

Immuno-Modulatory Role of Weeds in Feeds of *Cyprinus Carpio*

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Abstract : *Cyprinus carpio* has a wide spread occurrence in the lakes and rivers of Europe and Asia. Heavy losses in natural environment due to anthropogenic activities, including pollution as well as pathogenic diseases have landed this fish in IUCN red list of vulnerable species. The significance of a suitable diet in preserving the health status of fish is widely recognized. In present study, artificial feed supplemented with leaves of two weed plants, *Eichhornia crassipes* and *Ricinus communis* were evaluated for their role on the fish immune system. To achieve this objective fish were acclimatized to laboratory conditions (25 ± 1 °C; 12 L: 12D) for 10 days prior to start of experiment and divided into 4 groups: non-challenged (negative control= A), challenged [positive control (B) and experimental (C & D)]. Group A, B were fed with non-supplemented feed while group C & D were fed with feed supplemented with 5% *Eichhornia crassipes* and 5% *Ricinus communis* respectively. Supplemented feeds were evaluated for their effect on growth, health, immune system and disease resistance in fish when challenged with *Vibrio harveyi*. Fingerlings of *C. carpio* (weight, 2.0 ± 0.5 g) were exposed with fresh overnight culture of *V. harveyi* through bath immunization (concentration 2×10^5) for 2 hours on 10 days interval for 40 days. The growth was monitored through increase in their relative weight. The rate of mortality due to bacterial infection as well as due to effect of feed was recorded accordingly. Immune response of fish was analyzed through differential leucocyte count, percentage phagocytosis and phagocytic index. The effect of *V. harveyi* on fish organs were examined through histo-pathological examination of internal organs like spleen, liver and kidney. The change in the immune response was also observed through gene expression analysis. The antioxidant potential of plant extracts was measured through DPPH and FRAP assay and amount of total phenols and flavonoids were calculated through biochemical analysis. The chemical composition of plant's methanol extracts was determined by GC-MS analysis, which showed presence of various secondary metabolites and other compounds. Investigation revealed immuno-modulatory effect of plants, when supplemented with the artificial feed of fish.

Keywords : immuno-modulation, gc-ms, *Cyprinus carpio*, *Eichhornia crassipes*, *Ricinus communis*

Conference Title : ICFAS 2015 : International Conference on Fisheries and Aquatic Sciences

Conference Location : London, United Kingdom

Conference Dates : August 20-21, 2015