Bangladesh J. Fish. Res., 9(1): 65-67

HACCP based management system for improving quality of freshwater giant prawn, *Macrobrachium rosenbergii*

M. Kamal and M.N. Islam*
Department of Fisheries Technology, Bangladesh Agricultural University
Mymensingh 2202, Bangladesh
*Corresponding author
Email address: nazir@royalten.net (M.N. Islam)

Abstract
The study was conducted on the present status of HACCP based quality management system of golda, *Macrobrachium rosenbergii* farms in Fulpur region of Mymensingh. Information was collected on general condition of farms, culture systems and post-harvest quality management. In almost all farms, there is no or inadequate infrastructure facilities such as, road access, electric supply, telecommunications, ice, feed storage facility, vehicle forgolda transportation, washing and toilet facilities. The problems associated with sanitation and hygiene was: widespread use of cow dung, poultry manure and construction of open toilet within the vicinity of prawn culture pond. Different grades of commercially available and locally prepared feeds were used forgolda culture in the pond. Golda post-larvae (PL) of 40-50 days old were stocked with carp species. The price ofgolda PL ranged from Tk. 1.00 to Tk. 1.25/piece. The pond size varied from 50 decimal (0.2 ha) to 2.5 acre (1.0 ha) with an average depth of 2-2.5 m. The culture period ofgolda varied from April-May to November-December and survival rate ranged between 75 and 80%. Production ofgolda varied from 250-500 kg/acre (625-1,250 kg/ha). Harvested golda were transported to city market within 4 h. Two size grading were generally followed during pricing, e.g.Tk. 500 to 550/kg for >100 g size andTk. 300/kg for <100 g size. The cost-benefit ratio was found to remain around 1:1.25 depending on availability of PL. Water quality parameters such as, water temperature, pH, dissolved oxygen, total alkalinity and chlorophyll-*a* in five golda farms in Fulpur region were monitored. Water temperature ranged from 29°C to 33°C, dissolved oxygen from 2.28 to 4.13 mg/l, pH between 6.65 and 7.94, alkalinity from 44 to 70 mg/l and chlorophyll*a* concentration from 61.88 to 102.34 µg/l in the five investigated ponds. The Aerobic Plate Count (APC) of the water sample was within the range of $2.0x10^6$-$2.96x10^7$ CFU/ml and of soil samples within the range of $6.9x10^6$-$7.73x10^6$ CFU/g. *Streptococcus* sp., *Bacillus* sp., *Escherichia coli, Staphylococcus* sp., *Pseudomonas* sp. and *Salmonella* sp. were isolated from pond water and sediment. Different feed samples used for golda was analyzed for proximate composition. Moisture content ranged around 14.14-21.22%, crude protein 20.55-44.1%, lipid 4.67-12.54% and ash 9.7-27.69%. The TVB-N values and peroxide values of feeds used as starter, grower and fish meal were found within the acceptable ranges and samples were free from pathogenic organisms. A training was organized for thegolda farmers on HACCP, water quality and post-harvest quality management of prawn.

Key word: HACCP, *Macrobrachium rosenbergii*, Improved quality

Research findings

- The sizes of the farms were small to medium with no well-defined boundary. There were poor infrastructure and other facilities such as, road access, electric supply, telecommunication, ice and feed storage, vehicle for golda transportation, simple hygienic and sanitation.
- The major problems associated with sanitation and hygiene is widespread use of cow dung, poultry manure and construction of open, hanging toilet within the vicinity of prawn culture pond. Different grades of commercially available feed used as starter, grower and nursery feed manufactured by Saudi-Bangla fish feed Ltd., Modina fish feed Ltd., CP fish feed Ltd., Niribili fish feed Ltd. and locally prepared feed were used for golda.
- Golda PLs of 40-50 days old were stocked with carp species such as *Catla catla*, and *Labeo rohita*.
- The price of golda PL ranged from Tk. 1.00 to Tk. 1.25/piece. The pond size varied from 50 decimal (0.2 ha) to 2.5 acre (1.0 ha) with an average depth of 2-2.5 m. The culture period of golda varied from April-May to November-December and survival ranged between 75 and 80%.
- Production of golda varied from 250-500 kg/acre (625-1,250 kg/ha) depending on size. Harvested golda were transported to city market using bamboo basket and took 4 h to reach. Golda were sold in two size categories, e.g. Tk. 500 to 550/kg for >100 g size and Tk. 300/kg for <100 g size. The cost-benefit ratio was found to remain around 1:1.25 depending on availability of PL.
- Water quality parameters were within the acceptable ranges for aquaculture. APC of the water sample was within the range of $2.0x10^6$-$2.96x10^7$ CFU/ml and of soil samples within the range of $6.9x10^6$-$7.73x10^6$ CFU/g. *Streptococcus* sp., *Bacillus* sp., *Escherichia coli, Staphylococcus* sp., *Pseudomonas* sp. and *Salmonella* sp. were isolated from pond water and sediment.
- Different feed samples used for golda was analyzed for proximate composition. Moisture content ranged around 14.14-21.22%, crude protein 20.55-44.1%, lipid 4.67-12.54% and ash 9.7-27.69%. The chemical composition of the feeds were calculated on the dry weight basis.
- The TVB-N values of starter ranged around 23.38-24.5 mg/100 g, grower around 14.56-27.93 mg/100 g and fish meal around 25.34-33.7 mg/100 g. The peroxide values of starter ranged from 18.26 to 27.23 m eq./kg oil, grower from 16.37 to 25.63 m eq./kg oil and fish meal from 18.74 to 29.53 m eq./kg oil and samples were free from pathogenic organisms.
- The APC for starter varied from 4.58×10^4 to 8.13×10^4 CFU/g, grower from 9.25×10^4 to 2.7×10^5 CFU/g and fish meal from 5.4×10^4 to 1.34×10^5 CFU/g and some feed sample showed coliform contamination but *Salmonella* was not detected.
- Training was organized for the golda farmers on HACCP, water quality and post-harvest quality management of prawn in collaboration with the DoF.

- A handbook entitled, "Post-harvest Handling for Preservation of Golda Quality" and "Hazard analysis work sheet and HACCP plan" was prepared in Bengali to implement at field level for fish farmers. A pre-training test on the quality management aspects, sanitation and hygiene was conducted through interviews and discussions. The effect of delayed icing on the quality changes in golda was highlighted during the training.

Policy implications

- Poor condition of culture system, post-harvest quality management and infrastructure in the golda farms suggested that more effort should be exerted by the extension agencies to improve those conditions by providing technical support and training to the farmers.
- Facilities for regular monitoring of water quality should be made available to the farmers to tackle the problem of any wide spread disease and pollution.
- Little or no knowledge of the farmers on good hygiene and sanitation, which is a prerequisite for the production, harvesting, handling and marketing of safe food, may seriously undermine the dimension ofgolda culture in Bangladesh.
- Irregular and inadequate supply of PL is a serious problem of golda culture in Fulpur, Mymensingh. Extension agencies and private entrepreneurs should come forward to establish more hatcheries in the region.

Livelihood implications

Among the freshwater prawns, golda (*M. rosenbergii*) is most valuable and considered to be one of the most important products of aquaculture in Bangladesh. The consumer at home and abroad prefers golda for its size and taste. However, with the increasing demand in the international market, golda farming has been expanding rapidly throughout the country. In the study area a substantial number of men and women are directly or indirectly earn their livelihood from golda farming, harvesting, handling, transportation and marketing. There exists enormous prospect of extension of golda farming at Fulpur area of Mymensingh. Better management in culture practices, harvesting, handling, and marketing ofgolda is expected to bring great economic benefit to the common people of that area and Bangladesh as well.