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## RESEARCH REPORTS

Sustainable Aquaculture for a Secure Future

**Title:** Effects of *Microcystis aeruginosa* on life history of water flea *Daphnia magna*

**Author(s):** LIU Liping<sup>1\*\*</sup>, LI Kang<sup>1</sup>, CHEN Taoying<sup>1</sup>, DAI Xilin<sup>1</sup>, JIANG Min<sup>1</sup>, and James S. DIANA<sup>2</sup>

<sup>1</sup> Key Laboratory of Exploration and Utilization of Aquatic Genetic Resources of the Shanghai Ocean University and Ministry of Education, Shanghai Ocean University, Shanghai 201306, China

<sup>2</sup> School of Natural Resources and Environment, University of Michigan, Ann Arbor, MI, USA

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**Abstract:** Cyanobacterial blooms in eutrophic freshwater systems are a worldwide problem, creating adverse effects for many aquatic organisms by producing toxic microcystins and deteriorating water quality. In this study, microcystins (MCs) in *Microcystis aeruginosa*, and *Daphnia magna* exposed to *M. aeruginosa*, were analyzed by HPLC-MS, and the effects of *M. aeruginosa* on *D. magna* were investigated. When *D. magna* was exposed to *M. aeruginosa* for more than 2 h, Microcystin-LR (MC-LR) was detected. When exposed to  $1.5 \times 10^6$ ,  $3 \times 10^6$ ,  $0.75 \times 10^7$ , and  $1.5 \times 10^7$  cell/mL of *M. aeruginosa* for 96 h, average survival of *D. magna* for treatments were 23.33%, 33.33%, 13.33%, 16.67%, respectively, which were significantly lower than the average 100% survival in the control group ( $P < 0.05$ ). The adverse effects of *M. aeruginosa* on body length, time for the first brood, brood numbers, gross fecundity, lifespan, and population growth of *D. magna* were density-dependent. These results suggest that the occurrence of *M. aeruginosa* blooms could strongly inhibit the population growth of *D. magna* through depression of survival, individual growth and gross fecundity. In the most serious situations, *M. aeruginosa* blooms could undermine the food web by eliminating filter-feeding zooplankton, which would destroy the ecological balance of aquaculture water bodies.

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