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**ACETYLCHOLINESTERASE AND CYTOCHROME P-450 ACTIVITIES OF
THREE-SPOT GOURAMI (*Trichogaster trichopterus*) EXPOSED TO
DIAZINON AND CHLORPYRIFOS**

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ABBREVIATIONS

β - NADPH	β - nicotinamide adenine dinucleotide -phosphate
$^{\circ}\text{C}$	degree Celcius
μl	microlitre
ACh	acetylcholine
AChE	acetylcholinesterase
BChE	butyrylcholinesterase
BSA	bovine serum albumin
ChE	cholinesterase
DCM	dichloromethane
DDT	1,1,1-trichloro-2,2-bis(<i>p</i> -chlorophenyl)ethane
DMSO	dimethyl sulfoxide
DTNB	5, 5 - dithiobis - 2 - nitrobenzoic acid
EROD	ethoxyresorufin - O - deethylase
hr	hour
kg	kilogram
mg	milligram
min	minute
ml	millilitre
mm	millimetre
nm	nanometre
OC	organochlorine
OP	organophosphate
rpm	rotation per minute
i.p	intraperitoneal

ABSTRACT

The present study was taken to assess the effects on the AChE and EROD activities of the freshwater fish *Trichogaster trichopterus* exposed to the organophosphate insecticides, chlorpyrifos and diazinon under different exposure regimes. Chlorpyrifos and diazinon were found to cause 50% inhibition in brain AChE activity of *T. trichopterus* at concentrations of 3.0×10^{-1} M and 4.6×10^{-4} M respectively. When fish were subjected to a semistatic exposure of the insecticides at concentrations ranging from 0.001 mg/l to 1.0 mg/l, brain AChE activity was found to be dependent, in general, on the concentration and the period of exposure of the insecticide. Exposure to 0.1 mg/l and 1.0 mg/l chlorpyrifos and 1.0 mg/l diazinon caused persistent reduction in AChE activity of up to 86% compared to control. Furthermore, at low concentrations (0.001 mg/l & 0.01 mg/l chlorpyrifos and 0.01 mg/l & 0.1 mg/l diazinon), a stimulatory effect was observed whereby the brain AChE activity of exposed fish was significantly greater than control fish.

Recovery of AChE activity following 24 hr exposure to 1 mg/l chlorpyrifos and diazinon, showed markedly different trends. The AChE activity of chlorpyrifos-exposed fish remained significantly inhibited for as long as 15 days in clean water. The AChE activity was deemed to be fully recovered on day 22. Twenty four hours after being transferred into clean water, fish which were exposed to 1 mg/l diazinon for 24 hr exhibited AChE activity approaching that of control fish. However, subsequent measurements of AChE activity showed significant AChE inhibition.

In the pulse dose exposure experiment in which fish were exposed to 1 mg/l

insecticide with intermittent 21 day recovery periods, chlorpyrifos-exposed fish exhibited increasing inhibition in AChE activity following each 24 hr exposures to the insecticide. At the end of each of the intermittent recovery periods (21 days), AChE activity approached that of control. Fish subjected to a pulse dose exposure of 1 mg/l diazinon exhibited similar trends. However, the extent of inhibition following the 2nd exposure was not significantly different from that following the 1st exposure. The AChE activity was further inhibited (44% inhibition) following the 3rd exposure. At the end of each of the intermittent recovery periods, AChE activity approached that of control fish.

Fish exposed to various concentrations of the insecticides under chronic semistatic conditions exhibited EROD activity induction with the exception of fish exposed to 1.0 mg/l chlorpyrifos and diazinon whereby EROD activities were lower than control levels throughout the duration of the experiment.

In the recovery test, EROD activity in fish was significantly induced following 24 hr exposure to 1 mg/l chlorpyrifos and diazinon. EROD activity in fish appeared to return to basal levels as early as 7 days in insecticide-free water.

In the pulse dose exposure experiment, fish exposed to chlorpyrifos exhibited maximum EROD activity induction following the initial 24 hr exposure and returned to basal levels during the following recovery period. Subsequent exposures to chlorpyrifos did not cause further EROD activity induction. Fish exposed to diazinon did not exhibit EROD activity induction following the 24 hr exposures. Induction of EROD activity was noted during the recovery phases.

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