INFLUENCE OF BENZO(A)PYRENE IN THE ACTIVITY OF LIGNINOLYTIC ENZYMES PRODUCED BY FUNGI ISOLATED FROM CONTAMINATED SEDIMENT OF THE AMAZON REGION

Authors Souza, H.M.L. [1], Vieira, G.A.L. [2], Sette, L.D. [2], Oliveira, T.B. [2], Rodrigues, A. [2], Oliveira, L.A. [3], Barroso, H.S. [1], Zanotto, S.P. [4]

Institution [1] UEA – Universidade do Estado do Amazonas, Escola Superior de Ciências da Saúde (Av. Carvalho Leal, 1777, Cachoeirinha - 69065-170 - Manaus-AM), [2] UNESP – Universidade do Estado de São Paulo "Júlio de Mesquita Filho" (Av. 24-A, 1515 - 13506-900 - Rio Claro - SP), [3] INPA - Instituto Nacional de Pesquisas da Amazônia (Av. André Araújo, 2936 - Petrópolis - 69067-375 – Manaus - AM), [4] UFAM - Universidade Federal do Amazonas, Centro de Apoio Multidisciplinar, Divisão de Biotecnologia, (Av. General Rodrigo Octávio, 6200 - Coroado I - 69077-000, Manaus - AM).

Abstract:

Fungi isolated from environments contaminated by polycyclic aromatic hydrocarbons (PAHs) have been focus of interest, due to its potential application in bioremediation. The low specificity of ligninolytic enzymes and their relationship with the degradation of PAHs are already known. However, reports related to the influence of PAHs on the production of these enzymes are still scarce. In this context, the aim of this study was to evaluate the production of laccase, lignin peroxidase (LiP) and manganese peroxidase (MnP) by 21 filamentous fungal strains isolated from Amazon contaminated sediments. The assays were carried out with and without the supplementation of benzo(a)pyrene (BaP). Fungi were grown in Malt Extract Agar 2% (MEA2) for 7 days. After that, three plugs (7 mm) from the edge of the colony were transferred to the Malt Extract broth 2% (MEB2) in quadruplicate and incubated for 72 hours, 28 °C and 140 rpm. After this period, two assays were supplemented with 2 mg of BaP dissolved in 0,5 mL of dimethylformamide and the other two remained without the addition of the pollutant. The flasks were incubated for 7 days under the same conditions described above. Laccase, LiP and MnP activities were determined spectrophotometrically by the oxidation of ABTS, veratryl alcohol and complex formation of malonate Mn^{3+}, respectively. In the assays without the presence of BaP, 10 fungi showed positive responses for the production of MnP (5.98 to 14.96 IU L^{-1}). Only isolate S47 was able to produce laccase (3.82 IU L^{-1}). No fungi were able to produce LiP. In the presence of BaP, the isolates showed different behaviors. The production of MnP (30.20 IU L^{-1}) by strain S69 and laccase (22.15 IU L^{-1}) by strain S47 increased and no LiP activity were detected again. The ITS region of strain S47 was sequenced and the BLAST result showed *Perenniporia* sp. as the closest relative and identification of strain S69 is still in progress. Our results suggest that the presence of BaP induces the production of those enzymes. Thus, the production of MnP and laccase can be related to the degradation of the pollutant as a biological survival response.

Key-words: filamentous fungi, Amazon, Laccase, manganese peroxidase, benzo(a)pyrene.

Development Agency: Capes, Fapeam, Fapesp, CNPq