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

Dulce María Arias, Enrica Uggetti*, María Jesús García-Galán, Joan García

GEMMA – Environmental Engineering and Microbiology Research Group, Department of Civil and Environmental Engineering, Universitat Politècnica de Catalunya-BarcelonaTech, c/Jordi Girona 1-3, Building D1, E-08034, Barcelona, Spain

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ABSTRACT

In the present study, different photoperiods and nutritional conditions were applied to a mixed wastewater-borne cyanobacterial culture in order to enhance the intracellular accumulation of polyhydroxybutyrates (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 (12 h 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 wastewater-borne cyanobacteria under conditions where nutrients are limited.