

ABSTRACT

Probiotics along with herbs play a pivotal role in aquaculture as they enhance the growth, immunity, antioxidant status and survival rate of fish. The current study evaluated the impact of probiotics (Clostridium butyricum and Bifidobacterium) along with Moringa oleifera on the growth performance, immune enzymes, antioxidant status, hematological, biochemical parameters and gut histomorphology of Catla catla fingerlings. Total 105 fish were divided into seven groups with n=15 in each group. The study was conducted in replicates. Two different doses of probiotics LP1 containing 1g of probiotics (2×10^7 CFU Clostridium Butyricum and 2×10^6 CFU Bifidobacterium) and HP1 containing 2g of probiotics (4×10^7 CFU Clostridium Butyricum and 4×10^6 CFU Bifidobacterium) were used along with Normal Control (NC1) group for a duration of 10 weeks. In LM1 and HM1 groups 1g and 2g of Moringa oleifera leaf powder were used. LC1(LP1+ LM1) and HC1(HP1+HM1) were actually low and high dosage combination groups.

A high Combination group (HC1) in experimental fish improved growth rate, weight gain (WG) (1.194 ± 0.03 g to 7.366 ± 0.22 g), specific growth rate (SGR) (0.724 ± 0.02 to 1.084 ± 0.01), protein efficiency ratio (PER) (3.976 ± 0.12 to 24.55 ± 0.74) and improved survival rate (SR%) (100.0 ± 0.0 to 100.0 ± 0.0). Feed conversion ratio (FCR) was highest for NC1 group (6.430 ± 0.18) and lowest in HC1 group (4.088 ± 0.12). HC1 also showed improved values of hematology Hb (8.540 ± 0.06 g/dl), RBCs ($2.580 \pm 0.03 \times 10^6/\text{mm}^3$) and decreased value of parameters such as WBCs ($28.40 \pm 1.07 \times 10^3/\text{mm}^3$) and PLT (22.00 ± 0.70) as compared to NC1 group. Fish treated with high Probiotics (HP1) group showed improved values of AST (715.4 ± 0.67 U/L) and ALT (192.4 ± 0.81 U/L) as compared to NC1 group. Total Bilirubin was highest for HC1 (0.220 ± 0.00 mg/dl). BUN (7.180 ± 0.08 mg/dl) and Urea (15.04 ± 0.08 mg/dl) values were also highest for HP1 group while Creatinine was highest for LC1 (1.240 ± 0.08 mg/dl) group as compared to all other groups. In combination groups fish showed improved immune enzyme values LYZ (86.49 ± 0.00 U/ml) for LC1 and highest ACP value (25.17 ± 0.00 U/ml) for HC1. Antioxidant status in fish was improved in high combination group (HC1) having highest values of enzymes CAT, SOD, GPx as 1045 ± 0.00 U/ml, 11.44 ± 0.28 U/ml and 365.5 ± 0.00 U/ml respectively.

The high combination (HC1) group containing 2g of probiotics (4×10^7 CFU Clostridium Butyricum and 4×10^6 CFU Bifidobacterium) along with 2g of Moringa oleifera leaf powder demonstrated the overall favorable results. From current results we concluded that the addition of probiotics along with herb (Moringa oleifera) boosts the development and strengthens the immune system and also antioxidant status of Catla catla. Hence, this study suggest that probiotics along with herbs have the potential to serve as effective feed constituent for enhancing fish yield in aquaculture. Future research may explore the effect of these probiotics and herb on the intensive cultivation of the same species and also certain synergistic effects of these probiotics and herb can also be studied.

Keywords: Probiotics, hematology, Immune enzymes, antioxidant status, gut histology, Catla catla.