

Enzyme inhibition-based biosensors using Acetylcholinesterase from *Monopterus albus* for detection of carbamates contamination

ABSTRACT

Insecticides are an example of an environmental contaminant that can cause harmful effects on various types of organisms. Implementation of continuous monitoring program is needed to ensure the level of contamination can be controlled. In this present study, acetylcholinesterase (AChE) from the brain of *Monopterus albus* was elucidated to determine the potential alternative source of biosensor kit, which is sensitive towards various insecticides, especially carbamates. AChE from *M. albus* brain was extracted and purified through ammonium sulfate precipitation followed by procainamide-based affinity chromatography. Carbamate insecticides were used, such as bendiocarb, carbaryl, carbofuran, methomyl, and propoxur, to test their ability to inhibit AChE activity. Bendiocarb and methomyl show the capability to inhibit almost half of the enzyme activity at 51.05 and 51.20 %, respectively, while carbaryl, propoxur, and carbofuran inhibit 43.03, 42.80, and 15.06 %, respectively. Bendiocarb and methomyl were selected, and *M. albus* AChE was separately exposed with different concentrations of those carbamates and half maximal inhibitory concentration; IC₅₀ was determined at 0.874 and 1.639 ppm, respectively. A field trial was conducted by testing the enzyme with various vegetable samples. All samples show no significant effect on AChE activity, meaning there was no existence of insecticides in each sample ($p > 0.05$). This study could be used as an alternative source for developing biosensor kits for the environmental monitoring program.