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Two novel cyanobacterial bioluminescent whole-cell bioreporters based on superoxide dismutases MnSod and FeSod to detect superoxide anion

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This work describes the construction of two novel self-luminescent bioreporter strains of the cyanobacterium *Nostoc* sp. PCC 7120 by fusing the promoter region of the *sodA* and *sodB* genes (encoding the superoxide dismutases MnSod and FeSod, respectively) to *luxCDABE* from *Photorhabdus luminescens* aimed at detecting pollutants that generate reactive oxygen species (ROS), particularly O_2^-. Bioreporters were tested against methyl viologen (MV) as the inducer of superoxide anion (O_2^-). Both bioreporters were specific for O_2^- and Limits of detection (LODs) and Maximum Permissive Concentrations (MPCs) were calculated: *Nostoc* sp. PCC 7120 pBG2154 (*sodA*) had a range of detection from 400-1000 pM of MV and for *Nostoc* sp. PCC 7120 pBG2165 (*sodB*) the range of detection was from 500-1800 pM of MV after 5 h-exposure. To further validate the bioreporters, they were tested with the emerging pollutant Triclosan which induced bioluminescence in both strains. Furthermore, the bioreporters performance was tested in two real environmental samples with different water matrix complexity, spiked with MV. Both bioreporters were induced by O_2^- in these environmental samples. In the case of the river water sample, the amount of bioavailable MV as calculated from the bioreporters output was similar to that