

6th International Congress on Fisheries and Aquatic Research



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Certificate

This is certify that

Hamidreza Ahmaniaye Motlagh

Had a poster presentation entitled:

"Effect of peppermint extract supplementation on growth performance, intestinal microbiota, liver and intestine histopathology (*Cyprinus carpio*)"

Co-authors: Ali Baghalian, Davar Shahsavani, Sahar Roshanak, Soodeh Alidadi, Marina Paolucci

In the 6th International Congress of Fisheries and Aquatic Research

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Dr. Seyed Hossein Hoseinifard
Head of scientific committee

Dr. Roghieh Safari
Head of executive committee



Changes in intestinal microbiota, liver and intestine histopathology of *Cyprinus carpio* in response to *Mentha piperita* extract-supplemented diets

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Abstract

This study was aimed to evaluate the effects of *Mentha piperita* methanolic extract on *Cyprinus carpio* intestinal microbiota, including total microorganisms gram-negative bacteria, lactic acid bacteria, and fungi count. Liver and intestinal histopathology, and the activity of liver enzymes, were also used to evaluate the possible side effects of peppermint extract. A total of 96 healthy *C. carpio* fries (76.76 ± 20.26 g) were allocated to four treatment groups with three replications in a completely randomized design. The fries were fed with diets containing 0, 0.5, 1, and 2% extract for 40 days at the rate of 2% of body weight during the experiment. Results showed a significant decrease in total microorganisms, enteric gram-negative bacteria, and total fungi counts ($p < 0.05$). The total lactic acid bacteria count in 0.5% treatment was significantly lower than in the control and 2% treated fish ($p < 0.05$). Peppermint extract did not affect AST, while it led to a significant increase in ALT level. Simultaneously, ALP represented significantly higher activity in the control group ($p > 0.05$). Microscopic findings revealed marked lesions including congestion and cell degeneration in the livers of the three group



of fish fed with the extract. The intestinal folds were shortened and blunted in the treatment groups. Furthermore, the intestinal mucosa was necrotic, and the lamina propria was significantly thickened with mononuclear inflammatory cells ($p < 0.05$). Although *M. piperita* extract significantly affected intestinal microbiota, its consumption at 2% is not recommended for *C. carpio* due to the lesions made in the liver and intestine.

Keywords: Peppermint, Intestinal microbiota, Liver, *Cyprinus carpio*