International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Toxicity Evaluation (LC_{50}) of Endosulfan on Fresh Water Crab *Barytelphusa guerini*

Rajesh B.Desai

Head Department of Zoology, Mahatma Gandhi Mahavidyalaya, Ahmedpur, Dist. Latur, Maharashtra, INDIA (Pin-413515)

A B S T R A C T

Man's desire to control his environment has created many useful chemicals. Evolution of chemical insecticides essentially being with readily available materials such as arsenicals, petroleum oils and botanical insecticides that appeared for public age were Di-nitro compounds and Thiocyanates. Perhaps the most significant discovery leading to the proliferation of new synthetic insecticides was that of DDT. This unusual compound, 1, 1, 1–trichloro–2–2–bis (*p*–Chlorophenyl) ethane, was first synthesized by Zeidler in 1874, but its insecticidal properties were first discovered in 1939 by Miller of Switzerland. The use of DDT revolutionized the control of insect pests. Other chlorinated hydrocarbon insecticides such as BHC, toxaphene, chlordane, aldrin and dieldrin following immediately. The second massive introduction of new insecticides was initiated by a German worker. Gerhard Schrader, a pioneer in the chemistry and uses of Organ phosphorus insecticides. This work discussed about 50% mortality of experimental animal crab Barytelphusa guerini in the pesticide i.e. Endosulfan by calculus and graphically.

Keywords: Toxicity Evaluation, Endosulfan, Barytelphusa guerini.

1. Introduction

2. Man's desire to control his environment has created many useful chemicals. Evolution of chemical insecticides essentially being with readily available materials such as arsenicals, petroleum oils and botanical insecticides that appeared for public age were Di-nitro compounds and Thiocyanates. Perhaps the most significant discovery leading to the proliferation of new synthetic insecticides was that of DDT.

3. India is one of the countries which manufacture basic pesticides chemical in large scale (Krisnamurthi and Dilshith, 1982). It has been estimated that as many as 92,000 mts of pesticides will be needed for controlling pests, diseases and weeds during 1989–90 (Agarwal, 1986). Although pesticides are manufactured keeping in view a specific pest as the target, in practice, they never reach the target into. It has been calculated that only 1% of the pesticides applied would reach target pests while the remaining portion drifts slowly into the environment (Gupta and Gupta, 1980). Further, the pesticide will never remain in the area of application only but reach nearby water bodies through run–off waters badly affectingtheaquaticnon–target organisms. Therefore, it is imperative to have a better understanding of "Pesticide–Biosystem interaction".

4. As the use of pesticides reached massive proportion, a darker side of these toxic chemicals revealed itself. Carried by natural forces such as wind, rain and the flow of rivers and ocean currents, residues of organochlorines being to appear everywhere on the globe, from tropical forests to Antarctic snows. Wrose still, the slowly decomposing chemicals were talking their toll among many non–target fish and wildlife species. It becomes clear from the residue found in the bodies of dead or dying birds, that pesticides were directly responsible for their deaths.

* *Corresponding author*
E-mail address: *raj.desai07@gmail.com*

2. Organochlorines (OC)

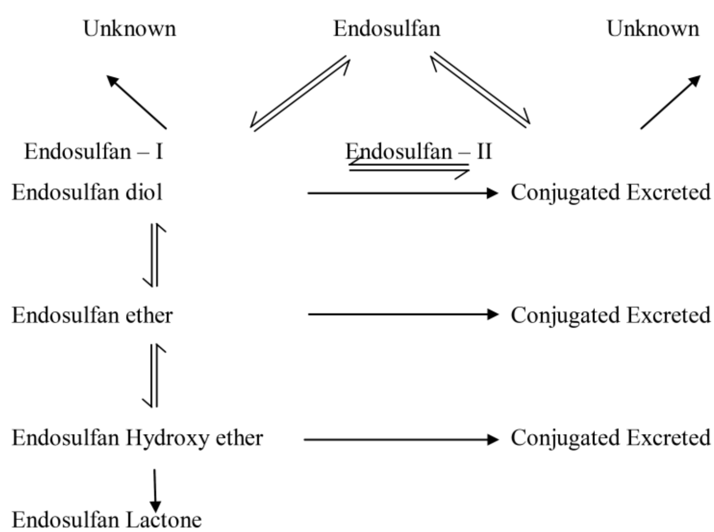
The chlorinated hydrocarbon compound includes such important insecticides as DDT, BHC, Chlordane and Dieldrin. All compounds which belong to this group are characterized by

1) The presence of carbon, chlorine, Hydrogen and sometimes oxygen atoms, including a number of C–Cl bonds.
2) The presence of cyclic carbon chains (including benzene ring)
3) Lack of any particular active intramolecular sites
4) Chemical unreactivity (i.e. they are stable in the environment)

Endosulfan (6, 7,8,10, hexachloro–1–5, 5a, 6, 9,9a, –hexahydro–6, 9–methano–2, 4, 3–benzodioxathiepine–3–oxide) is a broad spectrum cyclodiene compound. It was introduced in 1956 by 'Hoechst A.G.' under the code number 'Hoe 2671' with the trade name 'Thiodan'. Itis a brownish crystalline solid with a setting point of 70 – 100°C.

Metabolic Pathway of Typical Endosulfan in Indian Honey bee, *Apis Cerana indica*

(Rajandra Prasad Naidu, 1989)



3. Material and Method

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 Doudoroff *et al.* (1951). 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.

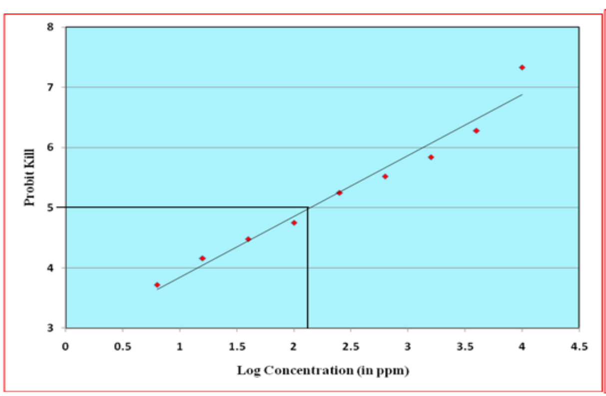
Different concentrations were used for each concentration 10 crabs were exposed in two litres of diluted solutions, after 96 hours the number of crab killed in each concentration was recorded. The average mortality in each concentration was taken to determine the LC_{50} by graphical plots of percent mortality and probit mortality against log concentration as suggested by Finney (1971).

4. Result and Observation

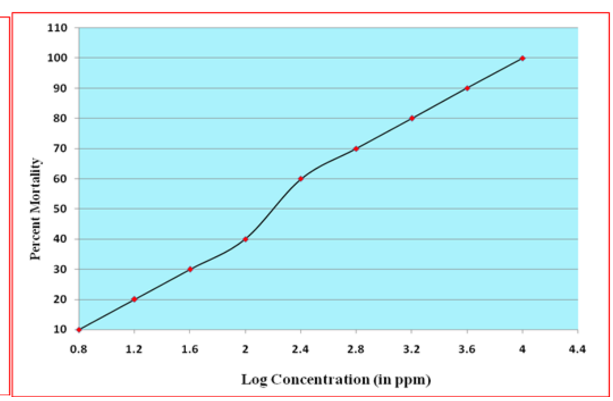
Observation:

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 Mortality of *Barytelphusa guerini* Against Concentration of Endosulfan

Result:

- The result of present study has given in the above Table and Figure.
- The LC_{50} values of female crab *Barytelphusa guerini* exposed to Endosulfan mortality increased upto 96 hours. The LC_{50} value decreased with increasing exposure period and inverse. The result showed that the mortality rate increases with increasing concentration.
- There was no mortality at 0.4 ppm for Endosulfan and hundred percent moralities 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 3.1, 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 contamination 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.

Recent investigations regarding acute to as vital organs of animals and cause fatal injury, a class of pollutions deserving attention in all environmental compartments including aquatic and terrestrial environment is toxic due to pesticides, toxic metals and degradation products.

These pollutants occur in aquatic environment at trace or ultra-trace level i.e. from parts per million experimentally 50% effect is the most reproducible measure of the toxicity of toxic agent to a group of text organisms and 96 hours, is often convenient reasonable useful exposure time for the crab, *Barytelphusa guerini*.

Static bioassay method is widely adopted (Handerson and Tarzwell, 1957; Handerson *et al*., 1959; Doudoroff, *et al.,* 1951; APHA *et al.,* 1971) shows medium lethal concentration LC_{50} values. For organisms mortality was recorded after 24, 48, 72 and 96 hours exposure time to a particular test is necessary for determinations of safe concentration.

5. Conclusion

The Acute toxicity tests are generally used to determine the concentration of a toxicant that produces a specific a diverse effect on a specified percentage of test organisms in a given amount of time. Because death is normally easily detected and obviously important adverse effect, the most common acute toxicity test is acute lethality test. Experimentally, effect on 50% of group of test organisms is the most reproducible & easily determined measure of toxicity and 96hour often convenient & useful exposure duration.

Acknowledgement

I am thankful to Dr.Ambore N.E. to guide me for this work and Dr. Garade V.B., Head of dept. of Zoology and fishery science, DSM, College Parbhani to give us laboratory facility.

References

- Agarwal, R.A. (1986) Pesticides in India. Pesticides Information, 12: 7-11.
- Gupta, R.S. and P.K. Gupta (1980) Environmental Pollution of Pesticides. Int. Sym. on Environmental Pollution and Toxicology. Nov. 28-30, 1977; Prog. Ecol. 517-173-181.
- Rajandra Prasad Naidu, (1989) Impact of endosulfan on the heamatology of fish, Cyprinus carpio. Environ. & Ecol. 5(4): 713-716.
- Doudoroff, P., Anderson, B.G., Burdick, C.E., Gultaff, P.S., Hart, W.B., Partick, E.R., Strong, E.R., Surbas, E.W. and Van Horn, W.M. (1951). Bioassay methods for the evaluation of acute toxicity of industrial waste of fish. Sewage in Waste, 23: 130.
- Finney (1971) Pestic. Biochem. Physiol. 10: 203.
- Handerson and Tarzwell (1957) Effect of sublethal concentrations of dimethoate EC30 on feeding, growth, oxygen consumption and activity in Macrones kletivs. J. Environ. Biol. 7(4): 277-284.
- Handerson, C., Pickering, Q.H., Tarzawell. (1959). Trans. Am. Fisheries Soc. 88: APHA, AWWA & WPCF. 1971. Standard method of examination of water and waste water. 13th Ed., New York.