

Effects of light and temperature on the growth and 2-methylisoborneol production by benthic and planktonic cyanobacterial species

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Abstract

2-methylisoborneol (2-MIB) and geosmin are the two most widely studied taste and odor (T&O) compounds. Although non-harmful to human health, the presence of 2-MIB and geosmin in drinking water can greatly affect the water quality. Cyanobacteria, as one of the major source of these T&O compounds, are influenced by light intensity and temperature. In this study, two locally isolated 2-MIB producing cyanobacteria, *Hapalosiphon sp.* MRB220 (a benthic isolate) and *Planktothricoides sp.* (a planktonic isolate) were subjected to two different microcosm studies which aimed to investigate the effects of light intensity (10, 25, 50 and 100 $\mu\text{mol photons m}^{-2}\text{s}^{-1}$) and temperature (25, 28, 33 and 38°C) on their growth and 2-MIB production. Of the different light and temperature treatments, the highest growth rate for *Hapalosiphon sp.* MRB220 was at 50 $\mu\text{mol photons m}^{-2}\text{s}^{-1}$ and 28°C, while the optimal growth for *Planktothricoides sp.* was at the highest light level and 33°C. Further increase in temperature to 38°C inhibited the growth of both species. However, the highest 2-MIB yield (average compound per cell or biovolume) by *Hapalosiphon sp.* MRB220 and *Planktothricoides sp.* was recorded at the lowest light treatment (4×10^{-3} pg cell⁻¹ and 3.9 $\mu\text{g mm}^{-3}$, respectively). An inverse relationship between the growth rate and 2-MIB yield was observed in *Planktothricoides sp.* For both the light and temperature experiments. The present study indicates that the effects of light and temperature are more significant on 2-MIB production by planktonic species ($p < 0.05$) as compared to benthic species.

Keywords: 2-methylisoborneol, geosmin, cyanobacteria, light, temperature

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