
Synergistic interactions between biogenic organic matter and microbial dynamics during simulated senescent cyanobacterial blooms in freshwater mesocosms

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Résumé

Freshwater ecosystems are periodically subjected to phytoplankton blooms, mainly due to cyanobacteria. This leads to the dominance of one or two phytoplankton species, combined to strong quantitative and qualitative changes of autochthonous organic matter (OM) inputs. These phytoplankton-derived OM pool sustain a large part of the heterotrophic microbial activities. In such context, we simulated the mineralization of biogenic OM during the senescent phase of two cyanobacterial blooms from *Microcystis aeruginosa* and *Aphanizomenon gracile*. A 30% enrichment in carbon content was thus performed in freshwater mesocosms by supplying the two inactivated strains. Dynamics of the microbial abundances (flow cytometry), bacterial diversity (metabarcoding targeting 16S rRNA) and functions (exo-enzymatic activities and Biolog ECOPLATES®) coupled with the chemical diversity of OM (fatty and amino acids, cDOM) was measured over 30 experimental days. The bacterial abundances and metabolic activities were rapidly stimulated, regardless of their free or attached mode of life. During this first phase, specialist and generalist OTUs competed for the labile OM resource. The OM supplies from the two strains and their mixture were of different qualities, yet no clear difference in the microbial responses was observed. Top-down control by viruses and the refractory nature of the OM after the microbial mineralization could then explain the decline of microbial abundances and activities. During this second phase, new generalist OTUs appeared, potentially able to use the remaining recalcitrant OM. Interestingly, depending on the cyanobacteria-derived OM, certain bacterial groups has emerged, such as Firmicutes in the presence of senescent OM from *Microcystis sp.*

*Intervenant

Mots-Clés: Microbial ecology, Cyanobacterial bloom, Organic Matter