

Monitoring of harmful cyanobacteria in Taiwan's drinking water reservoirs using real time PCR

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Abstract:

Harmful cyanobacteria may pose impact on drinking water quality, as they may produce cyanotoxins and odorants. Microcystins, cylindrospermopsin, saxitoxin, 2-methylisoborneol (2-MIB) and geosmin are the commonly detected cyanobacterial toxins and odorants in drinking water sources in many countries. Therefore, development of a rapid and reliable method to provide information for water utilities about the potential risks of those toxins and odorants in the source waters is needed.

In this study, a real time PCR method was developed to rapidly detect toxin- and odor-producing cyanobacteria in freshwater bodies. Primer/probe sets were developed and tested to quantify the synthetase genes for the five toxins and odorants, including microcystins, cylindrospermopsin, saxitoxin, 2-methylisoborneol (2-MIB) and geosmin. The method was then applied in the monitoring of the five targeted genes in 38 reservoirs in Taiwan. The detected gene abundances in the reservoirs were compared with the results of their corresponding toxins and odorants, as well as cyanobacteria in some cases. The results show that the data obtained with PCR method correlate well with those obtained from chemical analysis. The developed PCR approach may provide timely information for water utility to justify the risk associated with cyanotoxins and odorants in the source water.