EARLY DETECTION FOR INSECTICIDES BIOMONITORING ON VEGETABLES VIA ACETYLCHOLINESTERASE FROM THE BRAIN TISSUE OF DIODON HYSTRIX

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The exploitation of acetylcholinesterase (AChE) as a biosensor tool for the detection of pesticide contamination was well documented and considered a sensitive method with low-cost operations, rapid detection, and easy to handle. In this study, the brain tissue of *Diodon hystrix* was extracted, followed by precipitation and affinity purification using ammonium sulfate and procainamide Sepharose 6B, respectively. The enzyme was electrophoresed using Native-PAGE showed that the molecular weight was assessed to be ~ 135 kDa. Next, *D. hystrix* AChE was exposed to 2 $mg.L^{-1}$ of organophosphate. The result shows all the OP capable to inhibit more than 50% of AChE activity and ordered in ascending percentage of inhibition; chlorpyrifos = dimethoate < diazinon < trichlorfon ≤ acephate < malathion < parathion. However, the sensitivity is based on half-maximal inhibitory concentration (IC_{50}), malathion shows the highest followed by dimethoate and chlorpyrifos at 0.036, 0.092, and 0.098 $mg.L^{-1}$. *Spinacia oleracea* was separately treated with different commercial/formulated OP. On the first day of the treatment of malathion, dimethoate, and chlorpyrifos, the activity of AChE was inhibited by more than 80% except for diazinon which the enzyme activity was significantly inhibited after seven days of treatment. However, at the end of the treatment, on day 14^{th}, AChE activity was not affected considering the toxicity of OPs disappeared due to a decrease in their persistence and resistance. This study proves the capability of AChE from the brain tissue of *Diodon hystrix* as an alternative source for the development of biosensor tools to be used as a preliminary screening on food contaminants, especially pesticides.

Keywords: acetylcholinesterase, *Diodon hystrix*, organophosphate, IC_{50}.