STUDY OF OXYGEN CONSUMPTION IN THE FRESH-WATER FISH Labeo rohita (HAM.) AFTER EXPOSURE TO THE PHYTOTOXIN FROM Lysostaphin Eriophalus (DEC.)

R.G. Patil and S.G. Nanaware*
Department of Zoology, L.B.S. College, Satara, 415002, M.S. (India)
*Department of Zoology, Shivaji University, Kolhapur, 416004, M.S. (India)

The respiratory activity of the freshwater fish Labeo rohita was affected with significant change in the oxygen consumption after its exposure to the sublethal concentration of phytotoxin from fruits of Lasiosiphon eriocephalus. The rate of oxygen consumption was found to be decreased. This depletion in the rate of oxygen consumption was time dependent and rate of oxygen consumption was decreased with increase in the exposure period. The decreased rate of oxygen consumption affects the metabolic activity in the fish L. rohita. The results were discussed in relation the the gasous exchange, metabolic activity and mortality of the fishes.

The change in the respiratory activity have been used as an indicator of stress in toxicant exposed animals. Oxygen is necessary for metabolic activities of animals and to provide energy for life. The study of oxygen consumption in fish is an index of oxidative metabolism. Oxygen consumption experiments have been done to assess the impact of various toxicants 2-5. However, studies on oxygen consumption of fish are rare. Hence, attempts have been made in the present study to assess the effect of phytotoxin from fruits of L. eriocephalus on the oxygen consumption of the fish L. rohita.

MATERIALS AND METHODS

Fruits of the L. eriocephalus were collected, air dried and powdered mechanically. This powder was then extracted in absolute alcohol. The ethanol extract of the fruits of L. eriocephalus was dried in vacuum desicator. The fishes, L. rohita were collected form the local Thank Dhom (Satara District) and acclimatized to laboratory conditions for 15 days. After facilitating acclimatization, ten healthy fishes were selected and exposed to the sublethal concentration (77.00 ppm) of ethanol extract of the fruits fo L. eriocephalus. At the interval of 2, 24, 48, 72, 96 and 120 hrs. of intoxication two fishes were taken out and used for the study of oxygen consumption. Control set was also maintained. Oxygen consumption of fishes in different concentrations was estimated following “Winkler’s method” preventing O₂ diffusion from atmosphere6.

RESULTS AND DISCUSSION

The rate of oxygen consumption and percentage decrease and increase in oxygen consumption of the fish L. rohita when exposed to phytotoxin from the fruits of L. eriocephalus for 2, 24, 48, 72, 96 and 120 hrs. has been shown in Table-1. It was found that the rate of oxygen consumption increased (8.65%) immediately after 2 hrs of exposure of fish to phytotoxin while this rate of O₂ consumption slowly decreased after 24 hrs of exposure period (-2.19%).

The immediate increase in the rate of oxygen consumption is in agreement with earlier studies6-10. The initial increase in the rate of oxygen consumption is a result of natural defence to compensate the inhibited
mitochondrial oxidation and energy metabolism. Haniffa and Augustin\textsuperscript{11} were of the opinion that any organism subjected to the pesticidal treatment will be initially excited due to stress on respiratory rate therefore if consumes more oxygen.

In the present study the fish showed the initial increase in the rate of oxygen consumption and excitement. The excitement might be due to the defense to escape from the hypoxic conditions created by the phytotoxin, where as this hypoxia and excitement results in the increased rate of oxygen consumption in order to compensate PO\textsubscript{2} level of blood and inhibited metabolism.

The decrease in the rate of oxygen consumption was observed in \textit{L. rohita} after 24 hrs of exposure to phytotoxin from \textit{L. erocephalus}. It was also revealed that the rate of oxygen consumption was decreased slowly with increase in exposure period. The highest decrease in the rate of oxygen consumption was observed as 12.75\% after 120 hours of exposure period. Similar types of results were obtained in fish \textit{M. vittatus} and in \textit{C. punctatus} and in \textit{L. rohita}, after exposure them to heavy metals, penthoate, dimethyl parathion, zinc sulphate and copper and nuvan, respectively.

Previous findings have also indicated that more amount of toxicants brought in contact with gills due to increased opercular activity, causing damage to gills and to gill epithelium\textsuperscript{12}. In this investigation damaged gill epithelium and thin film of coagulated mucus on it may be due impairment of O\textsubscript{2} uptake and osmosis which results in the decreased efficiency for gas exchange. This may be reason behind the decrease in the rate of oxygen consumption.

Finally it is concluded that the phytotoxin from fruits of \textit{L. erocephalus} affects the rate of oxygen consumption in fish \textit{L. rohita} which may further increase rate of mortality in the fish.

### Table - 1 Effect of \textit{L. Eriocephalus} on the O\textsubscript{2} consumption of freshwater fish \textit{L. rohita}.

<table>
<thead>
<tr>
<th>Exposure period (hrs)</th>
<th>Control</th>
<th>Treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.00774</td>
<td>0.0841 (8.65)</td>
</tr>
<tr>
<td>24</td>
<td>0.0775</td>
<td>0.0758 (-2.19)</td>
</tr>
<tr>
<td>48</td>
<td>0.0769</td>
<td>0.0732 (-4.8)</td>
</tr>
<tr>
<td>72</td>
<td>0.0773</td>
<td>0.0719 (-0.98)</td>
</tr>
<tr>
<td>96</td>
<td>0.0774</td>
<td>0.0691 (-10.72)</td>
</tr>
<tr>
<td>120</td>
<td>0.0776</td>
<td>0.0677 (-12.75)</td>
</tr>
</tbody>
</table>
REFERENCES