

Abstract

Shrimp culture, in spite of its relatively short history as a commercial industry is developing at a rapid pace, but the sustainability of this trade is now at stake as threats of disease outbreaks have become a great concern of the shrimp producing countries including Sri Lanka. Various kinds of bacterial species act as causative agents in many of these diseases. Many other countries have studied these pathogenic bacteria in relation to diseases of shrimp but information on Sri Lankan scenario is not available. Therefore, a study was designed with the intension of addressing this problem. As background knowledge on farm management is a prerequisite to study diseases and their causative agents, information on randomly selected farms along the Western coastal belt of Sri Lanka was gathered. Most of the farms were found to be following malpractices in view of health considerations. Non-availability of sedimentation tanks for effluents and direct release of wastewater to water sources are among them. The water quality parameters of the ponds and water sources that supply them were generally within the recommended levels except for the total suspended solids. The mean ammonia concentration in pond water was remarkably higher than the standard levels. The mean dissolved oxygen levels of pond-water and water sources were at the lower limit of recommended range and this can be improved by increasing the frequency of aeration. Haemolymph from diseased shrimp and water samples were subjected to bacteriological investigations. As a result, five *Vibrio* species namely, *Vibrio harveyi*, *V. parahaemolyticus*, *V. vulnificus*, *V. alginolyticus* and *V. anguillarum*, along with *Staphylococcus aureus* were isolated and identified. Conventional bacteriological methods were employed to identify them. Immunohistochemistry, which is a more sensitive and confirmative method, confirmed identification of these bacteria and along with histological studies, provided evidence of their active

involvement in diseases of shrimp. Normal healthy shrimp were challenged with the isolated bacteria at a dose of 2×10^7 CFU per shrimp and all of them showed significant ($p < 0.05$) mortality with *Vibrio alginolyticus* being the most virulent. There were no deaths after first 3 days of the challenge study. Antimicrobial susceptibility of the isolates was tested and all showed resistance to erythromycin. Emerging resistance to tetracycline was also clearly evident. The efficacy of the commonly used remedial measures was tested by an *in vitro* study, and the use of probiotics and exposure of water to sunlight proved to be useful, while applying sugar provided evidence to be not effective in controlling the bacterial growth. Identifying probiotics, formulating quality feed, identifying proper systems for effluent management, development of successful vaccines and selection and development of disease tolerant shrimp are the areas that warrant future research.