

**Title:** Phosphate and Nitrate Influence on the Antibacterial Activity of Cyanobacterium *Synechococcus* sp. GFB01

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### **Abstract**

Cyanobacteria are photosynthetic microorganisms with a great biotechnological potential due to their capacity in producing various bioactive compounds in which can be applied in the production of biofuel, biofertilizer and pharmaceutical products, including antibiotics whose role in the producing organism is usually unknown. However, is normally agreed that these substances are responsible for increasing the competitive ability of the producer in environment. The study of the how environmental factors impact the level of certain secondary metabolite can reveal insights about its function in the producer and the best conditions to obtain the highest quantity of the product. Thus, this study aimed to investigate the antibacterial property of cyanobacterium *Synechococcus* sp. strain GFB01, isolated from the surface of the freshwater lagoon Lagoa dos Índios, Amapá state, northern Brazil, in different nitrate and phosphate concentrations. The cyanobacterium was grown photoautotrophically at a constant temperature at 25 °C with controlled light conditions (12 hours of light and 12 hours of darkness) in BG11 medium. Three additional conditions were introduced. In the first, nitrate concentration was tripled (BG11N+) while in the second, phosphate concentration was doubled (BG11P+). In the third, both nutrients had their concentrations reduced by half (BG11N+P+). The supernatant was harvested by centrifugation and then lyophilized. The freeze-dried material was extracted with Tris-HCL buffer pH 7.1 and subsequently with methanol. The antibacterial activity of fractions was determined by using paper disk diffusion method. Four bacterial strain were utilized as organism test: *Bacillus subtilis* ATCC 6633, *Salmonella typhimurium* ATCC 14021, *Corynebacterium fini* NTC 5 and *Listeria monocytogenes* ATCC 6477. These bacteria were cultivated in 10 ml of LB medium at 37 °C for 24 h. 100 µl of bacterial culture was mixed with 25 ml of BHI agar medium at 46 °C and then poured into petri dish. Paper disk treated with extract and previously dried were added to the agar surface and incubated at 37 °C for 24 h. With regards to the antibacterial assay, none of the obtained extracts showed inhibitory activity against gram positive bacteria. *Salmonella typhimurium* ATCC 14021 had its growth inhibited in all cases, except those where the extracts were obtained from BG11N+. Methanolic fractions exhibited antibacterial effects more pronounced when compared with aqueous fractions.

**Keywords:** cyanobacteria, antibacterial activity, biotechnology, phosphate and nitrate.

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