ID: 720

Growth and Feed Utilization Responses of Nile Tilapia (*Oreochromis niloticus*) to Microplastics and Sumithion Co-Exposure

Mobassir Bin Anwar[1], Md Shahjahan*[1]

[1]Laboratory of Fish Ecophysiology, Department of Fisheries Management, Bangladesh Agricultural University, Mymensingh 2202, Bangladesh

Abstract

The widespread contamination of aquatic environment by microplastics (MPs) and chemical pollutants, including pesticides, pose a severe threat to aquatic organisms, leading to significant disruption in ecological health. This research investigates the cumulative toxicity of polyamide microplastics and the organophosphate pesticides sumithion on Nile tilapia (*Oreochromis niloticus*), a widely cultivated freshwater key species. Over the course of 42 days, the fish were subjected to three treatment groups; 10 mg/L microplastics, 0.3 mg/L sumithion, and a combined exposure to both microplastics and sumithion (MP + Sum). This investigation focused on evaluating growth parameters and tissue histopathology. Co-exposure to microplastic and sumithion led to a significant reduction in growth attributes including final body weight, weight gain, and specific growth rate (SGR), while feed conversion ratios increased, suggesting diminished feed efficiency. The histopathological changes observed in the intestinal tissues including degeneration of columnar epithelium, hyperplasia of intestinal mucosa, degeneration of lamina propria from epithelium, reinforced the severity of the combined exposure. The GH, IGF1, and IGF2 gene expression in Nile Tilapia exibited a consistent downward trend, where the control group exhibits the highest level, followed by a significant reduction in response to microplastic exposure, a further decline under Sumithion treatment, and the most profound suppression in the combined exposure group, detrimentally affecting the growth and development. Overall, the results of the present study highlights the urgent need for integrated approaches to pollution management in aquatic ecosystems to mitigate these synergistic effects.

Keywords: *Microplastics, Sumithion, Nile tilapia, Growth, Histopathology, Gene Expression.*