# ACUTE TOXICITY, BIOACCUMULATION AND ELIMINATION OF PROMETRYN IN TILAPIA *OREOCHROMIS NILOTICUS*

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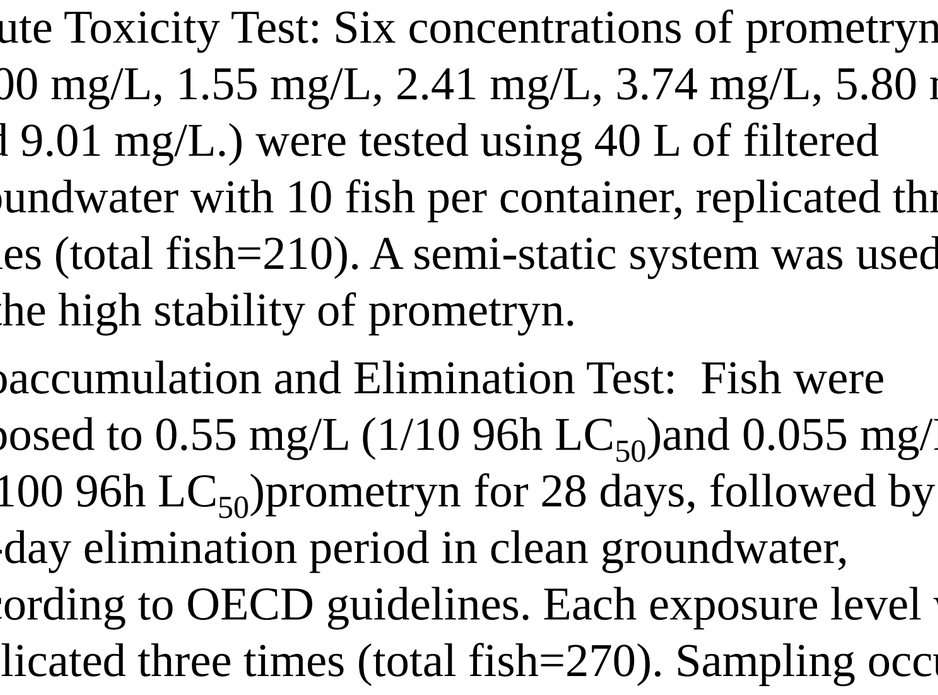
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## PURPOSE & OBJECTIVES

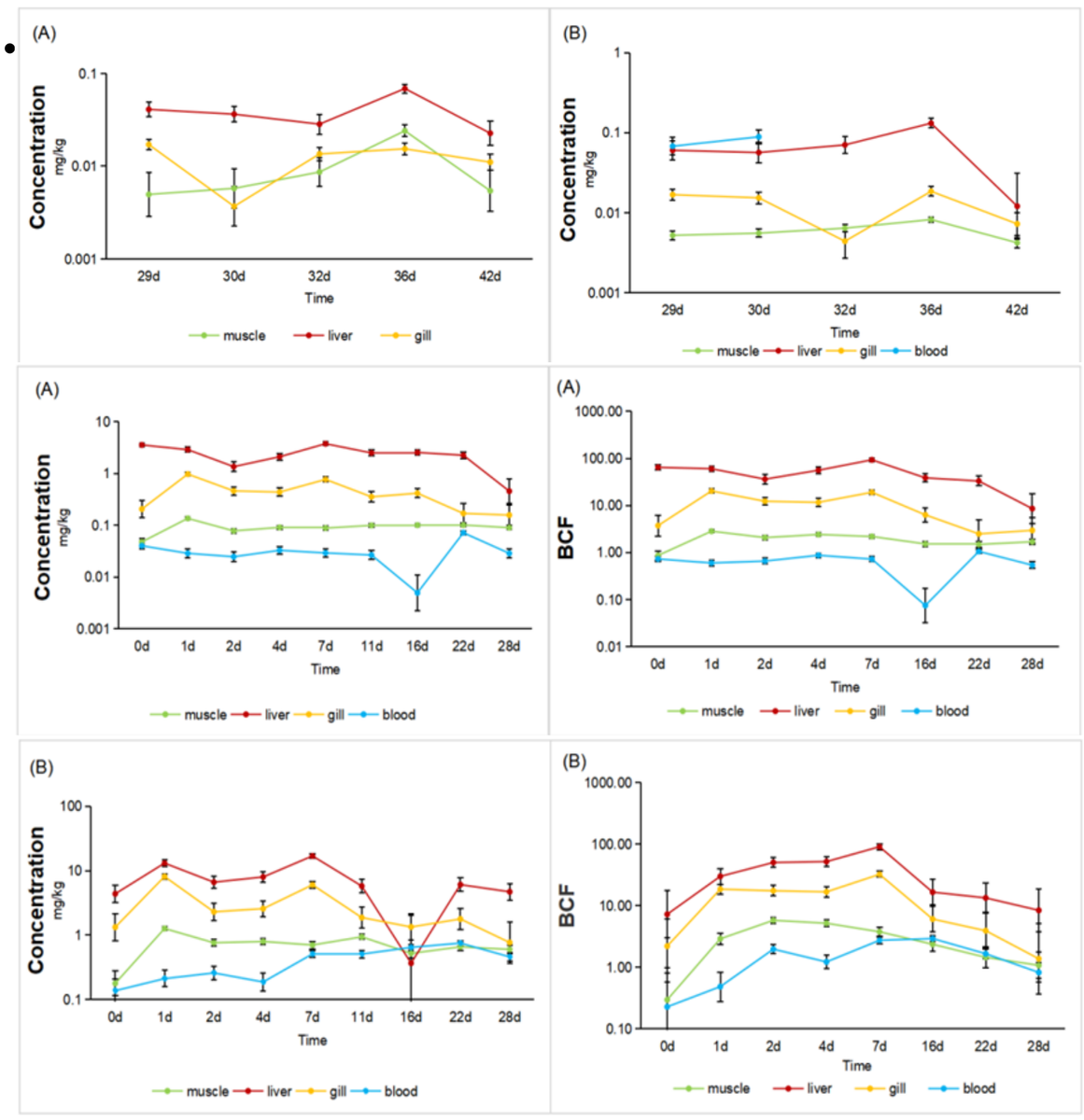
- Prometryn is widely used in China to control filamentous algae, aquatic weeds, and other harmful algae in aquaculture systems including fish, shrimp, crab, shellfish, and sea cucumber farming.
- Limited research exists on prometryn-related fatalities in cultured animals, and its impact on the safety of aquaculture products remains uncertain.
- This study evaluates the acute toxicity of prometryn by determining the 96h $LC_{50}$ in juvenile tilapia (*Oreochromis niloticus*) and investigates the bioaccumulation, uptake, and elimination kinetics of prometryn across different tissues under various exposure conditions.

## MATERIAL& METHODS

- Juvenile tilapia (average weight 50.00 ± 10.00 g) were exposed to varying concentrations of prometryn to assess acute toxicity, bioaccumulation, and uptake and elimination rates.
- Acute Toxicity Test: Six concentrations of prometryn (1.00 mg/L, 1.55 mg/L, 2.41 mg/L, 3.74 mg/L, 5.80 mg/L and 9.01 mg/L.) were tested using 40 L of filtered groundwater with 10 fish per container, replicated three times (total fish=210). A semi-static system was used due to the high stability of prometryn.
- Bioaccumulation and Elimination Test: Fish were exposed to 0.55 mg/L (1/10 96h $LC_{50}$)and 0.055 mg/L (1/100 96h $LC_{50}$)prometryn for 28 days, followed by a 14-day elimination period in clean groundwater, according to OECD guidelines. Each exposure level was replicated three times (total fish=270). Sampling occurred at 0 (1h), 1, 2, 4, 7, 11, 16, 22, 28, 29, 30, 32, 36, and 42 days from the start of exposure.




## RESULTS

- The 96h $LC_{50}$ was calculated to be 5.49 mg/L, and 96h $LC_{10}$ was 5.02 mg/L.
- In both water and tissues, prometryn concentrations fluctuated during the exposure period, indicating that steady state was not reached. The bioaccumulation of prometryn was the highest in liver, followed by gill, muscle and blood, with higher tissue concentrations at higher exposure levels.
- The peak tissue concentrations for the 0.055 mg/L treatment were: liver 3.74 ± 2.95 mg/kg at 7 days, gill 0.971 ± 1.45 mg/kg at 1 day, muscle 0.136 ± 0.0616 mg/kg at 1 day, and blood 0.0716 ± 0.0669 mg/kg at 22 days.
- For the 0.55 mg/L treatment, the peaks were: liver 16.9 ± 12.7 mg/kg at 7 days, gill 8.11 ± 3.02 mg/kg at 1 day, muscle 1.27 ± 0.284 mg/kg at 1 day, and blood 0.751 ± 0.0775 mg/kg at 22 days.
- The highest bioconcentration factor (BCF) of 93.1 was observed in the liver when exposed to the low concentration. Besides, for other tissues, the highest BCF were for muscle: 6.03, gill: 32.3 and blood: 2.91, all observed in the 0.55 mg/L treatment.
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## CONCLUSIONS

- The 96h $LC_{50}$ and 96h $LC_{10}$ of prometryn to tilapia were 5.49 mg/L and 5.02 mg/L, respectively.
- Prometryn concentrations fluctuated during the exposure period in both water and fish tissues.
- The bioconcentration factors of different tissues were ordered as liver > gill > muscle > blood.
- Most of the accumulated prometryn was removed from the fish within 24 h after being transferred to clean water.

## OUTLOOK

- Muscle tissue concentrations of prometryn rapidly decline to below the maximum residue limit (MRL) of 0.01 mg/kg following transfer of fish to clean water, indicating a low risk to food safety.
- However, prometryn is often applied directly to the water body of aquaculture ponds, and the water is hardly renewed, its food safety risk still can not be underestimated.
- The release of aquaculture wastewater containing prometryn into natural waters may adversely affect aquatic life, given the high adsorption to sediments and suspended particles of prometryn.
- Therefore, strengthening the supervision of the use of prometryn should give top priority in the future.

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