Assessment of inhibitive assay for organophosphate insecticides using acetylcholinesterase from the brain tissue of Monopterus albus

ABSTRACT

Organophosphate insecticides inhibit the development of pests by blocking the metabolisation of the neurotransmitter acetylcholine and making a strong bond at the active site of acetylcholinesterase. In this present study, Monopterus albus acetylcholinesterase was tested to evaluate its sensitivity to the nerve agent used to control the development of insect pests that affect the productivity and quality of crops. The inhibition level of acetylcholinesterase was arranged in the descending order of parathion ≥ dimethoate > malathion > chlorpyrifos = diazinon > acephate > trichlorfon. Half maximal inhibitory (IC_{50}) concentrations of parathion and dimethoate were determined at 0.162 ± 0.003 and 1.509 ± 0.152 $mg.L^{-1}$, respectively, showing parathion is the highest sensitivity towards AChE activity. Commercially available insecticides, namely malathion, and chlorpyrifos were used to treat C. asiatica. Each leaf was collected from a different day of treatment, and the result shows both strongly inhibiting acetylcholinesterase activity from day 0, then total 100% acetylcholinesterase was inhibited on day 10. This study proved that M. albus AChE could be used as another alternative acetylcholinesterase source to develop environmental biosensors, especially in an agricultural area.