

## DISEASE PROBLEMS IN SHRIMP SECTOR IN KHULNA DISTRICT OF BANGLADESH: A QUESTION OF SUSTAINABILITY

A.M. O. Faruque, G.U. Ahmed, M.R. Hasan and M.A. Hossain

Department of Aquaculture, Bangladesh Agricultural University, Mymensingh 2202, Bangladesh

Email: ahmedgias@hotmail.com/faruqamo@yahoo.com

### Abstract

Disease is the main restraining factor for the development of shrimp sector in Bangladesh. Both brackish water shrimp *bagda* (*Penaeus monodon*) and freshwater prawn *golda*, (*Macrobrachium rosenbergii*) farming in Bangladesh have been facing disease problem. A study on disease outbreak in both brackish water and freshwater small-scale shrimp farms (*gher*) in Khulna district was carried out through interviewing randomly selected 3-5% of shrimp farmers with a structured questionnaire during March to December, 2002. The study showed that 97% *bagda* farming *ghers* and 80% *golda* farming *ghers* were affected by disease. White spot disease was the severe disease for *bagda*, whereas, antenna rot was the main disease for freshwater prawn. Change of water and liming were carried out as control measures of disease for *bagda* shrimp farming, while it was only liming for *golda* farming. A small number of shrimp farmers (15%) used chemicals for treatment of shrimp diseases. Development of suitable farming technology to prevent disease contamination and innovation of proper treatments for diseases are required to overcome the disease problems for sustainable shrimp farming in Bangladesh.

**Keywords :** Disease, *bagda*, *golda*, *gher*.

### INTRODUCTION

The resources for shrimp production in Bangladesh are vast, though there are many constraints such as biological, social and economical (Mazid, 2003). Environmental problems faced by the shrimp culture industry today are the major constraints to its future growth, and in some cases even raise doubts over its continued existence. The shrimp farmers need to give emphasis on providing a healthy environment for the shrimp and provide more effort to control adverse environmental impacts outside the shrimp farm. The environmental management both

within the shrimp pond and outside the pond is concerned to farming success. So, government and their agencies must have to give more attention to manage internal and external environment of the shrimp pond (Macintosh and Phillips, 1992).

Shortage of clean water supply and insufficient waste removal lead to overloading of metabolites, environmental degradation, as a result, shrimp tends to be stressed by bad water quality, and thus more prone to get affected by diseases. Excessive fluctuations in abiotic factors like oxygen, salinity and temperature may also increase stress and

susceptibility to disease (Kautsky et al., 2000). The diseases of cultured penaeid shrimp include syndromes with infectious (viral, rickettsial, bacterial, fungal, protistan and metazoan etiologies), as well as a number of noninfectious diseases, which are also of importance for the industry, caused by environmental extremes, nutritional imbalances, toxicants and genetic factors (Brock 1992, Brock and Lightner, 1990, Lightner, 1988, Lightner and Redman, 1998). Disease is the main problem of penaeid farms now a days. Before December 1993, there were no reports of mass mortalities due to disease in semi-intensive or traditional shrimp farming of Bangladesh (Mazid and Banu, 2002). Outbreak of viral diseases in penaeid *ghers* was found since 1994 (Mazid, 2003, Hossain, 1997)) and have resulted in a dramatic decline in shrimp yields. Hasan (2002) also found that more than 95% small-scale penaeid *ghers* were affected by disease especially white spot disease. Disease outbreak in freshwater prawn *ghers* till now is not as severe as penaeid farms. Black spot or shell disease, white muscle, bacterial diseases are the common diseases of freshwater prawn in Bangladesh (Khondaker, 2001). Hossain (1996) observed outbreak of white spot disease, black gill disease, soft shell disease, external fouling and antenna breaking disease of shrimp in Bangladesh. Considering disease problem as a major problem for shrimp culture the present study was carried out to identify the actions needed to be taken to overcome the diseases.

#### MATERIAL AND METHODS

Small-scale shrimp *ghers* (within 5 hectares) was considered for the study.

Shrimp *ghers* of Khulna district were surveyed on disease problems during the period of March to December, 2002. The shrimp *ghers* were stratified according to species cultured such as brackish water shrimp *bagda* (*P.monodon*) and freshwater prawn *golda* (*M. rosenbergii*) *ghers*. *Gher* farmers were selected randomly and 3-5% farmers were interviewed with a structured questionnaire. The farmers of *bagda* and *golda* were interviewed according to the number of existing shrimp farms in an upazilas (sub-district) of Khulna district. The data collected through the survey were analyzed according to *bagda* and *golda* farmers. Descriptive statistics such as frequency distributions and percentages were analyzed using SPSS 11.5 programme.

#### RESULTS

Disease outbreak was reported in 97% of *bagda* *ghers* and 80% of *golda* *ghers*. White spot disease was ranked first for *bagda*, while antenna rot was ranked first for *golda* *ghers*. Water deposit on neck and malnutrition were the second major disease of freshwater prawn (Table 1).

Above 95% of *bagda* and 72% of *golda* *ghers* were found to be affected by disease resulting in death of shrimp. Abnormal appearance was the another major symptom of shrimp disease and according to the survey, 85% of *bagda* farmers and 57% of *golda* farmers could recognize shrimp diseases through abnormal appearance; while a small number of *bagda* and *golda* farmers recognized diseases through observation of abnormal behaviour, where the infected ones aggregated near the shore (Table 2).

Table 1. Rank of disease occurred in the *bagda gher*

Rank	<i>Gher type</i>			
	<i>Bagda</i>		<i>Golda</i>	
	Farmer	%	Farmer	%
Disease occurred				
Yes	277	97.2	892	80.1
No	8	2.8	221	19.9
Total	285	100.0	1113	100.0
Ranking of disease				
Water deposit on neck				
First rank	2	0.7	28	2.5
Second rank	42	14.7	113	10.2
Did not occur	236	82.8	965	86.7
White spot				
First rank	269	94.4	8	0.7
Second rank	-	-	4	0.4
Did not occur	14	4.9	1098	98.7
Antenna rot				
First rank	1	0.4	815	73.2
Second rank			34	3.1
Did not occur	284	99.6	264	23.7
Malnutrition				
First rank	1	0.4	10	0.9
Second rank	13	4.6	268	24.1
Did not occur	265	92.9	810	72.8

Table 2. Recognition of disease through symptoms exhibited by shrimp

Recognition method	<i>Gher</i> type					
	<i>Bagda</i>		<i>Golda</i>		Total	
	Farmer	%	Farmer	%	Farmer	%
Through death						
Yes	273	95.8	800	71.9	1073	76.8
No	12	4.2	313	28.1	325	23.2
Through abnormal behaviour						
Yes	21	7.4	113	10.2	134	9.6
No	264	92.6	1000	89.8	1264	90.4
Through abnormal appearance						
Yes	243	85.3	637	57.2	880	62.9
No	42	14.7	476	42.8	518	37.1
Through aggregation near shore						
Yes	9	3.2	106	9.5	115	8.2
No	276	96.8	1007	90.5	1283	91.8

According to the survey, 59% and 49% of *bagda* and *golda* farmers respectively communicated to some one for treatment of disease when disease out broke in their gher but about above 40% of both types of shrimp farmers did not communicate any person. About 18% of *bagda* farmers communicated government extension officer for treatment of disease out break in their gher, whereas,

9% of *golda* farmers communicated with them. Farmers of most of the disease infected gher communicated with other skilled farmers and a negligible number of *bagda* and *golda* farmers contacted hatchery owner, chemical sales persons and others for the disease problems (Fig. 1).

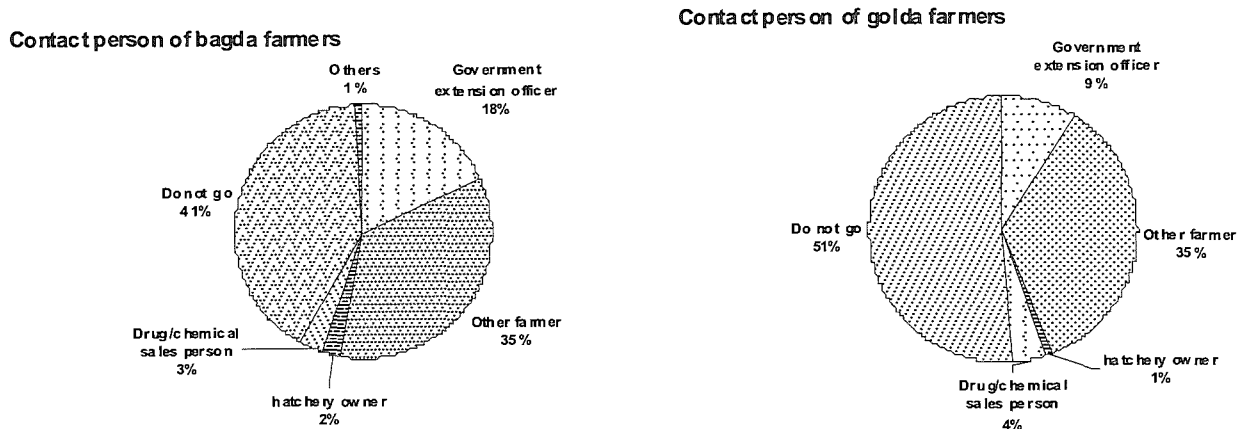


Fig.1 Contact person with whom farmers communicated to solve the disease problem

The advices 'change water' and 'use chemicals' were ranked as the first to 26% and 15% respectively to bagda farmers for treatment of disease. The advices 'use lime',

'use chemical' and 'change water' were ranked as first to 16%, 14% and 11% respectively to golda farmers as a means of treatment of diseases (Table 3).

Table 3. Ranking advice of contact person to disease problem

Rank	Bagda		Golda		Total	
	Farmer	%	Farmer	%	Farmer	%
Use chemical in the <i>gher</i>						
First rank	43	15.1	154	13.8	197	14.2
Second rank	10	3.5	16	1.4	26	1.8
No advice	229	80.4	921	82.7	1150	82.2
Change water						
First rank	73	25.6	123	11.1	196	14.0
Second rank	52	18.2	186	16.7	238	17.0
No advice	147	51.6	779	70.0	926	66.2
Use lime in the <i>gher</i>						
First rank	14	4.9	176	15.8	190	13.6
Second rank	72	25.3	135	12.1	207	14.8
No advice	190	66.7	771	69.3	961	68.7

Change of water, liming, removal of sick animal and use of chemical were considered as disease control measures. About 30%

shrimp farmers used lime to control disease and 49% farmers were found to change water of their gher in *bagda* farming. Use of lime was also popular (30%) in *golda* gher to control diseases (Table 4).

**Table 4. Disease treatment carried out following gher types**

Treatment was done	Gher type			
	<i>Bagda</i>		<i>Golda</i>	
	Farmer	%	Farmer	%
Use chemical				
Yes	43	15.1	172	15.5
No	242	84.9	941	84.5
Change water				
Yes	140	49.1	130	11.7
No	145	50.9	983	88.3
Transfer of sick fish to another <i>gher</i>				
Yes	44	15.4	57	5.1
No	241	84.6	1056	94.9
Liming				
Yes	92	32.3	340	30.5
No	193	67.7	773	69.5

## DISCUSSION

According to the study it was observed that white spot disease caused by white spot syndrome virus was the most common and severe problem for *bagda* farming in Bangladesh. About 95% of small-scale *bagda* gher were affected by white spot

disease. The present observations were similar to the findings of Begum and Alam (2002), Hasan (2002), Hossain (1997), Mazid and Banu (2002) who observed over 80% shrimp gher were affected by white spot disease. Hasan (2002) also observed that white spot disease became a limiting factor for small-scale *bagda* farming and most of the farmers have been

facing loss in shrimp farming. According to Mazid and Banu (2002), there were no reports of mass mortalities due to disease in semi-intensive or traditional shrimp farming before December, 1993. There is no evidence that freshwater prawn was affected with white spot disease. Change of crop pattern (culture of freshwater prawn instead of *penaeid*) could be one of the techniques of preventing white spot disease. Freshwater prawn farming in bagda gher for consecutive several years may also be a fruitful technique of prevention of white spot disease. According to the study, about 10% bagda farmers and 21% golda farmers found soft-shell disease in their gher and about 76% of golda farmers also found antenna rot disease in their gher, which was not emerged as the major problem in shrimp farming. Hossain (1996) also observed occurrence of these diseases in shrimp gher. Murthy and Thanuja (2004) observed similar diseases in the freshwater prawn grow-out farming in India. Change of water and liming in the gher were the common control measures of diseases in both brackish water and freshwater shrimp farming. These measures were simple and environmentally acceptable. Use of chemicals in disease control was limited in Bangladesh which indicated that most of the shrimp farmers had tendency to avoid the use of harmful chemicals in their gher.

*Penaeid (bagda)* farming has been suffering from severe disease problems since 1995, along with traditional culture method, lack of government support, lack of extension and motivation on improved culture techniques have made shrimp farming less or non profitable intervention. White spot disease of bagda is the main problem of

*penaeid* farming in Bangladesh which needs immediate action. Profit from small-scale shrimp farming is not sufficient for shrimp farm investors and farmers livelihood. In most cases, farmers could only save one term's investment or less for both in bagda and golda farming. In loosing condition, usually the farmers have no alternatives but to borrow. If such problems continue for consecutive years, the farmers will have no option but to abandon the shrimp farming and go for rice cultivation. Bagda farmers of Khulna district are now running in such type of critical situation and similar findings were also observed by Hasan (2002) and Begum and Alam (2002). Whereas, shrimp farming area is the most productive area of Bangladesh and which has to grow shrimp in this area for the proper use of land. Therefore, Bangladesh should overcome the existing problems urgently to sustain shrimp farming, to save the coastal poor people and to earn foreign currency for the economic development of the country. Development of suitable farming technology to prevent disease contamination and innovation of treatments of disease requires overcoming the disease problems for sustainable shrimp farming in Bangladesh.

#### ACKNOWLEDGMENTS

The authors are grateful to Ministry of Science and Information & Communication Technology, Government of Bangladesh for providing financial support to carry out the study.

#### REFERENCES

Begum, A. and S. M. N. Alam, 2002. Social and economic impacts of shrimp disease

among small-scale, coastal farmers and communities in Bangladesh. In: *Primary Animal Health Care in Rural, Small-scale, Aquaculture Development*. Ed: Arthur, J.R., Phillips, M.J., Subasinghe, R.P., Reantaso, M.B. and MacRae, I.H. FAO Fish. Tech. Pap. No. 406. pp.191-200.

- Brock, J. A.**, 1992. Current diagnostic methods for agents and diseases of farmed marine shrimp. In: *Proceedings of the Asian Interchange Program Workshop on the Diseases of Cultured Penaeid Shrimp*. Ed: Fulks, W. and Main, K. Asian Interchange Program. The Oceanic Institute, Oahu, HI. Pp. 209-231.
- Brock, J.A. and D. V. Lightner**, 1990. Diseases of crustacea diseases caused by microorganisms. In: *Diseases of marine Animals*. Ed: Kinne, O., vol. 3. Biologische Anstalt Helgoland. Hamburg, Germany, pp.245-349.
- Hasan, M.R.**, 2002. Annual Report on Development of farm-made aquafeed for sustainable small-scale shrimp farming in southwestern Bangladesh. Department of Aquaculture, Bangladesh Agricultural University, Mymensingh, Bangladesh, p.50.
- Hossain, M.A.**, 1996. Disease of fish and shrimp: prevention and cure. Fisheries resource development technology and management, Fish fortnight'96 compendium. Ministry of fisheries and livestock, Government of the people's republic of Bangladesh. pp. 110-115.
- Hossain, M.A.**, 1997. Status of aquatic farmed animal disease in Bangladesh and environmental consequences. Country paper, presented in the 2<sup>nd</sup> SEAADC project meeting, 24-28 February 1997, AAHKI, Bangkok, Thailand.
- Kautsky, N., P. Ronnback, M. Tedengren and M. Troell**, 2000. Ecosystem perspectives on management of disease in shrimp pond farming. *Aquaculture*, 191:145-161.
- Khondaker, H.R.**, 2001. Culture of golda prawn. Project of the aquaculture innovator development through national package program, Department of Fisheries, Dhaka, pp. 22.
- Lightner, D.V. and R. M. Redman**, 1998. Shrimp diseases and current diagnostic methods. *Aquaculture*, 164:201-220.
- Lightner, D.V.**, 1988. Vibrio disease. In: *Disease diagnostic and control in North American Marine Aquaculture*. Ed: Sinderman, C.J. and Lightner, D.V. Developments in Aquaculture and Fisheries Science vol. 17. Sci. Publishing, New York, USA, pp. 42-47.
- Macintosh, J.V. and M. J. Phillips**, 1992. Environmental issues in shrimp farming. In: *3rd global conference on shrimp industry*. Ed: Saran, D. and Singh, T. Kualalampur, Malaysia, INFOFISH, pp. 118-145.
- Mazid, M.A.**, 2003. Research strategies for coastal aquaculture development in Bangladesh. In: *Environmental and Socioeconomic Impacts of Shrimp farming in Bangladesh*. Ed: Wahab, M.A.



technical Proc. BAU-NORAD Workshop, 5 March 2002. BRAC Centre, Dhaka, Bangladesh. Bangladesh Agricultural University, Mymensingh, Bangladesh, pp.9-18.

*Small-scale, Aquaculture Development.* Ed: Arthur, J.R., Phillips, M.J., Subasinghe, R.P., Reantaso, M.B. and MacRae, I.H. FAO Fish. Tech. Pap. No. 406. pp.21-25.

**Mazid, M.A. and A. N. H. Banu, 2002.** An overview of the social economic impact and management of fish and shrimp disease in Bangladesh, with an emphasis on small-scale aquaculture. In: *Primary Animal Health Care in Rural,*

**Murthy, H.S. and K. Thanuja, 2004.** Hatchery production and grow-out farming of freshwater prawn in India – recent development. Book of Abstracts. 7<sup>th</sup> Asian Fisheries Forum 04, Penang, Malaysia, 30 November – 4 December, 2004, p.54.