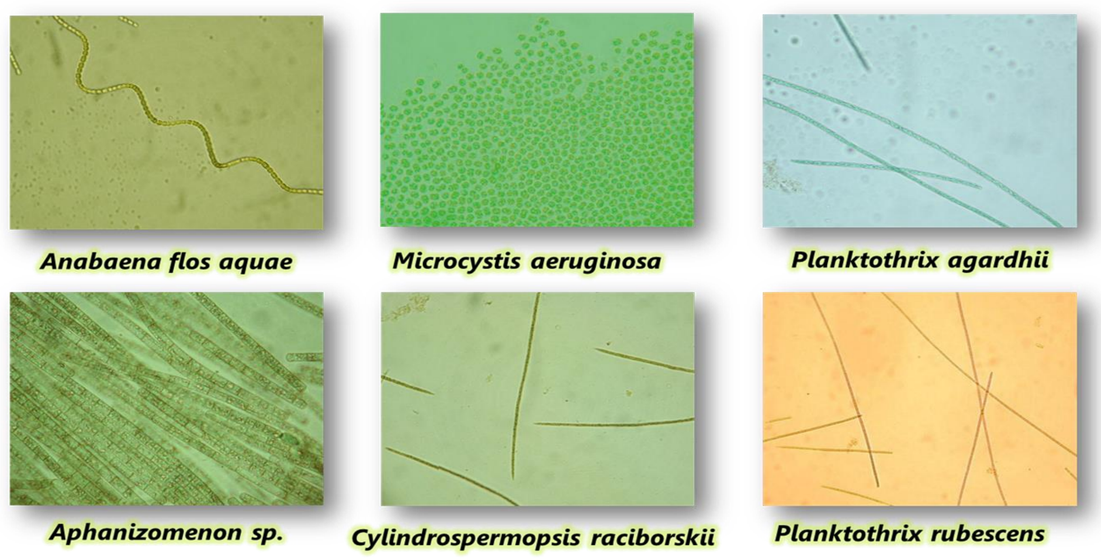
ECOTOXICITY

Examples of cyanobacteria blooms

Bacillus as a biocontrol agent

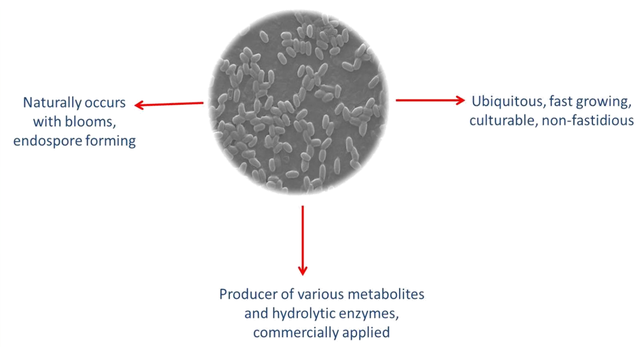
Microorganisms have proven to be effective biocontrol agents as opposed to more complex or higher order organisms, due to their less complex structure. Bacillus species are among the commonly used microorganisms for industrial and bioremediation purposes.

Examples of common cyanobacteria species



Potential Outcomes and applications

- If successful, the biocontrol agent may produce conformational changes to the cyanobacterial toxins or reduced eco-toxicity effects



- The laboratory study may give insight into the factors inhibiting the natural balance of predatory bacteria and cyanobacteria under bloom conditions
- The mode of action in terms of cyanobacterial inhibition will be better understood
- There is potential for upscaling the treatment process if effective
- PhD

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