ABSTRACT

ACUTE AND CHRONIC TOXICITY OF ENDOSULPHAN TO THE MOSQUITOFISH, *Gambusia puncticulata* (Poey 1854)

Amika Wright

The primary objectives of the present investigation were to determine the 24hrLC_{50} value of endosulphan to the mosquitofish, *Gambusia puncticulata*, using a static test system and to evaluate the effects of sub-lethal endosulphan levels (0.2691, 2.691 µg/l) and duration of exposure (10, 20, 30 days) on swimming behaviour, histopathological alterations in critical organs and gross biometric indices. Observations were re-assessed after a substantial recovery period.

The 24hrLC_{50} value for *G. puncticulata* was determined to be 10.760 ppb (slope value 3.865 ± 0.576) from Probit analysis. Swimming behavioural responses were dependent on endosulphan concentrations administered and duration of exposure. The frequencies of behavioural responses were more pronounced in fish exposed to 2.691 µg/l endosulphan. Disruptions in swim behaviour lasted for several days then declined gradually until no further effects were observed. All behavioural responses were reversible following recovery.

Histopathological investigations revealed severe structural damage to the liver, gills and alimentary canal resulting from endosulphan exposure. Frequency of alterations were not significant ($p>0.05$) between concentrations administered. A small percentage of pathologies in the gills and alimentary canal were dependent on duration of exposure. Histopathological changes to the gills and alimentary canal were irreversible after recovery. Endosulphan related damages to liver tissue were reversible due to the liver's regenerative properties.

Duration of endosulphan exposure had a significant effect ($p<0.05$) on condition factor (K) and hepatosomatic indices (HSI). With increasing length of exposure, mean K and HSI values increased. Significant variations in gonadosomatic indices (GSI) and fecundity were evident with duration of endosulphan exposure; however these differences were inconclusive as variations were also apparent in control fish. There were no significant differences ($p>0.05$) in mean GSI, HSI and fecundity values between treatment and control fish. Significant variations ($p<0.05$) in condition factor (K) values were evident between treatments. No significant differences ($p>0.05$) in GSI, fecundity and K values were observed between treatments subsequent to recovery, however HSI values were significantly ($p<0.05$) different between treatments and control fish. Other factors may have contributed to these variations as significant differences ($p<0.05$) were also apparent in control fish.

Keywords: endosulphan, *Gambusia puncticulata*, histopathology, biometric indices, behaviour, acute, sub-lethal, gills, liver, alimentary canal, GSI, HSI.