Monitoring of Nutrient Bioavailability Using Recombinant Cyanobacterial Reporter Strains

Flaubert Mbeunkui¹, Pat Schreiter¹, Osnat Gillor², Catherine Richaud³, Shimshon Belkin², Anne-Lise Etienne³, Rolf D. Schmid¹, Till T. Bachmann¹*

¹ Institut für Technische Biochemie, Allmandring 31, D - 70569 Stuttgart
Tel. 0711-685-3197
² Division of Environmental Sciences, School of Applied Science, The Hebrew University, Jerusalem, Israel
³ Unité Mixte de Recherche 8543, CNRS, Ecole Normale Superieure, Paris, France

itbtba@po.uni-stuttgart.de  www.itb.uni-stuttgart.de
Registriernummer der Online-Anmeldung: 294

Poster

Massive growth of cyanobacteria, known as "algal blooms", have become a major concern for water monitoring. Besides their negative effect on turbidity, taste and smell, cyanobacteria are associated with severe toxin production. However, the reasons for formation of cyanobacterial blooms are still not completely understood. It has been observed that certain patterns of P, N, and Fe-availability promote their increased proliferation and toxin production.

In order to investigate bloom forming environmental conditions two cyanobacterial reporter strains under control of nutrient responsive genetic elements have been constructed. M1415 is a phosphorus responsive strain of Synechococcus PCC 7942. Its genomic DNA harbors the gene coding the reporter protein luciferase from Vibrio harveyi under control of the inducible alkaline phosphatase promoter from Synechococcus PCC 7942, and it can be induced under phosphorus limitation [1]. NblA_2000 is the nitrogen responsive strain of Synechocystis PCC 6803 harboring an insertion of luxAB::kmr within nblA1 in its chromosomal DNA, and can be induced under nitrogen limitation. M1415 and NblA_2000 are able to detect phosphorus and nitrogen bioavailability, respectively, in physiological and ecological relevant concentration range. To increase the practicality of the concept, luminescent sensor strains were immobilized using agar as the matrix and “packaged” into an easy-to-use biosensor format.

Literatur