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ENDOSULFAN TOXICITY ON *TILAPIA MOSSAMBICA*

Deshmukh D. R.*, Dama S B and Chaudhari S. B.*****
*Department of Zoology, Pratishthan Mahavidyalaya, Paithan, (M.S.), India.
**Department of Zoology, Dr Babasaheb Ambedkar Marathwada University, Aurangabad, (M.S.), India.
***Department of Zoology, Government Institute of Science, Mumbai, (M.S.), India.

ABSTRACT
Fishes *Tilapia mossambica* were exposed to lethal concentration for a short term exposure to Endosulfan pesticide was studied and observations on behaviour were recorded in laboratory condition.

KEYWORDS: Acute toxicity, Endosulfan, *Tilapia mossambica*

INTRODUCTION

Endosulfan (Thiodon (R) 6,7,8,9,10, 10 hexachloro 1-5, 5a, 6, 9, 9a hexahydro, 6, 9 methano-2,4,3-benzodioxathiepine 3-oxide) is an organochlorine insecticide used extensively in the Guntur District, Andhra Pradesh, India, for controlling pests of cotton. Endosulfan is registered as a fish toxicant (French *et al.*, 1957) and the toxicity of this compound were studied by several workers on freshwater as well as marine water fish (Gorbach et al; 1971, Herzel and Ludeman, 1971). These studies are very important as the differences in pesticide toxicity among various fish may be due to differences in their capacity to detoxify the compound (Buchler, 1966). Indiscriminate application of these pesticides in order to increase food production may effect on target organisms including economically important food fishes and other biotic ecosystem, Many researchers carried out the toxic effects on different animals by mane et. al. (1984), Thomobsingh *et.al.* (1984), and Gopal *et. al.* (2006).

MATERIALS AND METHODS

Healthy food fishes of *Tilapia mossambica* were collected from Kham River near Aurangabad, M. S. India and were maintained in the laboratory for four weeks for acclimatization. During the period of acclimatization the fishes were feed with pieces of earthworms, altered aged water was used to maintain the fish as well as for the tests. The physical parameters of test water is shown in table No. 1 and calculated by using the Standard Methods APHA (1998).

The toxicity tests to calculate LC_{50} for 96 hours is carried out by desired concentration of Endosulfan were prepared by adding the stalk solution (100 ml) of the pesticide in acetone. The pilot test were performed for the selection of the test concentration. The range of concentration were selected such that it resulted in zero to hundred percent mortality. On the basis of the results of pilot test series of different concentrations grade were prepared. Ten fishes were tested for each concentration for 96 hours. The bioassays were tested in the morning and observation in the behaviour were noted. The mortality and survival rates were recorded after every 24, 48, 72 and 96 hours. The percent mortality for each durations was conerted into probit values and plotted against log of concentration (Gosh, 1962) (Table No.2).

RESULTS AND DISCUSSION

The results shown in Table 1 to 3.The fishes when exposed to the concentration of the pesticide, the fish shows high excitation, opercular movement very fast, Swift to and fro movement, Irregular Movement, Try to jump out, Complete loss of equilibrium, the excess mucous secretion was observed from the body surface (Table No. 3) similar results were observed by G. Ahmad and Srivastava (1983) in *Cirrhinus mrigala*, *Punctitus sophore*, *M. Vittatus and N. notopterus* to the phenol and pentachlorophenol. Our results clearly show that the relationship between log of concentration and empirical probability is linear and positive indicating that the percentage mortality rate was increased with an increase in toxicant concentration as well as on the duration of exposure.

The reaction and survival of aquatic animals depend not only on the biological state of the animals and physico-chemical characteristics of water but also on the toxicity and time of exposure to the toxicant. In the present study the LC50 for 96 hours was found to be 0.0035 ppm. Pant *et. al.* (1980), evaluate the impacts of chemicals and other toxic substances on aquatic environment and organisms. Khalaf (1990) studies acute and chronic toxicity of organochlorine, organophosphate and carbonate pesticides to freshwater fish *S. mossambicus.* Gopal *et.al.* (2006) Studied effect of kalthane insecticide on freshwater fish *Tilapia mossambica.*

Table 1. Physical and chemical parameter of water used for toxicity test

1	**Temperature**	**22^0 to 25^0 C**
2	Acidity (ppm) (phenolpthalein)	**4.7 ppm**
3	Alkalinity (ppm) (Bromophenol)	**28.2 ppm**
4	Total hardness CaCO3 (EDTA)	**62 ppm**
5	Dissolved oxygen	**5.1 ppm**
6	pH	**7.9**
7	Weight of fish	**50 gm**
8	**Length of fish**	**19 Cm.**

Table 2. Physical reaction of Tilapia mossambica to Endosulfan.

Sr. No.	Endosulfan pesticide
1	High excitation
2	Opercular movement is very fast
3	Swift to and fro movement.
4	Irregular movement
5	Try to Jump out
6	Complete loss of equillibrium
7	Body curved after death
8	Mucous covering

Table 3. Toxicity test with Endosulfan in *Tilapia mossambica*

Sr. No.	Concentration in ppm	% survival and mortality							
		24 hours		**48 hours**		**72 hours**		96 hours	
		S	**M**	**S**	**M**	**S**	**M**	**S**	M
1	0.0029	100	0	100	0	100	0	100	**0**
2	0.0031	100	0	100	0	100	0	90	**10**
3	0.0033	100	0	90	10	90	10	80	**20**
4	0.0035	80	20	60	40	50	50	50	**50**
5	0.0052	40	60	40	60	30	70	30	**70**
6	0.007	40	60	30	70	20	80	20	**80**
7	0.0087	20	80	10	90	10	90	0	**100**
8	**0.010**	**0**	**100**	**0**	**100**	**0**	**100**	**0**	**100**

LC_{50} 24 hours = 0.0049 ppm
LC_{50} 48 hours = 0.0042 ppm
LC_{50} 72 hours = 0.0038 ppm
LC_{50} 96 hours = 0.0035 ppm **S-Survival M- Mortality**

The exact cause of death is not fully explained as a number of channels are operating simultaneously. The serve physiological stress at cellular as organism level seems to be responsible for the death of fish.

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ETHICS
This article is original and contain unpublished material. The corresponding author confirms that the other author has read and approved the manuscript and no ethical issues are involved.

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