Evaluation of Glucosidases Inhibitors Production in Cyanobacteria Subjected to Nutritional Stress

Gradíssimo, D.G.[1]; Silva, V.C.O[1]; Mourão, M.M.[1]; Schneider, M.P.C[2]; Xavier; L.P.[1]; Santos, A.V.[1]

[1]Laboratório de Biotecnologia de Enzimas e Biotransformações. ICB, UFPA, PA, Brasil.
[2]Centro de Genômica e Biologia de Sistemas. UFPA, PA, Brasil.

INTRODUCTION: Cyanobacteria are microorganisms that in order to adapt to different environments, produce different metabolites of potential biotechnological applications, among these are glucosidase inhibitors**.** Glucosidases are enzymes responsible for the hydrolytic cleavage of the α or β-glycosidic linkages between monosaccharides. Microbial origin glucosidase inhibitors are important in the treatment of metabolic diseases and may also prevent viral replication. **OBJECTIVES:** To identify the proteins involved in the biosynthesis of glucosidase inhibitors produced by cyanobacteria subjected to nutritional stress. **MATERIALS AND METHODS:** A screening was conducted in 50 environmental samples, in search for glucosidase inhibitors producing cyanobacteria, using an esculin-agar plate assays. The cyanobacterium selected, cultivated in complete medium, had its methanolic extract (0.088 mg/mL, 0.176 mg/mL, 0.264 mg/ml and 0.352 mg/mL) tested for inhibitory potential of commercial α and β-glucosidases. For testing nutritional stress, the strain was cultivated for 45 days in BG-11 complete medium (1.5 g/L sodium nitrate), nitrate free BG-11, reduced nitrate BG-11 (0.15 g/L nitrate) and BG-11 with sodium acetate (10 mM). The strain growth was measured by absorbance readings at 750 nm periodically. **DISCUSSION AND RESULTS:** The strain *Synechococcus sp.* GFB01, isolated from Lagoa dos Indios, Macapá (AP) showed the best inhibitory potential. α-glucosidase and β-glucosidase were inhibited 54% and 11%, at the highest extract concentration, respectively. The strain does not survive in the absence of nitrogen, however the medium with reduced nitrate grew similar to the complete medium, and the medium supplemented with acetate showed higher growth. **CONCLUSION:** *Synechococcus sp.* GFB01 produces glucosidase inhibitors when cultivated in complete medium, and it showed better inhibition towards α-glucosidase than β-glucosidase. The methanolic extracts of this strain, grown in other mediums, will be tested for glucosidases inhibitors. Comparative proteomic analysis of different cultures will be held, searching for proteins that are involved in the biosynthesis of the inhibitors.

Key Words: Cianobacteria, glucosidase inhibitors, Amazon
Support by: CAPES