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Effect of iron and magnesium availability on bacterial growth and inactivation by chlorine

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Cases of coliform growth have been reported in drinking water distribution systems. Iron and magnesium as important inorganic nutrients are known to affect bacterial growth and survival under oligotrophic conditions. Corrosion of pipes can lead to elevated levels of iron in the system while magnesium is present in fairly high concentrations in ground waters. *E. coli* were grown in 1:100 nutrient broth solution and examined for the effect of varying iron and magnesium concentrations on bacterial growth and response to chlorine disinfection in the oligotrophic environments of drinking water distribution systems. Growth rates of *E. coli* increased with increase in concentration of inorganic nutrients such as Fe³⁺ and Mg²⁺. However, no growth of *E. coli* was observed in the presence of Fe³⁺ at a concentration of 0.05 mM. Growth and inactivation rates were negatively correlated for both inorganic nutrients tested, i.e., Fe³⁺ and Mg²⁺ implying that bacteria grown in the presence of inorganic nutrients are more resistant to chlorine disinfection and can survive in oligotrophic environments like drinking water distribution systems. Natural die-off rates also correlated negatively but strongly with growth rates ($R^2 > 0.9$) implying that higher growth rates resulted in lower natural die-off rates. Correlation co-efficient values for growth and inactivation rate of *E. coli* in presence of Fe³⁺ ion and Mg²⁺ ion were found as $r > 0.9$ and $r > 0.7$ respectively.

Biography

Bandana Mahto is pursuing her PhD from Indian Institute of Technology, Kharagpur. She is currently working as Assistant Professor in the Department of Civil Engineering, B.I.T. Mesra, India.

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