



Influence of cyanobacterial morphology on the efficiency of the coagulation and sedimentation technique for bloom control

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The combination of a low dose of coagulants and ballast in the 'Floc & Sink' (F&S) technique has been used to remove cyanobacteria from surface waters. However, different morphologies (unicellular, colonial, and filamentous) can affect F&S efficiency due to differences in surface-to-volume ratio and filament entanglement. This study aims to assess the influence of different cyanobacterial morphologies on the efficiency of F&S in removing surface biomass over 10 days. To this end, unicellular and colonial *Microcystis aeruginosa*, as well as filamentous *Planktothrix isothrix*, and *Dolichospermum planctonicum*, were tested in the laboratory in 20 cm glass tubes. The species were exposed to polyaluminium chloride (PAC) as a coagulant, and Phoslock® and a natural Red Soil as ballasts. Chlorophyll (Chl-a) and Photosystem II efficiency (PSII) were measured at the top and bottom of the test tubes, and pH was monitored over 10 days. The optimal PAC concentration varied within morphology, with the most effective concentration of 4 mg Al L⁻¹ for unicells, X mg Al L⁻¹ for colonies, and 8 mg Al L⁻¹ for filaments. The pH and PSII were reduced by the higher PAC concentrations (16 and 32 mg Al L⁻¹). The combination of PAC and low Phoslock® dose (50 mg L⁻¹) was sufficient to keep unicells and colonies at the bottom after 240 hours. In contrast, with filaments, a reduction in surface Chl-a was observed until 72 hours after dosing with red soil and Phoslock®; however, after that, high ballast concentrations were not effective at maintaining biomass at the bottom. In this context, morphology can influence F&S efficiency over time, requiring higher doses of coagulants and ballasts to sediment filamentous than unicellular or colonial. Hence, for each bloom, experiments will be needed to determine the optimal coagulant and ballast doses, as cyanobacterial morphologies affect the efficiency of the F&S technique.

Palavras-chave: *Lake restoration; eutrophication; cyanobacteria removal; morphology*