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Acute Toxicity Effects in the Kidney of Juveniles of *Tilapia mossambica* due to Pursuit

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Abstract - A group of fish fingerlings of Tilapia mossambica were exposed to different sub lethal concentration of herbicide pursuit for histological toxic effects of kidney with two sub lethal concentration (63.7 ppm 85.0 ppm) for 96 hrs. Kidney shows slight glomeruli exhibited mild shrinkage and breakage of their outer cell wall. But higher concentration (127.5 ppm) of Pursuit for 96 hrs. caused hypertrophy and compactness of the convoluted tubules.
Keywords: Acute toxicity, juveniles, kidney, pursuit, Tilapia.

Introduction - Pesticide toxicity is a serious problem for any water resources which may cause degradation of water quality and affect the organic life of that water body. Toxicity may include both lethal and sub lethal effect such as changes in growth development and damages to various organ system. The test herbicide (pursuit) falls in the category of carbamate extensively used for the control of weeds in soyabean and groundnut crops to get maximum yield of crops in Agriculture.

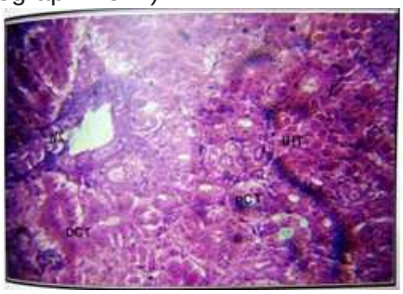
Aquatic toxicity can be more specifically measured on fingerlings (juveniles) of fishes rather than on adult once, as they are immature adult forms in its outward appearance having delicate organ system hence they are more sensitive towards any environmental changes. Considering the recent trend in the field of fishery the present work has been carried on fingerlings of Tilapia mossambica.

Kidney is the responsible organ for elimination and separation of harmful substances from the body so any toxicant present in water causes various structural changes in the kidney as shown in a few recent studies (Mandal & Kulshreshtha, 1980). It is therefore aimed to examine the acute changes in the kidney of Tilapia mossambica fish fingerlings due to pursuit intoxication.

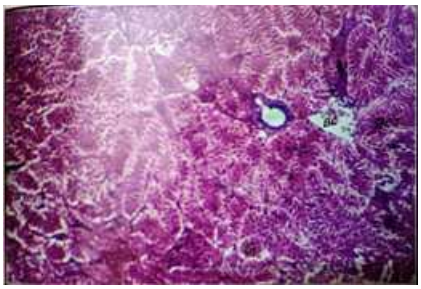
Material & Method : Live fingerlings of Tilapia mossambica (average length of 5 to 7 cm) were collected from the fish farm and acclimatized in to the laboratory condition. After detection of LC_{50} value to observed the acute toxicity (96 hrs.) of pursuit three different sublethal concentration (63.7 ppm, 85.0 ppm and 127.5 ppm) of their LC_{50} value were selected and the test fingerlings were expose to these three sublethal concentration.

After the termination of experiments i.e., after 96 hrs, all the fingerlings were sacrificed and their kidney were dissected out. Both the organs were weighed first and fixed in bouin's fluid, blocks were prepared in paraffin and 5 to 6 mm sections were cut for normal histopathological studies using hematoxylin and eosin staining (Ehrlich, 1886). Stained sections were examined by student's microscope and micro photographed.

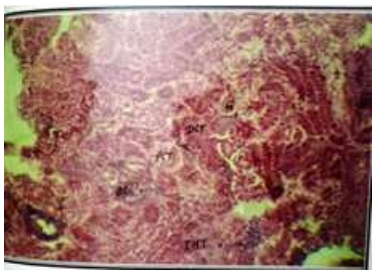
Result & Discussion : The kidneys of unexposed fingerlings are paired elongated structure showed well demarkated cortex and medulla. Histologically it is made up of a large number of tubules known as proximal and distal convoluted tubules. A mass of capillaries which is known as glomeruli present in the capsule and some haemopoetic tissues were distributed in the tubules (Microphotograph No. 1). Mild degenerative changes were observed in the kidney after 96 hrs exposure of 63.7 ppm pursuit. Glomeruli exhibited shrinkage and swelling of their outer wall (Microphotograph No. 2). Fingerlings exposed in to 85.00 ppm pursuit for 96 hrs resulted extensive necrosis in haemopoetic tissue proximal and distal convoluted tubules showed shrinkage (Microphotograph No. 3). After 96 hrs exposure of 127.5 ppm pursuit caused by hypertrophy and compactness of the convoluted tubules. Basement membrane of the glomeruli was ruptured and interstitial tissue were damaged and vaccuolation appeared (Microphotograph No. 4).



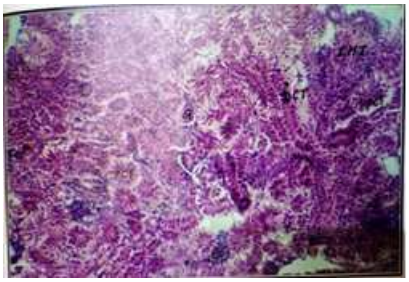
Microphotograph-1. - TS of kidney of Control O. mossambica fingerlings stained with haematoxylin-Eosin stain x 400.



Microphotograph-2. - TS of kidney of kidney of O. mossambica fingerlings after 96 hrs. exposure to 63.7 ppm pursuit.



Microphotograph-3. - TS of kidney of kidney of O. mossambica fingerlings after 96 hrs. exposure to 85.0 ppm pursuit.



Microphotograph-4. - TS of kidney of kidney of O. mossambica fingerlings after 96 hrs. exposure to 127.5 ppm pursuit.

Various researchers have also reported histopathological changes in the kidney of fishes due to pesticidal and other toxicants exposure. Pulla Rao, (1998) reported shrinkage in glomeruli disintegration of renal tubules due to intoxication of detergents in the kidney of Labeo rohita fingerlings. In the present study renal tissue of Tilapia rnossambica exhibited glomerular shrinkage and breakage of kidney tissue till 96 hrs. exposure of 63.7 ppm pursuit. Pandey et.al., (1997) also reported histopathological alterations in the kidney of Liza parsia.

Degenerative changes like vaccuolation, swelling of haemopoetic tissue by hypertrophy in convoluted tubules were observed after 85.00ppm pursuit exposure for 96 hrs. These observations were also supported by the finding of Sastry and Sharma, (1979), Rasthawar and Ilyas, (1984), Singh, (1993); Shrivastav, (1997). Sahoo et.al., (2001); investigated pathological alterations in various organs of Labeo rohita due to acute exposure of aflatoxin and found degenerative to necrotic changes in the kidney tubules. In the present study 127.5 ppm acute exposure of pursuit also causes compactness and hypertrophy of the convoluted tubules. These findings are well supported by the findings of Singh and Tilanthe, (1999); Barry, (2000); Benjamin et.al., (2006). In fine it is concluded that like other pesticides pursuit is also hazardous for aquatic organisms and ultimately through food chain it affects human life and environment also.

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