

PREFACE

Pesticides and agriculture are closely intertwined and immediate halt in the usage of the former would practically be impossible. The use of pesticides is necessary to combat the loss caused by the pests and the areas of Darjeeling, Terai and Dooars in North Bengal are frequently contaminated with pesticides due to vast stretches of tea plantations in the region. Besides the target organisms, a large number of non-target organisms are also affected and in turn, contaminates both the terrestrial and aquatic environment. The protection of aquatic ecosystems against adverse effects of anthropogenic chemicals is of great concern because of its high economic, genetic and recreational value.

In aquatic toxicology, most research on potential biochemical markers has been conducted on fish which have been suggested as indicators of chemical exposure and play a significant role in the monitoring of water pollution because of its high sensitivity to changes in the aquatic environment. Cytochrome P450 (CYP 450) with its broad substrate specificity is one of the most important phase I enzyme of biotransformation which has been widely studied throughout the world as a biomarker of environmental contamination and have been reported from different species of organisms including bacteria, fungi, plants, insects, molluscs, fishes and mammalian systems.

In India, very few research have been carried out regarding cytochrome P450 as a detoxifying enzyme or a biomarker to assess the contamination of the aquatic environment by domestic wastes, industrial by-products, pesticides, etc.

Therefore, in the present study, cytochrome P450 and its isoforms mainly of the family 1-3 (CYP1A, CYP2B, CYP2E1 and CYP3A4) responsible for the metabolism of xenobiotics in 3 fish species, *Channa punctatus*, *Heteropneustes fossilis* and *Clarias batrachus* have been examined. The water bodies of North Bengal region are contaminated through indiscriminate use of chemical/synthetic pesticides and their run-offs from the agricultural fields and tea gardens. Fishes are highly sensitive to such unwanted changes of the environment. Variations and induction of specific forms of cytochrome P450 can contribute to characterize specific genetic responses that not only may provide a mechanistic understanding of the fish to a chemical stress but may also be exploited as a potential biomarker for environmental hazards and provide evidence of the state of pollution in a comprehensive way.