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The Thesis Submitted for the Degree of M.Sc (in the field of Fisheries)

Investigation of effect of Copper, Mercury and Nickel on growth and reproduction of freshwater rotifer (*Brachionus calyciflorus*) isolated from Sistan's water resources

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Abstract

In the resent years, the use of rotifers in fish larviculture and also in ecotoxicological studies has substialy increase. This greater interest has been due to important role of rotifers in freshwater food chain, short generation time, ease of culture, their sensitivity to common pollutants, the commercial availability of cysts, and the existence of reliable, standardized protocols. In this study, we quantified the population level responses of *Brachionus caluciflorus* exposed separately to five different concentrations of Cu (0, 0.025, 0.05, 0.1, 0.2 and 0.4 mg/l as $CuSo_4$), mineral Hg (0, 0.0005, 0.001, 0.002, 0.004 and 0.008 as $HgCl_2$) and Ni (0, 0.025, 0.05, 0.1, 0.2, and 0.4 mg/l as $NiCl_2$) with three replicates in each concentrations at 25±1 °c and under an algal food density of 1-1.5 × 10^6 cells/ml of *Chlorella vulgaris*. We derived population density (per day), population growth rate (r), ratio ovogerous female to non-ovigerous females and ratio mictic females to amictic females in both controls and in heavy metal treatments. In general, the population growth of *B. calyciflorus* significantly decreaseed with increasing concentration of Cu, Hg or Ni in the medium ($P<0.05$). The peak population densities in control were 55 ind./ml wherease in heavy metal treatmentents, they ranged from 11.44±0.05 to 33.55±0.03 ind./ml depending on the concentration. The rate of population increase also significantly decreaseed with increasing concentration of Cu, Hg or Ni. The r varied from 0.07±0 to 0.56±0 depending on the metal type and concentration. Cu, Hg and Ni all significantly influenced the OF/NOF ratio and MF/AF ratio in the population of rotifers ($P<0.05$). Cu at 0.2 mg/l (second day) and 0.4 mg/l (third day), Hg at 0.004 and 0.008 mg/l (both in third day) and Ni at 0.4 mg/l (in sixth day) increaseed significantly the OF/NOF ratio ($P<0.05$). Cu at 0.2 (third day) and 0.4 (second and third days), Hg at 0.0005, and 0.001 (both in fifth day) and 0.002 (forth day), also Ni at 0.1 (sixth day) and 0.2 (seventh day) increaseed significantly MF/AF ratio ($P<0.05$).

Keywords: *Brachionus calyciflorus* rotifer, heavy metals, specific growth rate, population density