Pseudomonas fluorescens BG-E, a Potential Biological Control Agent for Bloom-forming Cyanobacterial genus, *Pseudanabaena*

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Outbreaks of toxin-producing cynobacterial blooms in freshwater reservoirs in Sri Lanka have increased over the past few decades and are likely to be responsible for fish death reported in many reserviores. Various physical and chemical methods are in practice to eliminate cyanobacterial blooms. However, due to some limitaions adhered with those practices, currently researchers have focused on the applicability of algicidal bacteria as an environmental friendly sustainable control strategy. The present study aimed to investigate cyanolytic and microcystin-LR (MC-LR), degrading potential of heterotrophic bacteria isolated from freshwaters. Sub-surface water samples were collected from Bandagiriya reservoir in Hambantota district. Bacteria were isolated from a composite water sample collected from 22 sampling sites representing the entire reservoir in 50% nutrient agar. Axenic cultures of colonial (*Microcystis sp., Synechoccus sp.*) and filamentous (*Pseudanabaena sp., Pseudanabaena lonchoids, Leptolyngbya, and Geitlerinema sp.*) cyanobacterial genera were used as tested cyanobacteria. Seven morphologically distinct bacterial isolates were screened for the lytic activity against cyanobacteria in BG11 broth. Briefly, cyanobacterial cultures at ~ 2×10^6 cells/mL were inoculated with 10% v/v each bacterial isoates at ~ 1×10^8 cells/mL. Following 10 days of incubation, distinct discoloration of blue-green into yellowish-brown color in the cell mass of two species of *Pseudanabaena* was observed in cultures inoculated with BG-E bacterial isolate. Microscopic images provided evidence for complete disintegration of filamentous structures. Disappearance of blue-green color might be due to the oxidation of released photosynthetic pigments during cell wall disintegration. The % lytic activity of BG-E against *Pseudanabaena sp*. and *Pseudanabaena lonchoids* based on the chlorophyll-a analysis were 82% and 73% respectively. Bacterial isolate BG-E was identified as *Pseudomonas fluorescens* by sequencing of its 16S rRNA gene. Since *Pseudanabaena* is a MC-LR producing and frequently found filamentous form in freshwater reservoirs of Sri Lanka, MC-LR biodegradation potential of BG-E was investigated. Results showed that BG-E is not capable of degrading MC-LR at tested concentrations. Further, none of the genes in the microcystin-degrading gene cluster, mlrABCD were amplified in polymerase chain reaction and might be the reason for the incapability in degrading MC-LR. However, strong cyanolytic activity highlights potential application of *P. fluorescens* BG-E in future biological control strategies in Sri Lanka.

Keywords: Cell lysis; Cyanobacteria; Cyanotoxin; *Pseudanabaena*; *Pseudomonas fluorescens*

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