CADMIUM, COPPER, NICKEL, AND ZINC TOXICITY AND BIOAVAILABILITY TO *AUREOCOCCUS ANOPHAGEFFERENS*

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The "brown tide" caused by *Aureococcus anophagefferens* was first documented in Long Island, NY in 1985. A survey from 1997-2001 confirmed the bloom occurrence at Barnegat Bay-Little Egg Harbor system and Great Bay, NJ. Because estuaries and harbors are often repositories for contamination, including heavy metals, understanding their uptake and accumulation is an important step in studying algal bloom formation and stability. However, except for iron, heavy metal impacts on *A. anophagefferens* have not been well studied. In this research, toxicity and bioavailability of cadmium, copper, nickel, and zinc to *A. anophagefferens* were determined through long-term and short-term experiments, respectively. In long-term studies, *A. anophagefferens* growth kinetics in three acclimations were investigated with Cd, Cu, Ni, and Zn concentrations ranging from 10^{-13} to 10^{-7} M in Aquil medium. As compared to the control with no Cd addition, free cadmium concentrations greater than $10^{-10.33}$ M inhibited *A. anophagefferens* growth, and approximately 70% of cells were inhibited at the greatest concentration evaluated for $[Cd^{2+}]$ of $10^{-8.33}$ M. For copper, *A. anophagefferens* did not grow at 10^{-9} M, and while 77% of growth was inhibited at 10^{-10} M, no significant inhibition was observed at concentrations less than or equal to 10^{-11} M. Interestingly, all Ni additions ($\leq 10^{-8.22}$ M) promoted *A. anophagefferens* growth compared with no Ni addition. For $[Zn^{2+}]$ of $10^{-6.82}$ M, the growth rate of *A. anophagefferens* increased 50% as compared to the control of $10^{-10.70}$ M, while from $10^{-11.82}$ M to $10^{-7.82}$ M, the growth rate varied ± 10% of that of the control (with a maximum growth rate error of ~ ± 10%). In short-term studies, intracellular and subcellular metal concentrations are currently being evaluated with radioisotopes ^{109}Cd, ^{63}Ni, and ^{65}Zn. Overall, this research contributes to addressing the bioavailability and impact of metal speciation on *A. anophagefferens*.