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Evaluating *mcy*A gene expression in two toxic cyanobacterial species under different light intensities using RT-qPCR

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Cyanobacteria are phytoplanktonic organisms widely occurring in freshwaters, being frequently associated with the production of toxins, namely microcystins. Microcystins are produced non-ribosomally, by a multienzyme complex (*mcy* genes). It is believed that environmental factors such light intensity can influence toxin production.

The aim of this study was assess the influence of light intensity, in the transcription of the *mcyA* gene and corresponding production of microcystins in *Microcystis aeruginosa* and *Planktothrix agardhii*. For that purpose, cultures were exposed to three different light intensities (4, 20 and 30 µmol photons m^{-2} s^{-1}) for 18 days at 20 ± 1ºC. The growth was followed daily using absorbance readings. At each growth stage samples were collected for cell counting, microcystins quantification by ELISA and RNA extraction. The level of transcripts was quantified by Real-Time RT-qPCR and the relative expression determined using three reference genes, 16S rRNA, *gltA* and *rpoc1*.

The results showed that the best reference gene was *gltA*, since it remained more stable, independently of the light intensity and exposure time. There were differences in the expression of *mcyA* between the two species. In *M.aeruginosa*, the highest levels of expression occurred at 20 whereas for *P.agardhii* was at 30 µmol photons m^{-2} s^{-1}. It was also observed differences in the *mcyA* expression with the growth stage and light intensity. Furthermore differences between the *mcyA* expression and the toxin content were different among species.

Our results indicate that the light intensity influences microcystin production and *mcy*A expression levels, although differently in *M.aeruginosa* and *P.agardhii*.