Heavy metals biomonitoring via inhibitive assay of acetylcholinesterase from Periophthalmodon schlosseri

ABSTRACT

Acetylcholinesterase (AChE) generally known to be sensitive toward insecticides but its sensitivity toward heavy metals was least reported. Herein, a sensitive assay for heavy metals has been pursued using AChE in a rapid and economic manner. The AChE from a mudskipper, Periophthalmodon schlosseri has been found to be sensitive toward copper > mercury > chromium > and arsenic ions at the sub parts per million levels. Field trial works showed that the assay was applicable in detecting heavy metals pollution from effluents of industrial sites at near real time and verified using ICP-OES and Flow Injection Mercury System (FIMS 400). Furthermore, hierarchical cluster analyses of inhibition profiles were performed, revealing a comparable capability of the AChE compared to the gold standard of MicrotoxÊ method.

Keyword: Acetylcholinesterase; Field trial; Heavy metals; Hierarchical cluster analyses; Periophthalmodon schlosseri