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The evaluation of toxic effect (LC 50) of endosulfan on female crab *Brytelphusa guerini.*

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Abstract
Man with extraordinary intellectual capability conquered the age; old traditional world by establishing modern technological world to cater the needs of all the human beings. As the most intelligent man acquired supremacy and mastery over each and every object on the earth and mode them to keep under his control. The paper deals with the organochlorine pesticide which is regularly used in agricultural purpose interact directly or indirectly with the biosphere spoils the biota flora and the fauna. The endosulfan toxicity calculated by LC 50 and effect of death rate found on the fresh water crab species *Barytelphusa guerini.* The paper details with mortality rate of experimental animals 50% at each 24 hours. It is calculated by statically and presented by graphically and tabulated by tables.

Keywords: Toxic effect, Endosulfan, Female fresh water crab *Barytelphusa guerini*

INTRODUCTION

Evaluation of a toxicant is a complex phenomenon and yet a debating topic for scientists. The potent toxic exposure leads to interaction between the chemical agent and the target species in space and time. This event must be characterized by the dosage types of exposure (oral, dermal, inhalation) and characteristic of all exposed populations (male, female, juvenile, sub–adult, etc.). The extent of biological effect can be at the molecule, cell, tissue, organ, organism, family and population levels through behavioral, physiological and pathological responses [8].

Toxicity of pesticides to animals of two types: 1) Acute or transitory, 2) Chronic. In the first case, the effect of pesticide is determined at the end of a few hours or a few days. But in chronic toxicity, the effect of a pesticide is studied on a long term basis i.e. days or months. The lethality is expressed on the basis of habitat of test species in term of lethal concentration (For aquatic animals) and lethal dose (for terrestrial animals). Lethal dose (LD) is always expressed in terms of µg or mg/kg body weight of the animal and lethal concentration (LC) in terms of part/million (ppm) or part/billion (ppb) or milligram/lit (mg/L).

LC_{50} of endosulfan to various aquatic animals:

1. Crab – *O. Senex senex*–Exposure 96h – conc. 15.14 mg/L – [15].
2. Apple snail – *Pila globosa*–Exposure 48h–conc. 1.28 mg/L – [11].
3. Fish – *Cyprinus carpio*–Exposure 96h– conc. 0.00198 mg/L – [15].
4. Fish –*Tilapia mossambicus* –Exposure 96h – conc. 0.00278 mg/L – [17].
5. Fish –*Channa punctata* –Exposure 96h – conc. 4.8 ppb – [5].
6. Fish – *Cirrhinus mrigala* – Exposure 96h – conc. 1.3 ppb – [1].
7. Fish - *Labeo Rohita* – Exposure 96h – conc. 1.1 ppb – [18].

MATERIEL AND METHODS

Investigation on the toxic effects of endosulfan to female crab *Barytelphusa guerini* involve the determination of LC_{50} i.e. the concentration which kills 50% of the test organisms under test conditions.

In the present investigation the bioassay tests were conducted using static as suggested by [6]. All investigations were conducted using technical grade endosulfan (35% EC) which is mostly used in the local area for the eradication variety of crop pests and insects. Endosulfan is not soluble in water; acetone was used as a carrier to obtain proper distribution in the test solution. A stock solution was prepared in acetone and mixed in water to obtain required dilutions of endosulfan (35% EC).

Fresh stock solutions were used for each exposure. The medium in which the animals were maintained was replaced for every 24 hours with freshwater in order to prevent the accumulation of excretory products of animals and possible biodegradation products of pesticides. Different concentrations were used for each concentration 10 crabs were exposed in two liters of diluted solutions, after 96 hours the number of crab killed in each concentration was recorded. The average mortality in each concentration was taken to determine the LC_{50} by graphical plots of percent mortality and probit mortality against log concentration.

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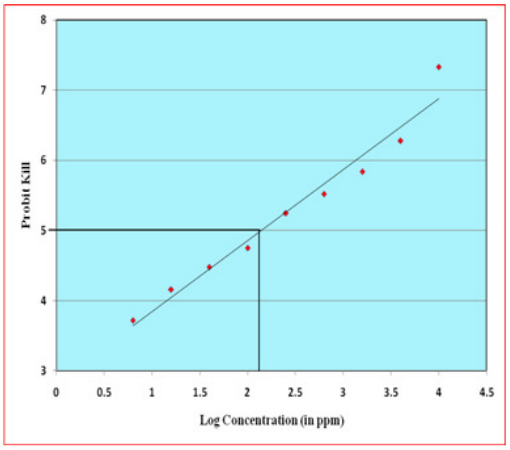
RESULTS

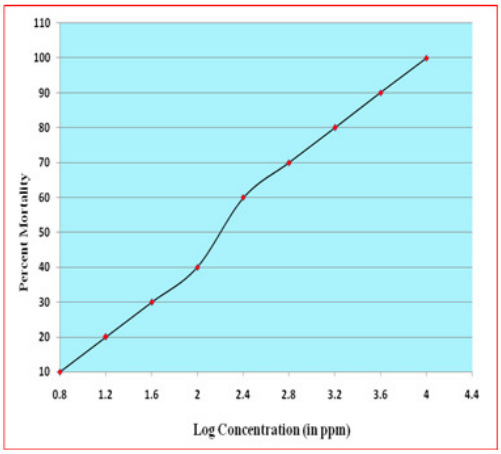
The LC_{50} values of female crab *Barytelphusa guerini* exposed to endosulfan, mortality increased up to 96 hours. The LC_{50} value decreased with increasing exposure period and inverse. The result showed that the mortality rate increases with increasing concentration.

LC_{50} of Endosulfan

Sr. No.	No. of Animal	Conc. in ppm	Mortality				% Mortality	Probit Kill
			24h	48h	72h	96h		
1	10	Control	–	–	–	–	–	–
2	10	0.4	–	–	–	–	–	–
3	10	0.8	–	–	–	1	10	3.72
4	10	1.2	–	–	1	1	20	4.16
5	10	1.6	–	1	1	1	30	4.48
6	10	2.0	–	1	1	2	40	4.75
7	10	2.4	1	2	2	1	60	5.25
8	10	2.8	2	1	2	2	70	5.52
9	10	3.2	2	1	3	2	80	5.84
10	10	3.6	2	2	3	2	90	6.28
11	10	4.0	2	3	2	3	100	7.33



Linear Curve between Probit Kill of *Barytelphusa guerini* Against Concentration of Endosulfan



Sigmoid Curve of Percent Mortalityof *Barytelphusa guerini* against Concentration of Endosulfan

There was no mortality at 0.4 ppm for endosulfan and hundred percent mortality at 4.0 ppm concentration. In case of endosulfan LC_{50} value calculated by graph log conc. against probit kill as shown in Figure was 2.15 ppm.

The data tabulated in Table, 50% mortality was observed at 2.15 ppm for endosulfan, but the mortality started from 0.8 ppm. 10% mortality at 0.8 ppm, 20% mortality at 1.2 ppm, 30% mortality at 1.6 ppm, 40% mortality at 2.00 ppm, 60% mortality at 2.4 ppm, 70% mortality at 2.8 ppm, 80% morality at 3.2 ppm, 90% mortality at 3.6 ppm and 100% morality at 4.0 ppm were observed for 96h.

DISCUSSION

Important water pollutants of ecosystem are pesticides, detergents, metals, chemicals, industrial wastes, including domestic and organic substances. Pesticides used for various purposes, ultimately drain into water by direct spraying or run off from agricultural and forest land, they directly affect the aquatic animals and reach man from various environmental compartments via the food chains. The pollutant not only affect the life cycle of aquatic organisms but may eventually became a threat to man by getting accumulated in aquatic organisms but may eventually became a threat to man by getting accumulated aquatic food chain.

Acute toxicity tests are generally used to determine the level of toxic agent that produces an adverse effect on specific percentage of text organisms in short period of time. Acute does of pesticides can normal range of variations.

The cause of death of animal owing to lethal action of the pesticides may be due to damage of respiratory surface or the formation of mucus film over the gills and body surface except for the study in *Macrobrachium caridine* in which gills surface were damaged after prolonged exposure to copper sulphate [7]. No other report is available but similar result has been forwarded for fishes [2, 20].

Acute toxicity data for DDT have been reported by many workers in fishes [12,10] and some studies have been also done in frog [9,13]. Recently [4] have investigated acute toxicity of DDT and sevin to Bull frog *Rana tigrina*.

Scanty literature was available regarding acute toxicity of two insecticides endosulfan and Eklaux for crustaceans, specially crab. Some literature is available regarding effect of heavy metal pollutants upon freshwater prawn *M. Kistenensis* [14]. They observed effect of heavy metal pollutants and reported their result as $CuSO_4$ appears to be more toxic than $ZnSO_4$ as the concentration of heavy metal,

copper and zinc sulphate increase in the medium.

The percent survival rate *M. Kistenensis* decrease [19] studied acute toxicity of insecticide of freshwater prawn *M. Lammarrel*. [3] Studied the toxicity of different pesticides on freshwater crab *Barytelphusa cunicularis* and observed that the order of toxicity was mercuric chloride, sevimole, Malathion, DDT, copper sulphate. This observation showed that the crustaceans also vary in their response towards pesticides.

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