

Can algal toxin production be predicted? A study of the toxic cyanobacterium *Cylindrospermopsis raciborskii*

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Abstract

The ability to predict algal toxin concentrations in water supplies is an ongoing challenge for water managers. The freshwater cyanobacterium, *Cylindrospermopsis raciborskii* produces the toxins, cylindrospermopsins with a range of cyto- and hepatotoxic effects. However, *C. raciborskii* cell densities within water supplies are often not well correlated with toxin concentrations. Our research has shown that the mismatch is not the result of differences in growth phase between and within blooms, and associated toxin production, but rather that there are multiple strains within reservoirs, each producing a specific quota of cylindrospermopsins. Indeed, it appears that within reservoirs there is substantial genetic diversity within the species, translating into a range of physiological differences, including cylindrospermopsins production. Our field-based research has also shown that more toxic strains increased in dominance with higher phosphorus loading, although the causal mechanism is not understood. This research has resulted in substantial gains in our understanding of the mechanism behind the cell density/toxin level mismatch. Further research is needed to understand how different environmental conditions promote more toxic strains. This will ultimately improve our ability to predict and manage algal toxin concentrations in water supplies.