

## TOXICITY EFFECT OF PESTICIDE ON FRESH WATER FISHES

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### Abstract

Modernization and rapid increase of chemicals, fertilizers and pesticides in agricultural production. Pesticides as any substance or mixture of substance intended for Preventing, destroying, repelling or mitigating any pest. Fish are directly or indirectly impacts by pesticides. There are several various pesticides such as herbicides, insecticides, and fungicide etc. These chemical affect almost every system of environment. Pesticides residues reach in to the aquatic environment by surface run off causing risk hazards for aquatic flora and fauna, fishes being most affected organism. Long term exposure of pesticides induces behavioral, physiological, reproductive abnormalities and diversity of the nature. Fishes serve as bio-indicators for aquatic contamination to access the changes caused by human activities and predict hazardous effects of pollutants. Since fish are rich sources of proteins and lipids, their health is very important for human being. Therefore, the protection of aquatic ecosystem and water quality only with the judicious and rationalized application of pesticides.

**KEYWORDS:** Toxicity, Pesticide, Fertilizer, pollutants, Ecosystem.

### Introduction:

Pesticides are the chemicals of natural or synthetic origin which are used to control pests, weeds and pathogens in animals. Pesticide can include insecticides, fungicides, herbicide, bactericides and larvicides. Annually, around 45% of the food produced worldwide is lost due to the pest. Therefore it is necessary to implement effective pest management by using a wide range of pesticides is required. In modern agriculture pesticides effectively increase the quality and quantity of yield at a relatively less economic era.

Rapid industrialization and urbanisation in the last few decades had taken a bad effect on the natural resources. Several anthropogenic activities like pollution by toxic substances through pesticides or global scale result in climate change. Large scale mortality by living Organism' Most important wildlife animals such as aquatic fishes and expanding threat to human health that is chronic diseases, cancer damage several major organs like the brains, lungs, kidneys are being witnessed in the recent years as a result of anthropogenic perturbations. Anthropogenic source of pollution agricultural, industrial, and domestic activities are the major sources responsible for contamination of natural aquatic resources. Agricultural crop production for growing highly yielding varieties requires the discriminate use of pesticides and fertilizers, which protect the crop from pests, thus help in improving the quality of crops. Aquatic environment get contaminated by the applications of pesticides through several methods spray drift, run-off and leaching. Which effect serious health risk to the aquatic ecosystem.

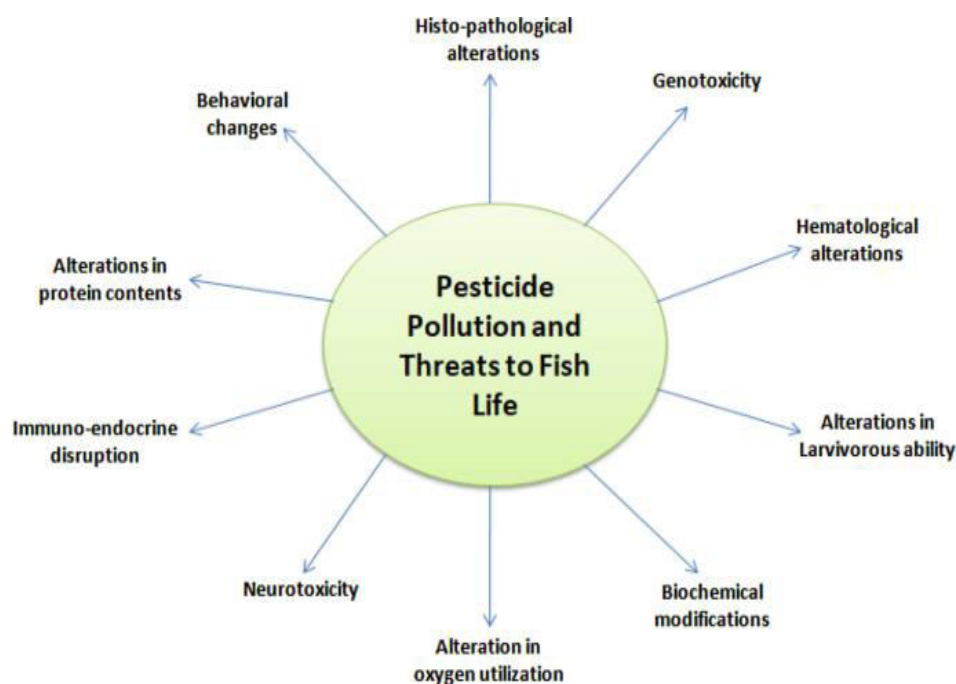
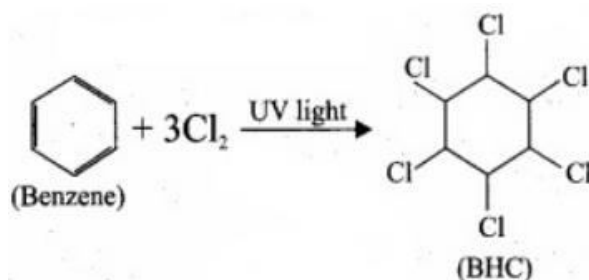


Figure 1.1 Effect of pesticide on fishes.

Classification of pesticides, based on their chemical composition, gives four main groups namely organochlorines, organophosphorous, Carbamates and Pyrethrin. Organochlorines belongs to the oldest group of pesticides synthesized and used. Most of them are broad-spectrum insecticides for the control of agricultural products and domestic insects.

The second major problem is that many pesticides are not biodegradable (DDT and BHC). Precisely because they are unnatural substances, they may be resistant to decay. This means that they accumulate in the environments. In particular, they may be concentrated as they pass a food web so that although the primary producers may only have low levels of contamination, the top carnivores may contain substantial concentrations of this chemical. (e.g. Wania & Mackay, 1993).



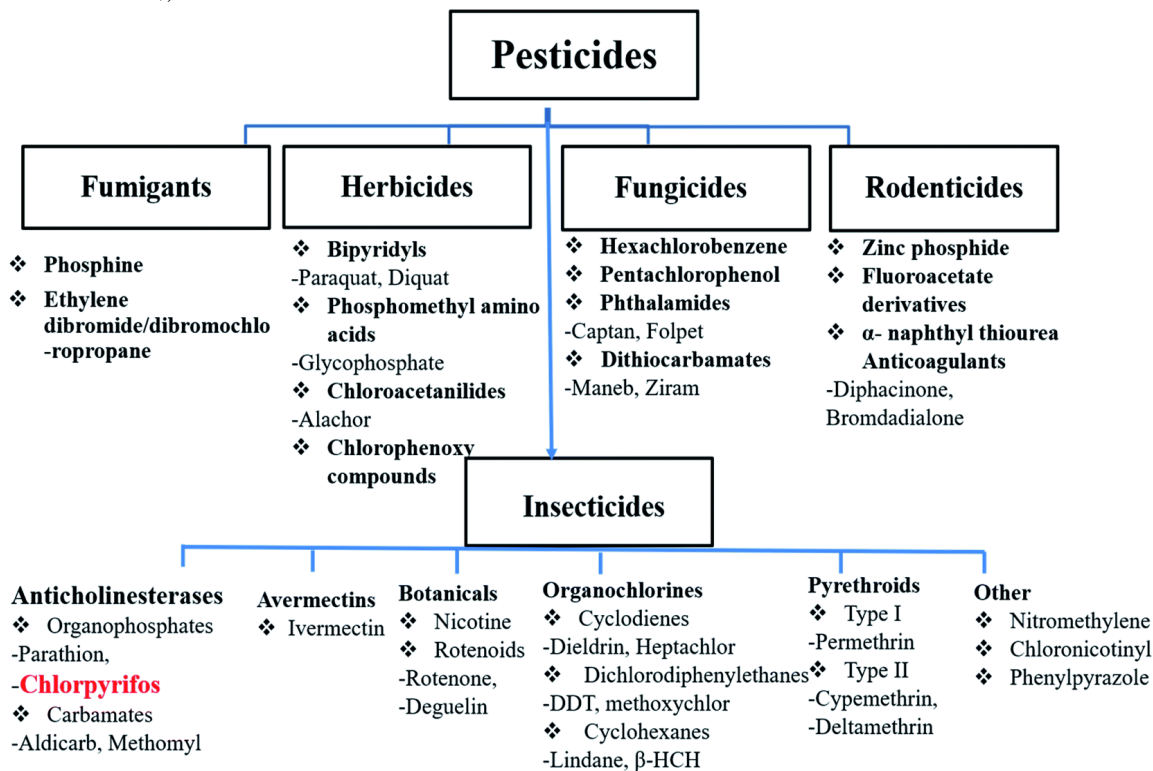
Structure 1.2 Non - biodegradable pollutant Benzene hexachloride (BHC)

The advent of genetic engineering has led some people to hope that pesticides use may decrease as crops are genetically engineered for pest resistance. It is probably too early to be certain which of these views is more correct, though there are some early encouraging signs that genetic engineering can reduce pesticides use (Resis & Straughan, 1996).

#### Role Of Pesticides On Aquatic Environment:

Pesticides have direct contact with surface fresh water fishes through accidental spills, aerial drift polluting aquatic environment which in turn has a havoc on aquatic habitats among others (Adeboyejo *et al.*, 2011). Several pesticides have been identified in various aquatic compartments such as within water

column and sediments (Bamjo *et al.*, 2010; Yusuf, 2010; Adegbola *et al.*, 2011; Akan *et al.*, 2013 and Azenwosu *et al.*,)



**Toxicity On Aquatic Organism:**

Toxicology is the field of science that help us understanding the harmful effects of chemicals, environmental contaminants on aquatic organism, such as the effects of pesticides on the health of fish. Toxicity of the pesticides refers to the effects that a poisonous substance. Brief exposure to some chemicals may have little effects on fish, where as longer exposure may cause harm (Arbuekal and Server, 1998; Borone *et al.*, 2000) The present work has been carried out to study the lethal concentration 50% (LC<sub>50</sub>) of pesticide Crpermethrin on the fresh water fish *Labeo rohita*. *Labeo rohita* is an edible freshwater fish of carp family, found in freshwater bodies, river, lakes and ponds in India. It is a large omnivorous and extensively used in aquaculture. *L.rohita* is one of the three major carps.namely catla (*Catla catla*), rohu (*Labeo rohita*) and mrigal (*Cirrhinus cirrhinus*) produced and consumed large quantities in the world.

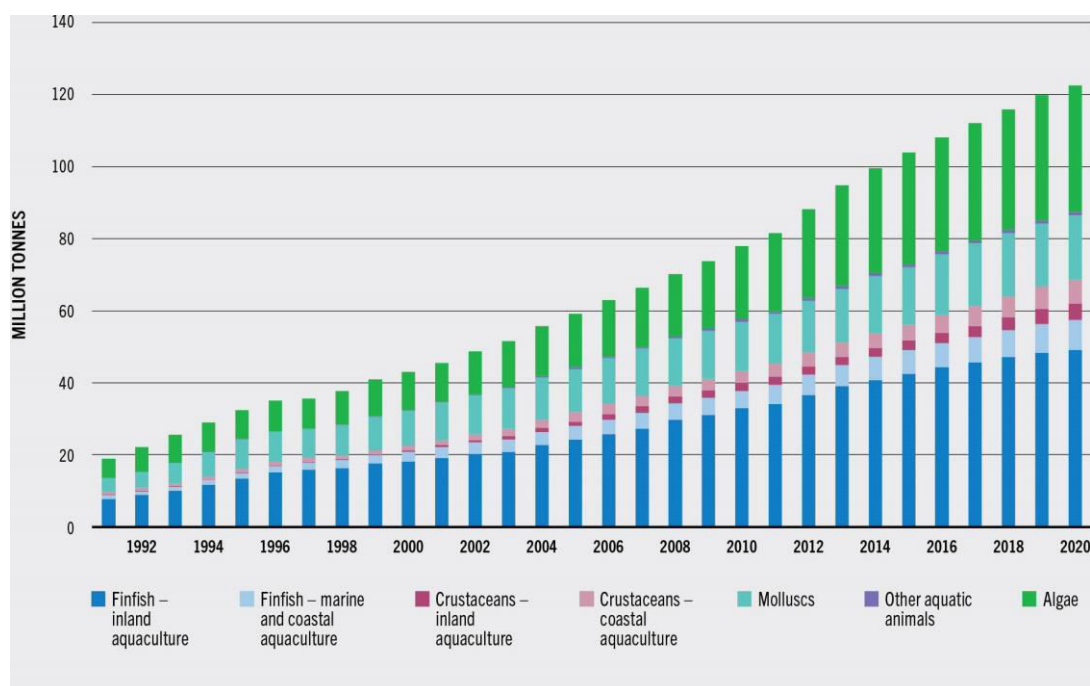


Figure 1.3 world Aquaculture production (NOTES: Data exclude shells and pearls.)

**Materials And Mtheds:**

The freshwater healthy fish, *L. rohita* of the weight (12±1g) and length (10±0.6 cm) were selected for the experiment and were collected from Basuhi River near jaunpur fish were screened for any pathogenic infections. The fish were washed in 0.2% K<sub>2</sub>MnO<sub>4</sub>. The fishes were just dipped in 0.1% K<sub>2</sub>MnO<sub>4</sub> for a few seconds and taken and taken out and again washed in normal water (Joshi *et al.*). Healthy fishes were then transferred to glass aquaria (30×20×20cm) containing dichlorinated tap water (Temperature 30±2<sup>0</sup>C; total hardness 520±24 mg/l; dissolved oxygen 5.7±0.2 mg/l salinity 1.2 ± 0.4 ppt and pH 7.8± 0.05). Fish were acclimated to laboratory conditions for 10 to 15 days prior to examination. They were regulatory fed with comercial food *ad libitum* and the medium tap water cahinged daily to remove faeces and food remnants.

**Toxicity Test:**

It is a short term disclosure to toxicants to determine the concentration of a chemical or toxicant effect on the test organism under controlled laboratory condition. Toxicity tests were conducted in accordance with standard methods (APHA, 1992). The death of the organism is the most distinguishable response to find out the lethality test or LC<sub>50</sub> concentration of test. The fish were undernourished for 24 hours prior to their use in experiments as suggest by storage to avoide any interference in the toxicity of pesticides by excretory products. After the addition of the toxicants in to the test tank with 12 liters of water having twenty two fish, mortality was recorded after 24, 24, 72, and 96 hours . Percent mortality was calculated and the values were transferred in to probit scale. Probit analysis was carried out as suggested by Finney (1971).

**Results And Discussion:**

Aquatic organisms are continously being exposed to various pesticides in the environment. Toxicity test provide a measurement of the toxicity of compounds to given species under specific environments onditions (pH, Temperature and water). Cypermethrin caused 100% mortality of *Labeo rohita* at 0.0046 ppm and 50% mortality (96 hours) at 0.0034 ppm. The LC<sub>50</sub> values obtained at 24, 48, 72 and 96 hours submission and the 95% confidence limits. The LC<sub>50</sub> values of Cypermethrin for 24, 48, 72 and 96 hours were 0.0044 ppm,0.0040 ppm 0.0037 and 0.0035ppm respectively. (Table 1; Figure 1-4)

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HOURS OF EXPOSURE	LC <sub>50</sub>	L.C.L	U.C.L
24	0.004412	0.004401	0.004423
48	0.004058	0.004051	0.004062
72	0.003725	0.003719	0.003729
96	0.003558	0.003549	0.003563

**Conclusion:**

The review paper concluded that pesticides cause tremendous economic loss by fish death and rendering them unfit for human consumption, indicating a threat to fish biodiversity. Various investigations revealed the detrimental effects of pesticides on fresh water fishes such as behavioural changes and morphological changes. Man-made disturbances within the environments are responsible for adversely affecting the normal functioning of living organism, which includes abnormalities from invertebrates to vertebrates. Therefore, recommended that more investigation concerning new introduced harmless pesticides should be carried out in-vivo and in-vitro. Environmental eco-friendly pesticides should also be employed agricultural production.

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