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# EFFECTS OF PESTICIDES ON FISH : AN OVERVIEW

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## ABSTRACT

The The problem of pesticidal impact on the ecosystem has assumed considerable proportions owing to the modernisation of agricultural operations and the consequent widespread and indiscriminate permeation of the ecosystem with these pesticides. The effects of pesticides on ways, since the majority of them are non-selective and produce detrimental and sometimes fatal side effects on non-target species. Knowledge on pesticide toxicity levels, either by acute toxicity, residual or physiological studies, is essential to develop effective protective measures for the conservation of our already depleted freshwater fauna.

## INTRODUCTION

It is apparent that human chemical additions have introduced or increased environmental stress for aquatic organisms and fishes in particular. Many of the effects of pesticides to fishes are subtle and insidious. Unlike direct eradication of populations (eg fish kills), the more serious long-term decline of stocks of fish are caused by indirect factors such as predation, disease and reproductive failure. Fish which are subjected to unnatural stresses in any part of their life history may be rendered less capable of performing those functions necessary ot fulfil their life cycle and if fish'es ability to defeat its natal stream is impaired by the presence of pollutants, then it may go unspawed and leave no natural means of perpetuating the species (Waldichuk, 1974).

Studies on the sublethal effects of pesticides have gained a great deal of impetus in the last decade, partly because of their practical importance and partly owing to academic interest. Quantitative assessment of the effects of pesticides on fishes has got cardinal importance in fishery management both from the biological and ecological points of view. Moreover, a sublethal both from biological and ecological points of view. Moreover, a sublethal effects of pollutants are now being recognized by regulatory agencies in establishing pollution controls. Rather than applying an arbitarary "application factor", as a safety factor, to the LC 50 data obtained in acute toxicity bioasays, poolution control is now being developed by using the sublethal threshold level, derived by chronic toxicity bioassays, as the limiting concentration. Even in administering the International Convention for the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (U.K. 1972), the term "harmlessness" of a particular substance is being defined by application of data from sublethal toxicity studies, among others (Waldichuk, 1979).

## DISCUSSION

The investigations of the effects of pesticides, or any other pollutants, on aquatic organisms, especially fishes, aimed at delineating the pollution effects, mainly centre around two broad scientific

approaches viz. ecological monitoring and laboratory investigations. Ecological monitoring and the efficacy of the approach mainly depend on the in situ effects of pollution, which in turn are controlled by the pattern of pollutant release in space and time. Negative ecological consequences of pollution manifest themselves in detrimental deviations from the normal state of individual investigations, mainly take into consideration the detrimental deviation from the normal state of individuals. Such impairments can be quantified. The philosophy of the present study holds true to the second approach.

Coastal zones are more prone to vulnerable to pollution, as this zone receives pollutants both from land and water sources. Further major industrial developments, transport and other activities causing pollution tend to take place in the vicinity of coastal zones.

Besides, coastal areas are densely populated and the coastal ecosystems are fragile by nature due to their high degree of variability in space and time. Conservation of this zone demands paramount importance as these are important areas for fisheries. Coastal area dumping grounds have much higher pollutant concentration not only because the material is being put into these shallow areas much more rapidly than it is being carried away by natural water motions, but also because of the normal structure of the oceans which tend to prevent the mixing of these inputs with the rest of the oceanic volume (Williams, 1979).

Among the various animal groups, fishes have been identified as being very sensitive to pollutants and have been the most popular test organism because they are presumed to be the best understood organism in the aquatic environment. Fishes are one of the most important members of the aquatic food chain, and through them some toxicants may reach human beings as well. The selection of organisms for toxicity test is mainly based on certain criteria like its ecological status, position within the food chain, suitability for laboratory studies, genetically stable and uniform populations and adequate background data on the organism (Buikema et al., 1982). The species selected for the present study viz. Etroplus maculates satisfy most of the above protocols.

It is no longer sufficient to document aquatic pollution in terms of the chemical concentration of the contaminant. The use of bioassays as part of a comprehensive approach to pollution assessment is widely accepted nowadays. Toxicity is a biological response, which when quantified in terms of the concentration of the toxicant can constitute the basis for a bioassay procedure. Toxicity tests are defined here as estimation of the amount of biologically active substance by the level of their effect on test organism (Chapman and Long, 1983). The direct determination of the acute toxicity levels has been followed in the present study also in spite of limitations, as it provides the best and most practical methods of evaluatin the danger levels of pesticide contaminants commonly found in the aquatic environment and consequent risks to fish populations (Alabaster, 1969). Such as investigation is particularly essential with the fish E. maculates, as no such study has hitherto been undertaken.

In general, sublethal effects cover the effect of all those concentrations which are not lethal for individuals even after prolonged exposures, but increases the population mortality, decreases its size, or changes in composition. Thus, a group of effects that effect the growth, rate, metabolism, reproductive potential behaviour or which impair the defence mechanism of an organism are referred to as sublethal effects. In the present study sublethal effects of pesticides on a selected fish were looked into detail. Physiological responses like activation or inhibition of some selected enzymes, disturbances in haematology and histological changes are the parameters chosen for the assessment of the sublethal effects.

The present article involved investigation of the lethal and sublethal effects of three pesticides individually. The pesticides selected are the commercial formulations of DDT (organochlorine), Dimecron (organophosphate) and Gramoxone (paraquat dichloride). Synthetic pesticides, especially organochlorines and organophosphates have become increasingly important additions to chemical wastes polluting natural aquatic communities and many of these are considered hazardous because of their ability to kill or immobilize organisms even at very low concentrations. Generally the commercial formulations of pesticides are found to be more toxic to fishes than the respective active ingredient which seldom encounter with the aquatic communities.

## CONCLUSION

Most toxic substances exert their effects on a basic level in the organism by reacting with enzymes or by affecting membranes and other functional components of the cells. Biochemical and Physiological techniques are commonly used in laboratories to measure such effects and together with histological, histochemical and haematological studies can contribute most fruitfully to reveal the toxic mechanism of a single or a group of substances (Bengtsson, 1979).

The impact of pollutants on an organism is initiated as disturbances at the subcellular and cellular levels. Since lysosomes are the subcellular units involved in the concentration, disintegration and elimination of toxicants, a knowledge on the concentration of important lysosomal marker enzymes is inevitable in monitoring the extent of pollution caused by biotic and abiotic factors. Cell membrane and the confluent endoplasmic reticulum are the first to confront pollutants. They are susceptible to the effect of pollutants as they bind to the lipoprotein layer of the membrane and induce variation in the permeability which upset the whole cellular systems. So a study of the activity of membrane bound enzymes becomes a useful index of the extent of pollution imposed (Annie, 1988). Investigations on the impact of pesticides on the activity of two phosphomonoesterases; Acid phosphatise, an enzyme bound to the cell membrane and endoplasmic reticulum (Ciro et al., 1975) is thought to be meaningful.

## REFERENCES


- Abegg, R. 1950. Some effects of inorganic salts on the blood specific gravity and tissue fluids of the blue gill, Lepomis macrochirus (Raf.) Physiol. Zool. 23: 124-134.
- Barlow, G. W. 1970. A test of appeasement and arousal hypothesis of courtship behaviour in a cichlid fish, Etroplus maculates. Z. Tierpsychol. 27: 779-806
- Cairns, T. and Charles, H. P. 1980. Persistience and metabolism of TDE in California clear lake fish. Bull. Envt. Contam. Toxicol. 24 : 504-510
- Ciro Balestrieri, Giovanni Colonna, Gaetano Irace and Francesco Cedrangolo. 1975. Purification and some properties of an alkaline phosphatise form beef brain. Comp. Biochem. Physiol., 50(13) : 203-207.
- Dalela, R. C. Thyagi, A. K., Pal, N. and Verma, S. R. 1981. Subacute stress induced by sodium lauryl sulphate SLS on certain haematological parameters in Sachobranchus Fossilis. Water Air Soil Pollut. Vol. 15: 3-9.
- Edward E.Little, Boris A.Flerov and Natasha N.Razhinskaya. 1985. Behavioural approaches in aquatic toxicity investigations: A review in “Toxic substances in aquatic environment: an International aspect” Ed. Merrle, P.M., Jr.R.H.Gray and R.L. Kendall. Ame. Fishery. Society. pp. 72-98.