Production of polyhydroxybutyric acids and carbohydrates in a mixed cyanobacterial culture: Effect of nutrients limitation and photoperiods

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ABSTRACT

In the present study, different photoperiods and nutritional conditions were applied to a mixed wastewaterborne cyanobacterial culture in order to enhance the intracellular accumulation of polyhydroxybutyric acids (PHBs) and carbohydrates. Two different experimental set-ups were used. In the first, the culture was permanently exposed to illumination, while in the second it was submitted to light/dark alternation (12h cycles). In both cases, two different nutritional regimes were also evaluated, N-limitation and P-limitation. Results showed that the highest PHB concentration (104 mg L⁻¹) was achieved under P-limited conditions and permanent illumination, whereas the highest carbohydrate concentration (838 mg L⁻¹) was obtained under N limited condition and light/dark alternation. With regard to bioplastics and biofuel generation, this study demonstrates that the accumulation of PHBs (bioplastics) and carbohydrates (potential biofuel substrate) is favored in wastewaterborne cyanobacteria under conditions where nutrients are limited.