

ABSTRACT

A study was carried out in major cultured shrimp (*Penaeus monodon*) producing area (North Western Province) in Sri Lanka. The prevalence of the pathogenic bacteria, *Salmonella*, *Vibrio cholerae*, *Vibrio parahaemolyticus*, total coliforms, faecal coliforms and *Escherichia coli* in shrimps, sediments and water from shrimp farms (ponds) and pelleted feed given in farms and water samples from water sources (Dutch canal and Mundal lake) for shrimp farming were analysed. Salinity, pH and suspended solids in water were estimated. The impact of pH and salinity on the growth of pure isolates of *Vibrio parahaemolyticus*, *E. coli* and *Salmonella* were examined. Bacteriological quality of frozen shrimps were determined. The combined effect of salinity and pH on the survival of *Salmonella spp.*, *E. coli* and *V. parahaemolyticus* were determined.

Water samples were collected from six sampling points. The total coliform count of water varied between 11 to 1800 MPN/100ml. The faecal coliforms and *E. coli* were between 2 - 175 MPN/100ml and 0-95 MPN/100ml respectively. *Salmonella arizonae* was observed in one occasion while *Vibrio parahaemolyticus* observed in two occasions at the population of 10^1 cfu/g. The physicochemical parameters varied among sampling points monitored. Total coliforms, faecal coliforms and *E. coli* were isolated from waters at salinities ranging from 8 to 37 ppt with the majority of samples from 14 to 28 ppt range. Total coliforms, faecal coliforms and *E. coli* were observed mostly in water samples with pH values and suspended solid levels ranging from 7.9 to 10.0 and 50 to 98 mg/L.

respectively. The highest population of total coliforms were recorded in water with low salinity (8 ppt) and pH (8.2).

The total coliform count of shrimps varied between <3 to 93 MPN/g whereas in the surrounding waters and sediments were between 0-45 MPN/100 ml and 3.6-93 MPN/g respectively. Faecal coliforms in shrimps varied from <3 to 15 MPN/g while surrounding water and sediment contained 0-11 MPN/100ml and <3-23 MPN/g respectively. *E.coli* were in the ranges of 0-8 MPN/100ml (water) <3-9.1 (sediment) and <3-7.3 (shrimps). In one occasion feed were highly contaminated with coliforms (>1100), faecal coliforms (>1100) and *E.coli* (460). *Salmonella* was not recovered from samples of farm shrimp, pond water, sediment and feed. *V. parahaemolyticus* was detected in farm shrimp, sediment and water at population of 10^1 - 10^2 cfu/g.

Raw frozen shrimps (162 samples) were obtained and analysed for aerobic plate count, coliforms, faecal coliforms, *E.coli*, *Staphylococcus aureus*, *Salmonella*, *Vibrio parahaemolyticus* and *Vibrio cholerae*. The aerobic plate count for frozen shrimps ranged from 10^2 - 10^7 cfu/g. In 27% samples ranged from 10^5 - 10^6 while 59% ranged from 10^6 - 10^7 /g. The *E.coli* count of frozen shrimp ranged from <3 to 10 MPN/g with 94% counts less than 3 MPN/g. *Vibrio cholerae*, *Vibrio parahaemolyticus*, *Salmonella* and *Staphylococcus aureus* were not found in frozen shrimps. The overall bacteriological quality of the product was found to be satisfactory.

Growth of *V. parahaemolyticus*, *Salmonella* and *E. coli* was observed at 5–100 ppt, 5-40 ppt and 2-65 ppt salinity levels and pH range of 3.0-10.5, 3.5-9.8 and 3.5-10.3 respectively under experimental conditions.

There was no growth of *E. coli* when the salinities were 35 and 40 ppt and pH values were 9.0 and 9.5. The least growth of *Salmonella spp.* was observed when the combination of salinity level was 40 (ppt) and pH values were 9.0 and 9.5. It has been observed higher growth of *V. parahaemolyticus* at all combinations of salinities (ranging from 15 to 40 ppt) and pH (7.5-9.5) and the growth was optimum at salinity level of 40 ppt and pH values ranging from 7.5-9.5.

A poor correlation was observed between the population of indicator organisms (Coliforms, faecal coliforms and *E. coli*) and the incidence of pathogens, indicating that the indicator organisms are a part of natural microfauna of the shrimp culture environment.

Physicochemical parameters of water used for shrimp farming in Dutch canal and Mundal lake are in favourable conditions for the growth of *Salmonella spp.*, *V. parahaemolyticus*, Coliforms, Faecal coliforms and *E. coli* during the study period.