

**TOXIC EFFECTS (BY LC50 ANALYSIS) OF ENDOSULFAN ON
A CYCLOPOID COPEPOD, *Mesocyclops leuckarti* (CLAUS,1857)**

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ABSTRACT

Spraying of various pesticides for controlling pests has been a very common affair in agricultural practice. As the pests develop resistance to the pesticides, use of stronger pesticides become inevitable. These pesticides accumulate in the environment and cause serious hazards to biosphere. The present study was carried to elaborate the toxic effect of one such pesticide (Endosulfan) on the fresh water. *Mesocyclops leuckarti* (Claus, 1857) was selected as a model for studying the effects of Endosulfan. Endosulfan is known as a highly efficient pesticide. At the same time details discussed in the following paper will prove that its effects on the aquatic microfauna are also significantly toxic, LC50 studies of the same have indicated that even minute doses like 0.01 ppm were lethal. For *M.leuckarti* when exposure time was 96 hours. The forthcoming paper details LC50 values of this pesticide for different periods of exposure.

Key words :- Pesticide, Endosulfan, Copepod, *Mesocyclops leuckarti*.

INTRODUCTION

Use of pesticides has been a very common practice in modern agricultural methods. These chemicals help in controlling the pests, but disturb the environmental conditions. They and their residues cause water pollution because during monsoon, they get drained off into the natural water bodies posing a threat to the aquatic organisms. Their small doses also can prove toxic to the tiny planktonic organisms. As these organisms play important role in food chain, it is necessary to gain the knowledge about the hazardous effects of the pesticides on different planktonic types.

Toxic effects of various pesticides have been assessed using cladoceran species as models (Sanders and Cope, 1966).

However, such studies on copepods are rare. In this study toxicity of endosulfan to *M.leuckarti* has been assessed for different time exposures. The review of literature shows that, it is highly toxic and its residues are reported to remain in the sediments (Rao et al., 1979). *Mesocyclops leuckarti* (Claus, 1857) is a cyclopoid copepod occurring in fresh water. Hence, it was taken as a model zooplanktonic organism for present

study to assess the toxic effects of endosulfan, which is a commonly used pesticide in the fields.

MATERIALS METHODS

Mesocyclops leuckarti were collected from the Masunda and Makhmail lakes from Thane city and stock cultures were maintained in the laboratory. Phased Fertilisation Technique (Phale, 1984) was used for propagating the cultures in fresh water. Adults were drawn from the stock cultures and used for LC50 experiments. Stock solution of endosulfan was prepared in distilled water and its dilutions were made as per the requirements.

For the experiments, sets of 50ml beakers were prepared; each beaker containing 40 ml prefertilised medium and a different dose of endosulfan. The doses ranged from 0.01ppm to 0.1ppm. Ten M. leuckarti organisms were exposed to every dose and mortality was recorded. The experiments were carried for different time exposures such as 2 hours, 24 hours, 48 hours and 96 hours. For each time exposure the experiments were repeated three times and averages were calculated. Control sets were also prepared simultaneously and observed. Temperature during the experiments ranged between 24°C to 27°C, Probit analysis was used to determine the LC50 values.

RESULTS AND DISCUSSION

As stated before, pesticidal concentration of endosulfan ranged from 0.01 ppm to 0.1ppm. The results are shown in Table 1.

2 hours exposure: There was no mortality at the concentrations 0.01 and 0.02 ppm. 10% to 20% mortality was observed for 0.03 to 0.05 ppm concentrations, whereas at 0.06 ppm concentrations there was sudden increase in deaths i.e. 63.33% there was a steady increase in mortality for the concentrations 0.07 ppm onwards reaching 100% at 0.1ppm.

24 hours exposure : 10% mortality was observed at 0.01 ppm concentration, 20% at 0.02 ppm, 23.33% mortality at concentration 0.03ppm and 0.04 ppm concentration showed 40% mortality increased upto 93.33% in the further doses from 0.05 to 0.08ppm.

48 hours exposure : 20% mortality was observed in pesticidal concentration of 0.01ppm, 0.04ppm showed 46.66% mortality, 95% mortality was observed at 0.08 ppm concentration.

72 hours exposure : 33.33% mortality was recorded at concentration 0.01 ppm. 0.02 concentration showed 43.33% mortality, whereas 96.66% mortality was recorded at concentration of 0.06 ppm.

Table-1 : Percent mortality in Mesocyclops leuckarti observed for different time exposures and concentrations of endosulfan

Endosulfan	Percentage mortality at different exposures				
	2 hours	24 hours	48 hours	72 hours	96 hours
Control	0	0	0	0	0
0.01	0	10	20	33.3	40
0.02	0	20	36.66	43.33	56.66
0.03	13.33	23.33	43.33	46.66	56.66
0.04	13.33	40	46.66	56.66	73.33
0.05	20	43.33	60	80	83.33
0.06	63.33	76.66	76.66	96.66	100
0.07	73.33	90	93.33		
0.08	80	93.33	95		
0.09	96.66				
0.1	100				
LC ₅₀ determined by probit	ppm	0.045 ppm	0.041 ppm	0.035 ppm	0.014 ppm

96 hours exposure : 49% mortality was observed at 0.01 ppm concentration and 100% mortality at 0.06 ppm concentration of endosulfan.

It was observed during LC50 studies that, M.leuckarti showed heavy mortality when the duration of exposure was 96 hours. At this duration the pesticidal concentration in micro doses also proved lethal for adult M.leuckarti. 63.33% mortality was recorded at 0.06 ppm concentration of endosulfan for 2 hours exposure, whereas at the same concentration 100% mortality was observed for 96 hours exposure. Thus, as the period of exposure increased, the rate of mortality went on increasing giving low LC50 Thus endosulfan proves to be more toxic even in lower concentrations when the exposure is prolonged.

As such endosulfan has been found to be highly toxic even for megascopic animals like snails (rao et al., 1994). The current paper envisages effect of the said pesticide on a

microscopic zooplankton and the results do indicate comparable effects of Endosulfan. Fish species cultivated on commercial basis have also been adversely affected by endosulfan (Rao et al., 1980), M. leuckarti is used as the feed organism for these cultivated fishes. Thus, effect of endosulfan on this microorganisms also needs to be taken as a matter of serious concern.

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