PESTICIDE EXPOSURE - OXYGEN CONSUMPTION OF WHOLE ANIMAL
METHOD

The rate of $O_2$ consumption of the whole animal was measured both in lethal and sublethal concentrations of malathion. The measurements for the period of 4 days in fresh water without malathion served as control. The selected exposure periods were 24, 48, 72 and 94 hrs for lethal and 24-hr, 7, 15, 25 and 30 days for sublethal studies. The experimental procedure was the same as described earlier in the time course study.

RESULTS

The values of $O_2$ consumption in lethal concentration at 24, 48, 72 and 94 hrs of exposure periods are given in Table 7 and Fig. 5. The % suppression in $O_2$ consumption increased with the period of exposure and reached maximum at the end of 84 hr exposure. However a slight increase in $O_2$ consumption was noticed at 72-hrs before the respiratory activity was arrested leading to mortality at 96 hrs (Fig. 6).
The data for the rate of \( O_2 \) consumption (\( O_2 \) ml/g/hr) in Lamellidene marginalis in different sublethal exposure periods of malathion like, 24-hr, 7, 15, 25 and 30 days and also in the control medium (fresh water without malathion) are presented in Table 11 and Fig. 8. The % suppression and % recovery in \( O_2 \) consumption at different sublethal exposure periods calculated in relation to the rate of \( O_2 \) consumption in the control are presented in Fig. 9. The suppression in \( O_2 \) consumption was 70, 45, 55, 18 and 3 at 24-hr, 7, 15, 25 and 30 day exposure periods respectively. Further, towards the end of the 30 day exposure period there is a rise in \( O_2 \) consumption from its early maximal % suppression and the animals exhibited a good amount of recovery in their \( O_2 \) consumption showing 82% and 97% at 25 and 30 days respectively.

**DISCUSSION**

Respiratory activity (\( O_2 \) consumption) has been used as sensitive and good indicator of stress in aquatic animals exposed to pollutants in general.
(Sellers et al., 1975; Bayne et al., 1980; Mahajan and Dheer, 1980; Bashamohideen and Subba Rao, 1982; Bashamohideen and Parvati, 1984; Bashamohideen, 1982, 1984).

The O$_2$ consumption in bivalves represents the product of two factors — ventilation volume and quantity of gas withdrawn from each litre of water. The fluctuations in the respiratory levels observed sometimes in a given specimen are considered probably due to variations in the quantity of water moved through the gills and to interruption of the ventilation current either spontaneous or in response to an external stimulus (Ghiretti, 1966).

In lethal exposure, the % suppression in O$_2$ consumption was progressive with the period of exposure and the slight recovery at 72 hrs may be due to the hyperactivity before the death of the animal.

In sublethal exposure, the early suppression in O$_2$ consumption was removed and the animal is
recovered from the toxic effect of malathion at the end of 30 day period. This indicates the animal's capacity to compensate to pollutional stress. Thus in the present study malathion could cause O2 consumption to oscillate outside its normal range of variations, mostly suppressive, yet with time the O2 consumption could return to the nearing normal state without suffering lasting effects.

Further the operation of the detoxification mechanisms (Cser, 1971) might be more active after 24 hr exposure and hence the highly depressed level of O2 consumption at 24 hrs might be brought up during adaptation to required level. Further this elevation of oxidatative metabolism may also be due to the activation of microsomal drug metabolising enzymes which bring about the biodegradation of the pollutant to reduce its toxicity as reported by Mukhopadhyay and Dehadrai (1978) in air breathing catfish, Clarius batrachus, where the microsomal drug metabolising enzymes from the liver and gill were enhanced under sublethal exposure of malathion.
toxicity after 10 days, indicating that the organs are on the way of compensation to pollutional stress. Thus $O_2$ consumption as involved in this investigation could serve as good indicator of pollutional stress especially at sublethal level.