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Fish Health Management: Health Status of Extensive Shrimp Culture Systems of Kerala, India

Abstract

Shrimp aquaculture, which is hailed as a 'miracle money spinner' and 'export-earner', has been facing very serious problems with production hit by epidemic level diseases and a groundswell of discontent developing due to the industry's severe adverse ecological and social impacts. Among the five categories of shrimp culture practices--traditional, extensive, modified extensive, semi-intensive and intensive--by virtue of the inherent low stocking density and less intense extra inputs such as supplementary feed and chemotherapeutics, extensive and modified extensive shrimp farming systems ought to be safer than intensive and semi-intensive systems from drastic environmental degradation and infections. They are more eco-friendly and sustainable methods also. Keeping this in mind and considering the preference of extensive/modified extensive systems of shrimp culture over the others, the commonness of such systems in our state and the paucity of relevant ecobiological information on such systems, the present study was conceived with a view to understanding the water and sediment qualities, planktonology and the contaminant/ potentially pathogenic microbial variety and loads in representative extensive/modified extensive shrimp farming systems of Kerala State.

As a prelude to the study, a detailed survey was carried out to understand the health status of the shrimp culture systems in relation to pond characters/management practices adopted, by analysing 48 extensive and 50 modified extensive shrimp culture ponds across the State. However, on analysing the results, it was felt that the extra management care adopted by shrimp farmers, such as stocking PCR-scanned seed and prophylactic measures like use of antibiotics, details of which may not often be truly and fully revealed by them, might have jeopardised the objective of the survey. It was also felt that a longer term study involving several cycles of culture would be needed to bring out the relations envisaged, if there are any. For the ecobiological study, six shrimp culture ponds located in Kollam District, Kerala, were selected. Hydrograhical variables analysed were, water temperature, pH, salinity, dissolved oxygen content, dissolved CO_2 content, total alkalinity, total-, Ca- and Mg-hardness, H_2S content, NH_3 content, total-, dissolved- and suspended solids, nutrient concentrations (NO_3, NO_2, PO_4, SiO_3 and SO_4), and depth and transparency of water. Along with water sample collection, atmospheric temperatures of the sites were also recorded. The sediment characteristics analysed were temperature, organic carbon, pH and soil texture. Plankton variables estimated were, biomass, total plankton, total phytoplankton and zooplankton densities and densities of different phytoplankton families. For microbiological studies, shrimp specimens and water and sediment samples were collected twice a month and over the entire duration of culture from all six ponds. The samples were analysed for total plate count, total coliforms, faecal coliforms, faecal streptococci, total Enterobacteriaceae, *Escherichia coli*-like organisms, *Proteus-Klebsiella*-like organisms, *Shigella*-like organisms, *Pseudomonas aeruginosa*-like organisms, *Salmonella*-like organisms, *Vibrio cholerae*-like organisms, *Vibrio parahaemolyticus*-like organisms, *Staphylococcus aureus* and *Listeria* spp. Suspected colonies were purified and confirmatory tests were done.Internationally accepted, standard methods were employed for collection and analyses of samples. Statistical significance of associations (dependence) of estimated hydro biological, sedimentological, planktonological and microbiological variables among themselves and between them were tested using correlation analysis and of variations within extensive and modified extensive systems, between them and between seasons, by employing ANOVA. Presence of various microbial contaminants in substantial quantities in all three compartments (water, sediment and shrimp) of both extensive and modified extensive shrimp culture ponds, must be reckoned as a warning signal on the environmental deterioration of such ponds and on the high likelihood of precipitation of human health hazards. Overall, the results of the survey and the results of the detailed ecobiological study indicate that though extensive and modified extensive shrimp farming systems are not significantly different both in terms of incidence of diseases/infection and in terms of the ecobiological features, notwithstanding, modified extensive farming, which adopts stocking disinfected PL, measures for avoiding cross contamination and use of probiotics, may have slight edge over extensive type of farming.

Key Words: Shrimp Aquaculture, Planktons, Microbes, Infections, Culture Systems, Kerala, India

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