

Characterization and in vitro effect of organophosphorus and carbamates pesticides on the acetylcholinesterase from tambaqui (*Colossoma macropomum*) brain

Assis, C.R.D.¹, Castro, P.F.², Amaral, I.P.G.¹, Carvalho, E.V.M.M.¹, Carvalho Jr, L.B.¹, Bezerra, R.S.¹

¹Laboratório de Enzimologia – LABENZ, Departamento de Bioquímica and Laboratório de Imunopatologia Keizo Asami, Universidade Federal de Pernambuco, Recife-PE, Brazil.

²Empresa Brasileira de Pesquisa Agropecuária – Embrapa Meio-Norte, Parnaíba-PI, Brazil.

Organophosphorus and carbamates are the major classes of pesticides in use around the world. Their relatively fast hydrolysis and low persistence in environment allow them to quickly replace other important classes. However, their high toxicity to mammals and other non-target organisms is a threat for human and environmental health. Both classes are cholinesterase inhibitors and several methodologies have been developed in order to monitor their presence in natural samples. Aquatic species are commonly chosen for it, since their environments are being contaminated with those compounds. Here, acetylcholinesterase (AChE; EC 3.1.1.7) from brain of the Amazonian fish tambaqui (*Colossoma macropomum*) was partially characterized, and its activity was assayed in presence of five organophosphate and two carbamate insecticides: dichlorvos, diazinon, chlorpyrifos, temephos, TEPP, carbaryl and carbofuran, respectively. The optimum pH (between 7.0 and 8.0), temperature (ranged from 40 to 45°C) and thermal stability (up to 60% activity retained until 50°C) were determined. The inhibitory assays were performed at insecticide concentrations from 0.001 to 10 ppm. The concentration as low as 0.001 ppm of dichlorvos, chlorpyrifos and carbofuran was capable to inhibit 34.4 %, 17.1 %, 16.3 % the AChE activity from tambaqui brain, respectively. The IC₅₀ determined for each compound were 0.045 µmol/L (dichlorvos), 7.583 µmol/L (chlorpyrifos), 3.734 µmol/L (TEPP), 33.86 µmol/L (carbaryl) and 0.92 µmol/L (carbofuran). These results suggest that AChE from tambaqui brain could be useful for routine organophosphorus and carbamate screening.

Key words: Organophosphorus, Carbamates, Biomarker, Acetylcholinesterase, *Colossoma macropomum*.