

# In-feed oxolinic acid-induced histopathological alterations in Nile tilapia *Oreochromis niloticus* juveniles

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## ABSTRACT

The effects of oral oxolinic acid (OA) administration on *Oreochromis niloticus* at the dose of 12 (1×: recommended dose) and 36 mg/kg biomass/day (3×: overdose) for 7 consecutive days, relative to a control group were investigated. The 1× and 3× groups experienced dose-dependent mortalities ranging from 3.33% to 8.33%. Histological observations were carried out in the kidney, liver, gill, spleen, and intestine. The OA residues peaked in the plasma, liver, and kidney on day 7 of administration with the muscle tissues showing the greatest amounts. In both groups, the residues persisted even on day 35 post-dosing. Elevated levels of malondialdehyde and total nitric oxide were noted, signifying oxidative stress responses, which correlated with the tissue level changes in various organs. Nevertheless, the cohort administered the recommended dose exhibited recovery following OA discontinuation. Recovery was noted in the 1× group. However, none of the assessed parameters normalized in the 3× group even after 35 days of dose suspension. The results, thus, indicated that *O. niloticus* can able to adapt and tolerate OA safely. However, the recommended dose of OA (12 mg/kg biomass/day for 7 days) elicited reversible biological reactions in *O. niloticus* and can be utilized with due caution following regulations in aquaculture.

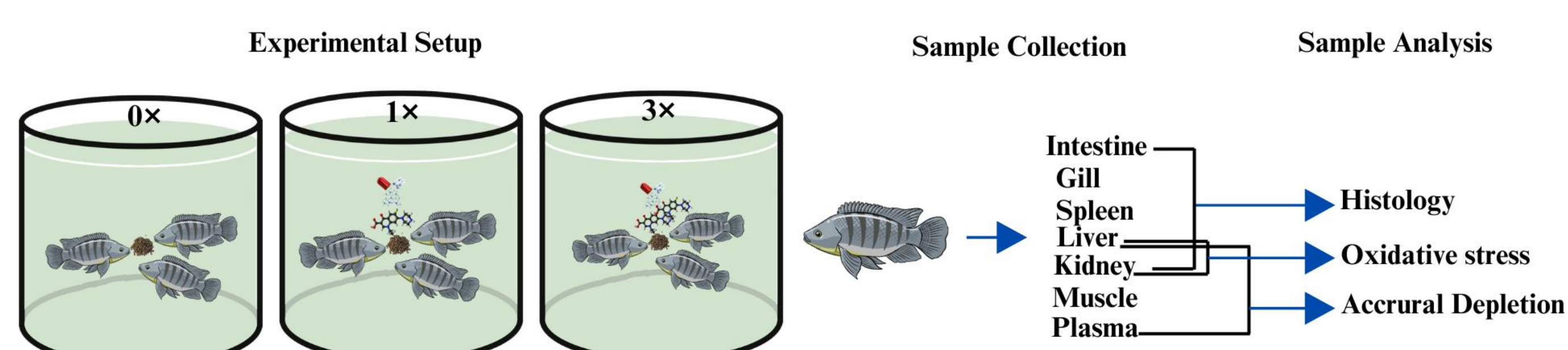
## INTRODUCTION

- Aquaculture contributes significantly to global fish production, with Asian countries accounting for 70% of the total output. Inland fisheries account for 12.5% of total production (FAO 2024).
- Cichlids are farmed in 140 countries, with most production concentrated in Southeast Asia. Southeast Asian countries particularly emphasise tilapia cultivation, with the Nile tilapia accounting for 80% of production, making it the second most significant finfish group. However, issues with disease and biosecurity have restricted its use (FAO 2024).
- Disease outbreaks in tilapia hinder growth, impacting fish quality, safety, and market access. Streptococcal and viral diseases, including the Tilapia Lake Virus, pose significant threats. The aquaculture industry is at risk due to increasing new infectious pathogens (Patil et al. 2022).
- OA is a widely used antibiotic in aquaculture but is not regulated in India. Scientific research is needed to develop guidelines for responsible use and biocompatibility with antibiotics in Indian aquaculture (Abraham et al. 2023).

## OBJECTIVES

- To assess the accrual and depletion of OA residues in the edible tissue and oxidative stress parameters in *Oreochromis niloticus* juveniles upon oral administration.
- To study histopathological alterations in the vital organs of OA-dosed *O. niloticus* juveniles.

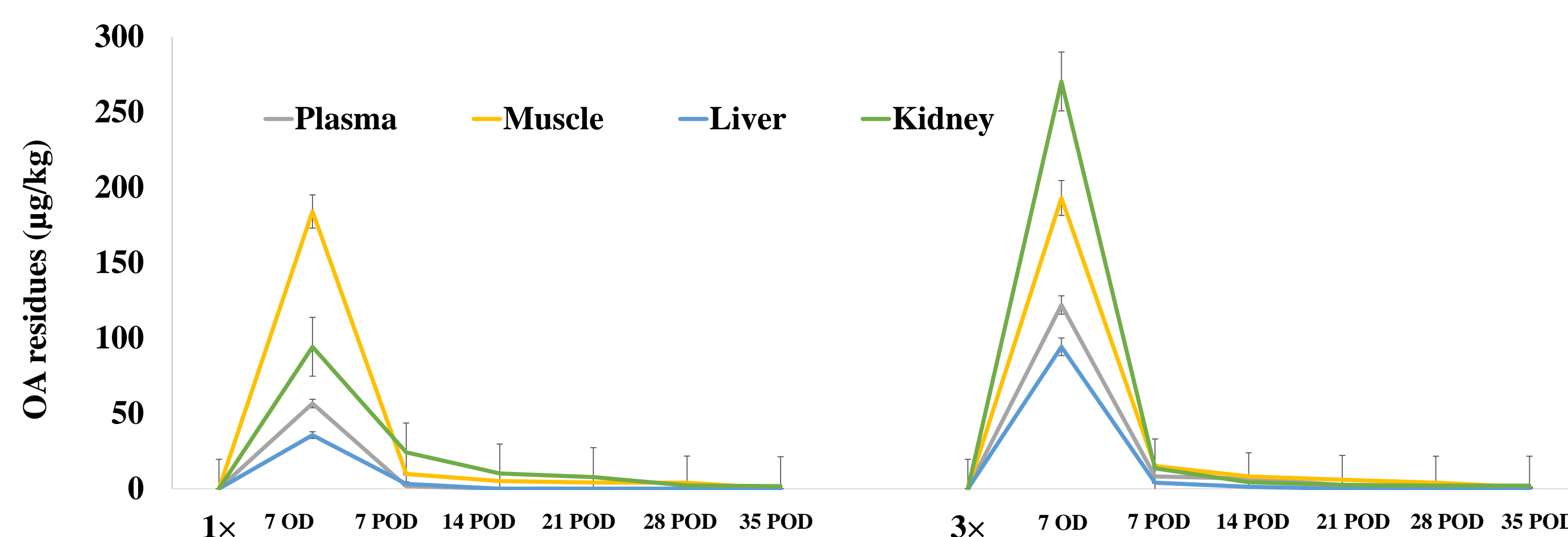
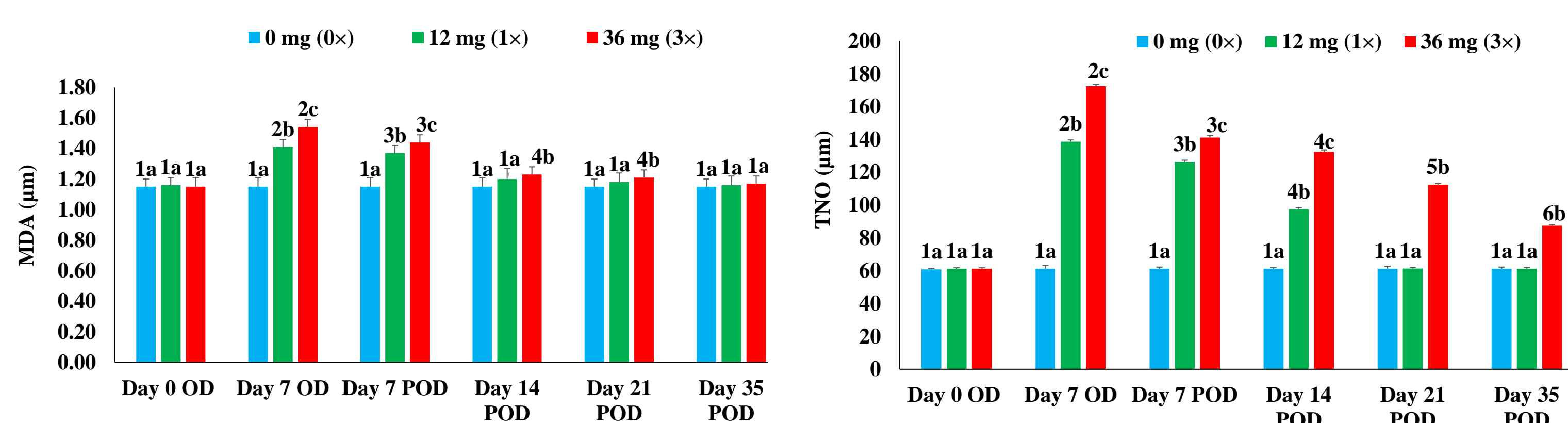
## METHODOLOGY



## CONCLUSIONS

- OA-dosing (OD) impacted the fish health status, dose-dependently.
- At the recommended dose, OA caused reduced feed intake, and increased mortality, histopathological alterations, and oxidative stress.
- OA residues in fish tissues peaked on day 7 of dosing and depleted rapidly by day 35 post-OA-dosing (POD) highlighting rapid absorption, distribution, and elimination.
- Dose-dependent recovery was observed during the POD period.
- The fast elimination of OA residues suggested safety for both fish and consumers.
- Due to the rising concerns about antimicrobial resistance, responsible use of the antibiotic is warranted.

## RESULTS AND DISCUSSION

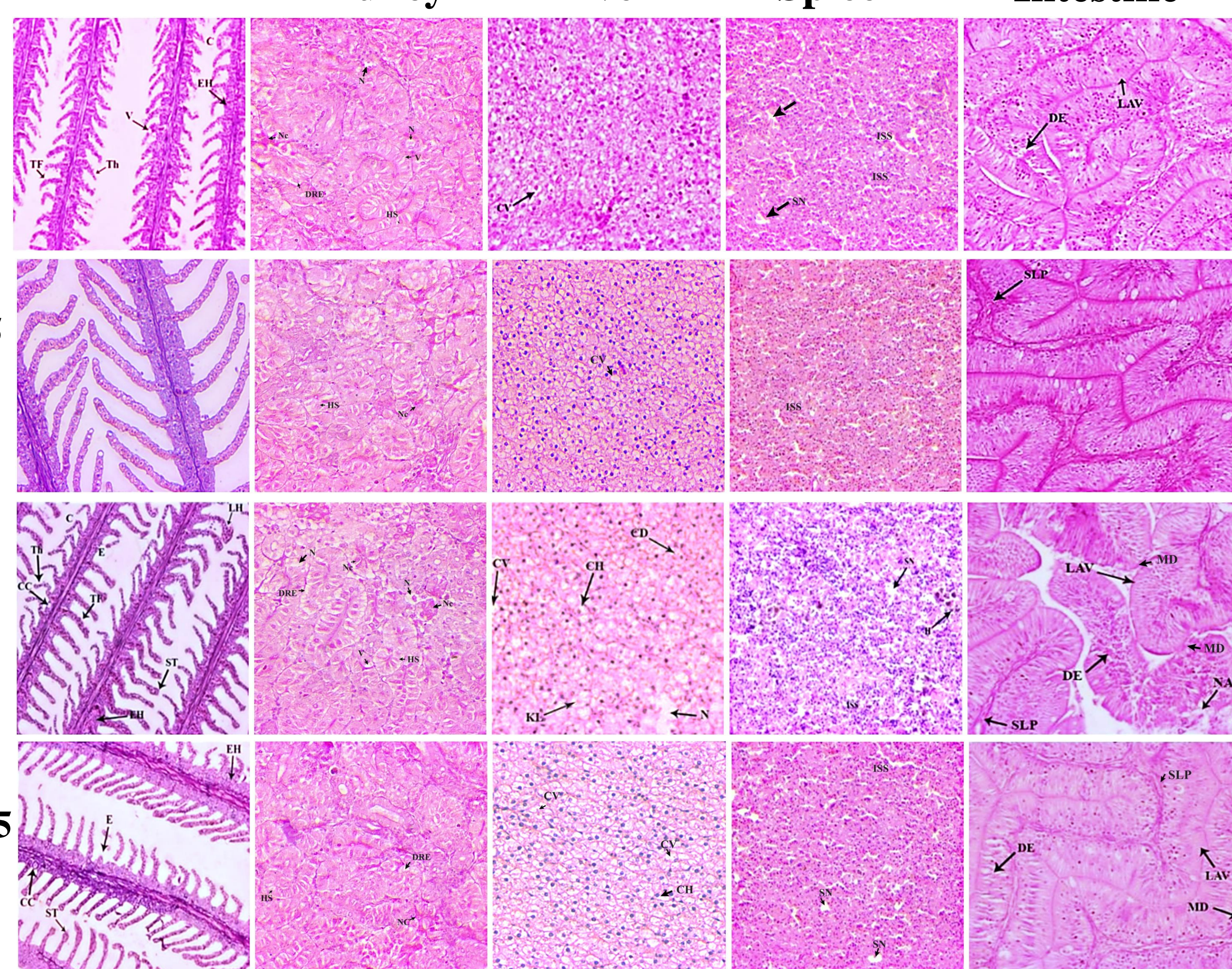


1×  
Day 7  
OD

1×  
Day 35  
POD

3×  
Day 7  
OD

3×  
Day 35  
POD



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