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## Toxic effect of mardo on bimodal oxygen uptake in a fresh water fish, *Labeo rohita* (Ham.)

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**Abstract-** The toxic effect of Mardo (profenofos i.e. pesticide) on bimodal oxygen uptake in a fresh water carps fish *Labeo rohita* (Ham.). The LC50 Values of profenofos (Mardo) were calculated to be 0.450, 0.420, 0.300 and 0.270 mg/L for 24 hrs, 48 hrs, 72 hrs and 96 hrs respectively exposure at 30.0 + 1.0°C . Control group of fishes (35.0 + 1.5g secures 52.480 + 1.72 cc/kg/hr. from gills and 2.810 + 0.32 where as from skin through aerial route i.e, total 55.250 + 1.25 cc/kg/hr Mardo (Profenofos) intoxication (at sub lethal concentrations of 0.20, 0.31 and 0.250 mg/L in *Labeo rohita* caused Significant decrease in aquatic respiration through gills and total oxygen uptake but significant increase in aerial oxygen uptake through skin as compared to control.

**Key words:** Mardo, Bimodal O<sub>2</sub> uptake, *Labeo rohita* (Ham.).

### INTRODUCTION

Respiration is one of the most important physiological parameters on which many of the vital functions like growth and reproduction of the fish depends,<sup>1</sup> which in turn, has a direct bearing on the productivity of fresh water ecosystem in terms of fish production per unit area. The fishes are water breathers using their gills and integument for obtaining O<sub>2</sub> both through aquatic and aerial route.

It kept moist but few species have developed specialized accessory respiratory organs to extract O<sub>2</sub> from air also (ie, bimodal respiration). The indiscriminate and extensive use of pesticides has adversely affected the several non target organisms of aquatic ecosystem. One of the early symptoms of a cute pesticide poisoning is the

alteration or failure of respiratory metabolism.<sup>1</sup> Changes in O<sub>2</sub> uptake of fishes in response to pesticide exposure are varying in different species of fishes exposed to a variety of pesticides.

The effect of pesticide exposure are varying in different species of fishes exposed to a variety of pesticides. The effect of pesticides on oxygen consumption has been extensively studies in a number of water breathing fishes but the effect of pesticide poisoning on O<sub>2</sub> uptake in air breathing has been less studied in siluroid fishes,<sup>2-8</sup> as such the present study has been taken into account in fresh water siluroid fish, *Labeo rohita* (Ham.)

### MATERIALS & METHODS

Live specimens of *Labeo rohita* (Ham.) were procured from local fish dealers at Dighi pond, Gaya. The fishes were transported to the laboratory for proper

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acclimatization for about 10 days. They were Red daily with pieces of goat's liver. The infected or unhealthy fishes were discarded and the rest fishes were washed in 0.1% KMnO<sub>4</sub> Solution for 30 minutes to get rid of external infection. Before Starting any experiment, toxicity (LC<sub>0</sub>, LC<sub>50</sub> and LC<sub>100</sub>) values of Mardo (Profenofos) were calculated by the Method as described by APHA (2005)<sup>9</sup> APHA *et al.* (2012)<sup>10</sup> and the experiments were conducted at sublethal Concentrations which is illustrated in table-1.

The LC<sub>50</sub> Values of Mardo (Profemofos) were Computed to be 0.450, 0.420, 0.300, and 0.270 mg/L for 24 hrs, 48 hrs, 72 hr and 96 hrs exposures respectively. The details of the methods employed in the determination of bimodal O<sub>2</sub> uptake were those as followed by Ray and Kumar (2013)<sup>3</sup> and Sharma and Kumar (2013)<sup>4</sup>. The difference of significance, if any, between control and experimental animals were calculated by Student's t-test at the level of 5%. The dissolved O<sub>2</sub> content of water was measured by winkler's Valumentric method as described by Welch (1948). Aquatic O<sub>2</sub> consumption was calculated from the differences between O<sub>2</sub> level of the ambient water in the respirometer before and after the experiment and the valume of water inside the respirometer. O<sub>2</sub> Consumption from air was calculated from the range of imbalance of the level of the manometric fluid and by the use of combined gas law equation and vapour pressure (Dejours, 1975). PH of ambient water was measured by an electronic PH meter.

**RESULTS & DISCUSSION**

The data showing the effect of Mardo, O<sub>2</sub> uptake, percentage (%) increase or decrease in O<sub>2</sub> consumption in

*Labeo rohita* (Ham.) are presented in Table-1 So, that the table indicats that oxygen uptake through aquatic, aerial route and total O<sub>2</sub> consumption in control group of fishes were 52.480 + 1.72, 2.820 + 0.32, and 5.5. 250 + 1.25 respectively in control group of fishes. Mardo (profenofos) in toxication (at sublethal con contraction of 0.18, 0.21 and 0.215 mg/L) in *Labeo rohita* (Ham.) caused significant decrease both in aquatic and total O<sub>2</sub> uptake but significant increase in aerial O<sub>2</sub> uptake (through skin) as compared to control.

There are mainly three groups of pesticides such as organochlorine, organophosphate and carbamate which are used for selective killing of pests in biological community. The main thing is that all the different groups of pesticides of the same group do not have some effect on aquatic organism.<sup>11-13</sup> The mode and site of action of different biocides also differ and therefore, effect of different biocides in different species of fishes unless a detailed investigation is carried out. In this investigation Mardo (Profenofos) pesticide brought significant decrease in O<sub>2</sub> uptake as compared to control.

The fluctuations in the physico-chemical characteristics of the ambient water, the air breathing fishes are equiped with bimodal gas exchange machinery employing two modes of respiration using highly vascularized air breathing organs to combat the adverse ecological condition of their habitat.<sup>14-17</sup> Therefore, it may be considered as an adaptive mechanism to avoid the stress of pesticide in the aquatic media. However, the increased dependency on respiration through aerial route probably indicates that the fish tried to avoid aquatic medium containing sublethal concentration of any pesticide.

**Table-1: Showing the effect of Mardo on bimodal oxygen uptake in air breathing fish *Labeo rohita* (Ham.) at water temperature 30 + 1°C, N.= 6, + = SEM = Significant (P<0.05)**

Condition	Dose (mg/L)	O <sub>2</sub> Consumption (CC/ Kg/hr)			% decrease in total O <sub>2</sub> uptake	% increase in aerial O <sub>2</sub> uptake
		(Aquatic through Skin + gills)	Aerial	Total		
Control values	00.	52.480+1.72*	2.810+ 0.32	55.250+ 1.25*	—	—
Mardo	0.20	41.061+1.76*	8.761+ 0.12	49.810+ 1.21*	8.175	235.750
Mardo	0.31	42.052 + 1.25*	5.520+ 0.25	47.625+ 1.32*	12.314	103.180
Mardo	0.250	35.152+ 1.56*	6.582+ 0.18	41.810+ 1.21*	23.125	151.250

## CONCLUSION

It is the fact that the nutritive nutrients value of each and every species of fishes under this contention is essential. The flora and fauna are vital for aquatic organism that provides nutrients to them and the nutrients absorbed by flora that also transferred to the other tropic levels after utilization. Due to increased application of pesticides to ameliorate the problems cause pollution of fresh water ponds, lakes, rivers and show on. The industrial effluents let out by major industries form another sources of water pollution. Since, the fishes are extremely sensitive to pesticides and are also used as indicators in water quality management.

As we know that, fishes having rich sources of animal proteins, carbohydrate and fat. These are cheaper than that of Mutton. These are good sources of vitamins and easily available in the open market. These are maintaining the malnutrients in workers and poorer. At present time, it provides good employment to maintain the economic status for people.

In recent years pollutants induced toxicity in fresh water fishes is well documented, so toxicants induced changes in the respiratory behaviour as well as metabolic activities of fishes, that indicate the attention of many world Biologists. However present study concluded an object to evaluate the toxic impact of Mardo pesticide on the total O<sub>2</sub> uptake of air breathing edible fish *Labeo rohita* (Ham).

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