



Title: Assessment on Biocides Bioaccumulation in Mullet *Liza klunzingeri* in Kuwaiti Waters, off the Arabian Gulf

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Abstract: Biocides, such as formaldehyde (HCHO), sodium hypochlorite (NaOCl) and glutaraldehyde (C₅H₈O₂) that are commonly used in thermal, desalination and power plants and industries were tested on the commercially important mullet fish, *Liza klunzingeri* to determine the environmental contamination in the stressed ecosystem of Kuwait Bay sites. Multi-factor Probit analysis toxicity tests (96 h) on *L. klunzingeri* showed the lowest observed effective concentration (LOEC) and median lethal concentration (LC₅₀) with NaOCl (0.019 and 0.027 $\mu\text{g L}^{-1}$) followed by HCHO (0.058 and 0.157 $\mu\text{g L}^{-1}$) and C₅H₈O₂ (0.056 and 0.072 $\mu\text{g L}^{-1}$). Site-wise analysis in the absence of feed showed high biocides toxicity in *L. klunzingeri* reared in seawater from Site I when compared to Sites II-III. Experiments were conducted (2-9 months) by rearing fish separately in seawater collected from three Kuwait Bay sites to test the bio-accumulated toxicity levels at LOEC of biocides fed fish using Feed Conversion Ratio (FCR) calculation. The lowest FCR was observed in fish fed with biocides in the sequence of NaOCl (0.40-1.1) followed by C₅H₈O₂ (0.91-1.2) and HCHO (0.92-1.3) as well as with fish reared in seawater from Site I followed by Site II and Site III. High FCR was recorded in control (1.2-1.6) without the addition of biocides. These results exemplify the use of *L. klunzingeri* as an indicator species and may characterize a better quantification of biocides bioaccumulation using FCR calculation in mullet fish.