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Study of Aquatic Environmental Toxicology And Its Effects On Fish (Anabas Testudineus / (Bloch)/ Koi. Due to Extensive Use of Chemicals and Pesticides

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ABSTRACT

Toxicant in aquatic environment enters can be either directly in the medium or through air. Pesticides production and use have shown remarkable increase in india & their indiscriminate use in agricultural & forestry has poses a great threat to aquatic environment and hence ,fish become one of the immediate targets of such biocidal doses that of terrestrial animals. It is also possible that the insecticides run off & drift during insect control operations may prove sufficient to kill fish (scott ,1967 , Trim 1987).

KEYWORDS;- Toxicity ,LC_{50} , Pesticides ,Dimethoate ,Cypermethrin.

INTRODUCTION

Aquatic toxicology generally involves the measurement of contaminant. Levals to characterize the hazareds imposed on the aquatic environment. However this field of study also includes information on how those contaminants can affect humans in and around these aquatic environments. The multidisciplinary research that comprises the field of aquatic toxicology has provided a better understanding of the effects anthropogenic activities and chemical contaminants have on aquatic environments. Fisheries and aquatic resources (ponds , Lakes , Rivers etc.) are exceptionally valuable natural assets enjoyed by people. These benifits can be direct financial ones that provide employment.

Pesticides are one group of toxic compounds linked to human use that have a profound effect on aquatic Life and water quality. When pesticites enter aquatic systems, the environmental costs can be high. Unintentional pesticide –related fish kills have been large . A pesticides capacity to harm fish and aquatic animals is largely a function of its (1) Toxicity (2) Exposure (3) Dose rate (4) Persistence in the environment.

A brief exposure to some chemicals may have Little effects on Fish , Where as Longer exposure may cause harm. A Lethal dose is the amount of pesticide necessary to cause death. Because a standard toxicity dose measurement ,called a lethal concentration 50(LC 50) is used. This is the concentration of a pesticide that kills 50% of a test population of animals with in a set period of time usually 24 to 96 hours.

MATERIALS AND METHODS

FISH ACCLIMATIZATION:- The freshwater healthy fish A. Testudineas of the weight (10±1g) and length (8±0.5cm) were selected for the experiment and were collected from Bhittha ,Jalalpur aqua farm near pupri (sitamarhi). Fish were screened for any pathogenic infections. Glass aquaria were washed with 1% $kmno_4$ to avoid fungal contamination and then sun dried Healthy fishes were then transferred to glass aquria (35×20× 20cm) containing dechlorinated tap water (Temp.28±2°C: total hardness 518±23mg/l ; dissolved oxygen 5.6±0.2 mg/l salinity 1.2±0.13ppt and PH 7.8±0.04). Fish were acclimated to laboratory conditions for 10 to 15 days prior to experimentation.

ACUTE TOXICITY TEST:- Toxicity test were conducted in accordance with standard method (APHA 1992). Stock solution of dimethoate and cypermethrin individually with a concentration of 1ml per Litre was prepared in distilled water and different dilutions were prepared by adding required amount of distilled water. Based on the progressive bisection of intervals on a logarithmic scale , Log concentrations were fixed after conducting the range finding test. The fish were starved for 24hrs prior to their use in the experiments as recommended by storage to avoid any interference in the toxicity of the pesticides by excretory products. After the addition of the toxicant into the test tank with 10 litres of water having twenty fish , mortality was recorded after 24 , 48 , 72 and 96 hrs. Percent mortality was calculated and the values were transferred in to probit scale. Probit analysis was carried out as suggested by finney (1971).

DISCUSSION ;- Dimethoate caused 100% mortality of A .testudineus at 0.0044 ppm and 50% mortality (96hrs) at 0.0036 ppm and for cypermethrin , the lethal effect was at 0.0029 ppm and LC_{50} at 0.0021ppm. The LC_{50} values obtained at 24 , 48 , 72 and 96hrs. Exposures and the 95% confidence limits for the two pesticides revealed the cypermethrin showed higher toxicity than dimethoate. The LC_{50} values of dimethoate and cypermethrin showed in (Table:1: Figure 1-2) and (Table 2 and Figures 5-4).

Table 1:- Percent mortality of Anabas testudineus exposed to different concentrations of dimethoate for different periods.

Hours OF Exposure	LC_{50}	U . C . L	L . C . L	Regression Equation	Calculated $\times^2$ value	Table $\times^2$ value
24	0.004084	0.004167	0.004003	Y=32.0815+11.336×	8.2512	12.59

48	0.003870	0.003946	0.003796	Y=33.423+11.783×	9.0221	11.07
72	0.003726	0.003791	0.003662	Y=37.451+13.361×	3.5032	11.07
96	0.003556	0.003611	0.003611	Y=42.976+15.206×	6.7556	11.07

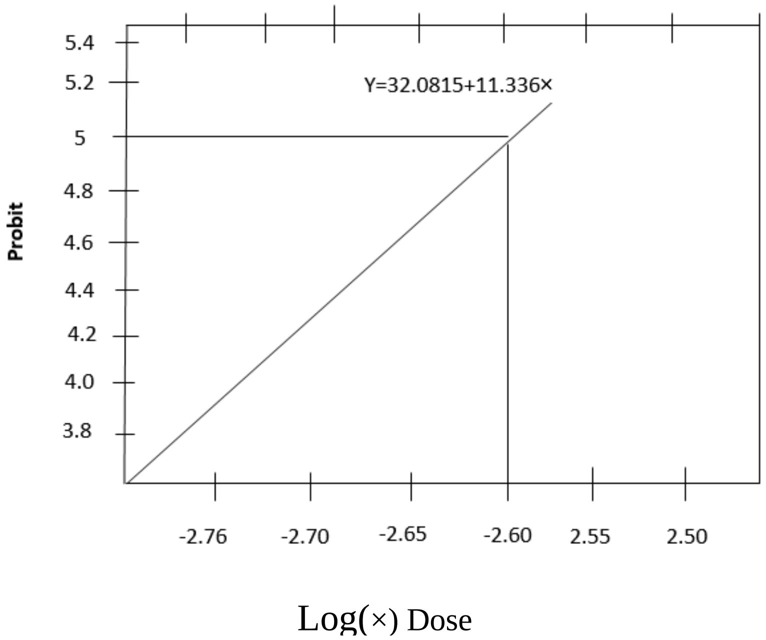


Fig-1 :- Regression line of log concentration of pesticides vs % mortality.

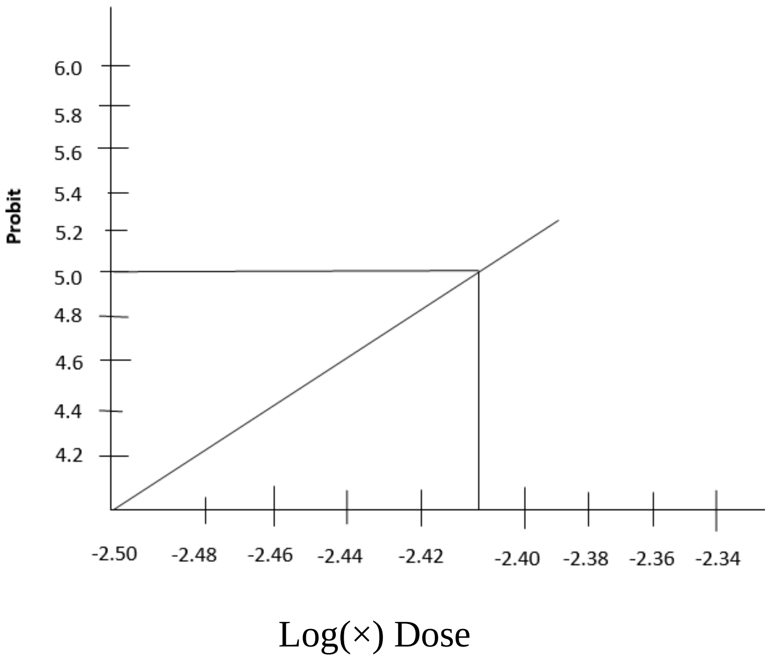


Fig-2:- Regression line of log concentration of pesticides vs % mortality.

TABLE 2:- Percent mortality of Anabas testudineus exposed to different concentrations of cypermethrin for different periods.

Hours OF Exposure	LC_{50}	U . C . L	L . C . L	Regression Equation	Calculated $\times^2$ value	Table $\times^2$ value
24	0.00257	0.00267	0.00247	Y=22.444+6.737×	5.668	11.07
48	0.00237	0.00245	0.00228	Y=21.490+6.281×	8.885	12.59
72	0.00215	0.00229	0.00202	Y=24.597+7.350×	17.686	12.59
96	0.00203	0.00209	0.00209	Y=23.858+7.004×	8.914	12.59

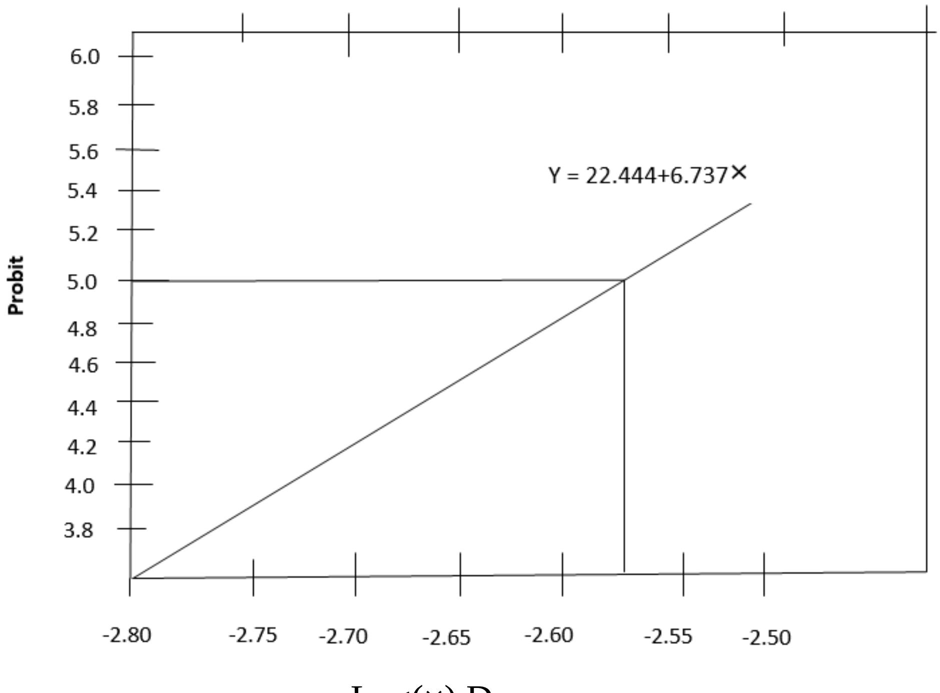
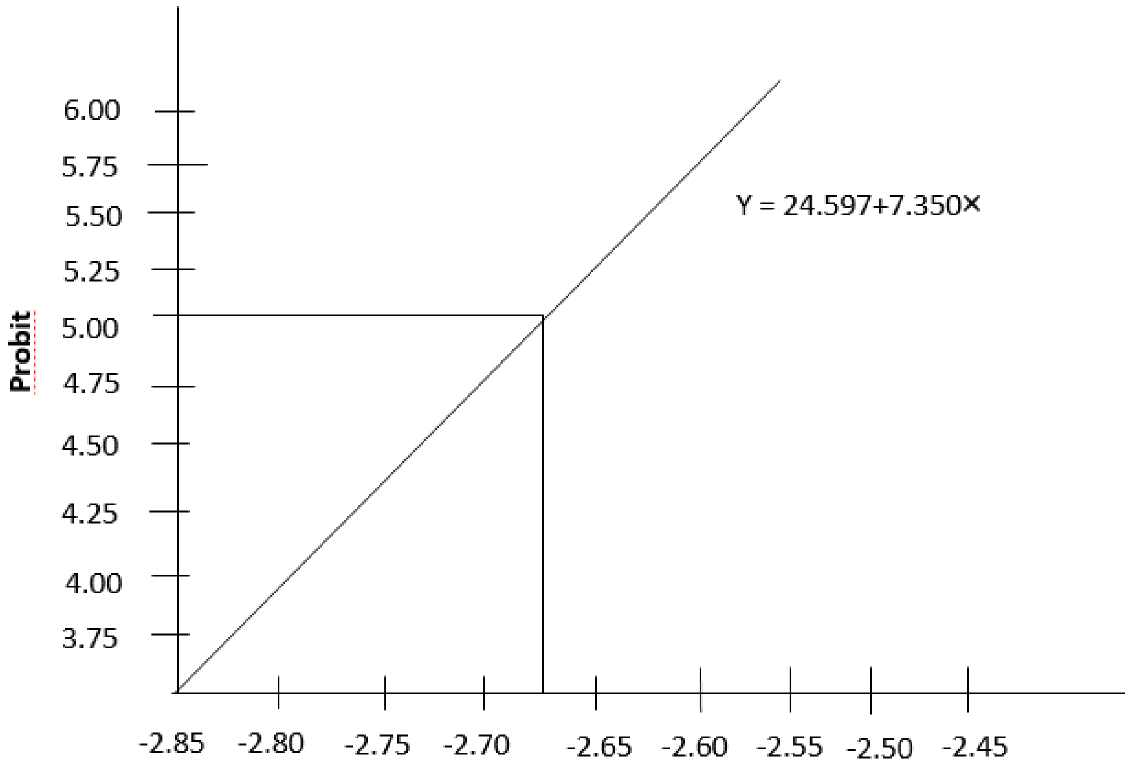


Fig-3:- Regression line of log concentration of pesticides vs % mortality.



Log(×) Dose

Fig-4:- Regression line of log concentration of pesticides vs % mortality.

RESULTS ;- Body colour changed from original colour in pesticide treated fish. When the fish was exposed to pesticides, eractic swimming, abnormal posture, disbalance, sluggishness, imbalance in postuere, increase in surface activity, opercular movement, gradual loss of equilibrium. The mucus covering all over the body surface & gill observed in the fish exposed to both dimethoate and cypermethrin.

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