

The application of Phytoxigene™ CyanoDTec Test as a cyanobacteria screening tool for prediction, monitoring and management of harmful algal blooms in public water supplies

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Abstract

Over the last decade the genetic basis for biotoxin production in cyanobacteria has been identified and characterised. The discovery of these toxin biosynthetic pathways were proposed to enable the rapid development and subsequent implementation of genetic screening methods for identifying toxin-producing cyanobacteria in public water systems. The uptake of this application, however, has been limited, but along with the development of a standardised commercial assay and a number of significant harmful algal events, utilisation and integration into water testing programs has now begun.

In August 2014 Toledo City issued a “Do Not Drink” advisory to its citizens. The microcystin that caused this advisory was produced by a large cyanobacterial bloom on Lake Erie. In 2015 Lake Erie once again bloomed in what is now believed to have been the largest bloom ever recorded. This was followed by a 1,000 km bloom over the full length of the Ohio River. These events caused significant debate and resulted in an overhaul of the water testing guidelines by the Ohio EPA. During this process the agency evaluated and proposed a molecular test to supplement their traditional taxonomic screening and cell counting.

On June 1, 2016 the new rules for water testing were initiated and for the first time a state authority has adopted a genetic approach to screening for toxin-producing cyanobacteria. The Ohio EPA has chosen to use the Phytoxigene CyanoDTec assay, a multiplex quantitative PCR that simultaneously detects, discriminates and quantitates the genes for total cyanobacteria, and the production of microcystin and nodularin (*mcy/nda*), cylindrospermopsin (*cyr*) and saxitoxin (*sxt*).

The presentation will look at the background and process in which this decision was made and how it is being utilised within their guidelines.

Key words: cyanobacteria, biotoxin pathway, cyanodtec, Phytoxigene, microcystin, saxitoxin, screening