A loop-mediated isothermal amplification method (LAMP) for detecting toxic *Microcystis*

Oral

Cyanobacteria & Freshwater HABs

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One of the major concerns about cyanobacterial blooms is that some of them are capable of producing metabolites that are toxic to animals and humans (cyanotoxins). Thus, their presence in water affects human uses, from direct consumption, irrigation, aquaculture, to recreational uses. In Uruguay, the cyanobacteria most frequently associated with these events are species of the genus *Microcystis*, which includes toxic (carrying the *mcyA-J* cluster) and non-toxic populations. Since microscopy-based methods are not able to distinguish between them and analytic methods are time-consuming, the development of early detection techniques to generate early warnings and avoid health risk is straightforward. In this work, we developed a method for monitoring toxic *Microcystis* quickly, at low cost and without specific or expensive equipment to read the results. A loop-mediated isothermal amplification protocol (LAMP) was designed using the *mcyJ* gene, which has been described not to suffer recombination and is present in single copy in toxic populations, as a target. The detection of *mcyJ* gene was achieved for natural samples by LAMP reaction and was confirmed by real-time quantitative PCR. The limit of detection showed that it was able to detect 28 pg/μL of DNA (corresponding to 3.65×10^4 toxic cells of *Microcystis*)

in 19 min with 100% sensitivity. By extending the incubation time to 40 min, ca. 5000 toxic *Microcystis* cells could be detected but with lower sensitivity (< 80%). This method constitutes a promising tool for early warning that could be used to make monitoring and water management decisions.