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Sensitivity of Microcystis aeruginosa strains to copper and influence of phosphorus.

WEST M. BISHOP, BEN E. WILLIS, AND ROBERT J. RICHARDSON

P79

Cyanobacterial blooms are widespread and increasingly affecting freshwater resources. Phosphorus (P) enrichment is often described as promoting blooms and may influence growth rates and response to management. The impact of P in growth media and cellular P content were assessed in terms of susceptibility of *Microcystis aeruginosa* (Kutzing) Lemmerman to copper sulfate. Five strains of *M. aeruginosa* were tested under three different P concentrations (1,500 ug L^{-1} = high; 150 ug L^{-1} = medium; 75 ug L^{-1} = low). All *M. aeruginosa* strains grown at low P concentration, compared with medium or high concentrations, had significantly decreased ($P < 0.05$) P and chlorophyll a content per cell, though strain 2664 still had significantly higher P content than the other strains. *Microcystis aeruginosa* strains grown in high and medium P concentrations had similar 96-h 50% lethal concentration (LC_{50}) on the basis of chlorophyll a content and cell densities. In the low-P growth concentration, *M. aeruginosa* strain 2386 had significantly decreased 96-h LC_{50} than all other *M. aeruginosa* strains, and *M. aeruginosa* 2665 had a significantly higher 96-h LC_{50} compared with *M. aeruginosa* strains 2386, 2388, and 2664. The relative sensitivities of strains grown in low-P medium to copper were *M. aeruginosa* 2386 > 2388 ≥ 2664 ≥ 2061 ≥ 2665. All strains had significantly decreased growth rates under low P compared with high P, but only *M. aeruginosa* 2386 had increased sensitivity to copper. This research provides insights about altered sensitivity of cyanobacteria to reduced P supplies. Decreasing P availability can decrease the amount and need for reactive copper algaecides by altering growth rates and carrying capacity of *M. aeruginosa* strains and, in specific cases, increase the sensitivity of cyanobacteria to copper.