

## Abstract

Rotifers are a group of zooplankton due to the sensitivity to chemicals, their central position in food chains, reproduction rapid, short-term generation and distribution vast global ecotoxicology studies are the high importance. One of important factors in ecosystem pollution is agricultural pesticides that are very dangerous for aquatic communities. Lethal concentrations ( $LC_{50}$ ) of paraquat and permethrin on freshwater rotifer (*Brachionus calyciflorus*) determined and impacts of sublethal concentrations of these pesticides on this zooplankton were studied. Rotifers cultured at highly controlled conditions by using chlorella (*Chlorella vulgaris*) as food. The  $LC_{50}$ s were calculated for pesticides based on O.E.C.D standards. We determined lethal concentrations of paraquat herbicide and permethrin insecticide  $0.541 \text{ mg l}^{-1}$  and  $8.997 \text{ mg l}^{-1}$  respectively and based on these concentrations, four treatments plus one control group determined for each pesticide. Treatments concentrations were  $0.027$ ,  $0.054$ ,  $0.1$  and  $0.27 \text{ mg l}^{-1}$  for paraquat and  $0.449$ ,  $0.899$ ,  $1.799$  and  $4.498 \text{ mg l}^{-1}$  for permethrin. Effects of these two pesticides on population growth and reproduction of freshwater rotifer *B. calyciflorus* were studied using these four treatments. The results showed that difference in density of rotifers in all treatments compared to the control group on tenth day of the experiment were significant ( $P < 0.05$ ). Specific growth rate (per day) did not show a significant difference compared to control group for paraquat herbicide at concentration of  $0.027 \text{ mg l}^{-1}$ . Compared to control group, the ratio of ovigerous females to non-ovigerous females and ratio of mictic females to amictic females at all concentrations of both pesticides were impressed significantly. Increasing in mictic/amictic ratio at the end of the experiment with increasing by concentrations of pesticides indicates the dominance of sexual reproduction in the rotifer life cycle. For Paraquat at concentration of  $0.27 \text{ mg l}^{-1}$  and Permethrin at concentration of  $4.498 \text{ mg l}^{-1}$  ratio of mic/amic not defined because of stop in reproduction and population growth. paraquat and permethrin classified as highly toxic and average for aquatic communities respectively. Specific growth rate is the most sensitive indicator to study effect of these pesticides on rotifer population growth.

Keywords: Paraquat, Permethrin, Rotifer, *Brachionus calyciflorus*,  $LC_{50}$



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**LC<sub>50</sub> 24h of paraquat herbicide and permethrin insecticide  
and their effect on reproduction and population growth of  
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