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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*

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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 1.5×10^6 , 3×10^6 , 0.75×10^7 , and 1.5×10^7 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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