Status of Shrimp Health Management in Myanmar

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Abstract

Extensive cultivation of the black tiger shrimp (*Penaeus monodon*) started in the 1970's in Myanmar using trap and hold method. *P. monodon* postlarvae (PL) were trapped into the ponds measuring approximately 50 to 100 hectares (ha) during high tide. Because these large ponds have no inputs in terms of pond preparation, eradication of predators, water fertilization, and feeding, production volume during the early years of the shrimp industry in the country provided some lucrative income for the farmers. With this promise, a 3-year project aimed at developing the shrimp culture systems into extensive, extensive plus and semi-intensive was implemented by the Department of Fisheries (DoF), Ministry of Livestock and Fisheries (MLF) in 2010. Unfortunately, in that same year, an outbreak of white spot disease (WSD) caused by white spot syndrome virus (WSSV) occurred in ponds stocked with imported postlarvae and devastated the shrimp industry of the country. Moreover, *P. monodon* samples from Ayeyarwaddy Division (western part of Myanmar) were also found positive for Taura syndrome virus (TSV) and infectious hypodermal and haematopoietic necrosis virus (IHHNV) by polymerase chain reaction (PCR) method in 2010. In addition, yellow head virus (YHV) was also detected in shrimp samples for export in 2014. Fortunately, acute hepatopancreatic necrosis disease (AHPND) has not yet been detected in cultivated shrimps in Myanmar. Because of disease problems, majority of the shrimp farmers have shifted to extensive or traditional shrimp farming. The Aquatic Animal Health and Disease Control Section (AAHDCS) of the DoF formulates the action plans for aquatic animal health and disease control. Thus to keep abreast with the novel techniques used for the detection and management of previously reported and newly emerging diseases of penaeid shrimps, upgrading of laboratory equipment and facilities, and improving the capacity of the departmental personnel on aquatic animal health management are currently being undertaken.

Introduction

Myanmar is endowed with rich and varied marine coastal and inland fishery resources. It has 2,832 km of coastline and total marine fishery areas of 486,000 square kilometers. Moreover, its inland water bodies such as natural lakes, reservoirs, rivers, and ponds cover an area of about 8.2 million hectares (ha). Inland fisheries do not only support the livelihoods of thousands of families but importantly contribute to the fish supplies and national revenue. To increase fish production, culture-based capture fisheries have been practiced in some leasable waters. As a government regulation, the lessee has to release fish fingerlings or juveniles into these identified areas.

Aquaculture has a major role in terms of food security being one of the most important industries contributing to the national economy of the country. Myanmar's fish and shrimp pond areas are approximately 91,653 ha and 92,691 ha, respectively. Pond culture of rohu (*Labeo rohita*), a freshwater fish, is well developed in Myanmar. Notably, production of cultured freshwater fishes does not only supply the country's domestic consumption but likewise other neighboring countries. The local people prefer freshwater fish than marine fish; hence, the Government of Myanmar has laid a policy to target marine fish for the export market.

Shrimp culture in the country started in 1970's using a trap and hold method. Postlarvae (PL)

of *Penaeus monodon* were trapped into the ponds during high tide. There were no inputs in terms of pond preparation, eradication of predators, water fertilization, and feeding. As the ponds were usually as large as 50 to 100 ha, the shrimp production provided more than enough income for the shrimp farmers (Thame and Aye, 2005). With this promise, a 3-year project aimed at developing the shrimp culture systems into extensive, extensive plus and semi-intensive was implemented by the Department of Fisheries (DoF), Ministry of Livestock and Fisheries (MLF) in 2010. This was followed by another 3-year project that primarily focused on the development of an intensive culture system (Saw, 2004). However, due to occurrence of diseases, majority of the farmers have shifted back to extensive or traditional shrimp farming system.

The shrimp farming areas in 2013 to 2014 have been estimated at 96,000 ha with the largest areas in Rakhine State (65,324 ha), followed by Ayeyarwady State (24,003 ha), and Yangon State (4,296 ha). Smaller shrimp farming areas could be found in the States of Bago, Kayin, Mon and Thanintharyi (Figure 1). *P. monodon* has been the major species produced, but other species have also been collected from extensive and traditional trap and hold ponds. According

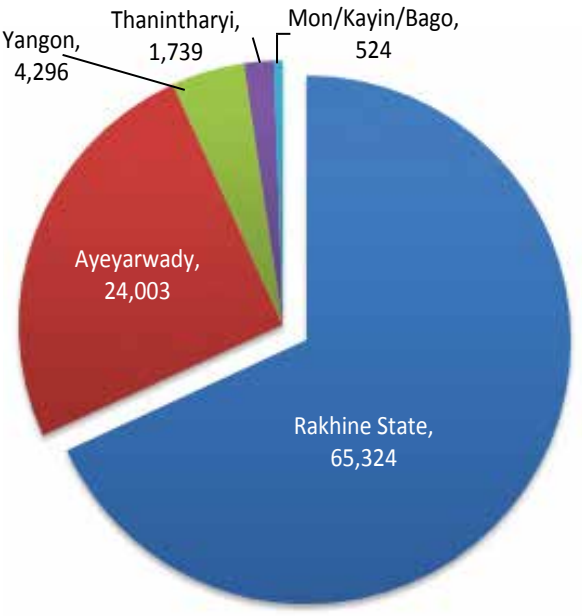

Figure 1. Shrimp farming areas (ha) by region in 2013-2014 (Central Statistical Organization of Myanmar and Department of Fisheries, 2010 and 2013)

to the Food and Agriculture Organization (FAO) of the United Nations, the overall production of *P. monodon* in 2012 was estimated at 52,000 metric tons (MT) giving a production rate of about 550 kg/ha/yr (BOBLME, 2014).

Freshwater prawn (*Macrobrachium rosenbergii*) is also a popular species for aquaculture in Myanmar (Saw, 2004). Captured *M. rosenbergii* was one of the top twenty fishery export items of Myanmar in 2007-2008. It ranked number 13 in the list with a production volume of 1,228.11 MT amounting to 12.28 million U.S. dollars (Fishery and Aquaculture Country Profiles: Myanmar, 2010). Currently, Myanmar has 15 backyard freshwater prawn hatcheries that can produce billions of freshwater prawn seeds (Myanmar Shrimp Association, 2016).

Status of persistent and emerging diseases of cultured shrimp

In 2010, white spot disease (WSD) caused by white spot syndrome virus (WSSV) devastated the shrimp industry of Myanmar. WSD outbreak occurred in intensive shrimp ponds stocked with imported postlarvae. Consequently, the disease spread to other ponds through horizontal transmission (Saw, 2004). WSSV was also detected by PCR method in shrimp samples for export in 2014 (NACA and FAO, 2015).

Taura syndrome (TS) and infectious hypodermal and haematopoietic necrosis (IHHN) caused by Taura syndrome virus (TSV) and infectious hypodermal and haematopoietic necrosis virus (IHNNV), respectively, have been officially reported in Myanmar (AGDAFF-NACA, 2007). In January 2010, 40 samples of *P. monodon* from Ayeyarwaddy Division (western part of Myanmar) were submitted to DoF for PCR analysis. Ten percent of the samples examined were found positive for TSV while only 2.5% were positive for IHHNV (NACA and FAO, 2010). Yellow head virus (YHV) was also detected in shrimp samples for export in 2014 (NACA and FAO, 2015). Fortunately, acute hepatopancreatic necrosis disease (AHPND) has not been reported yet in Myanmar.

In February 2013, another case of serious mortality was also observed in hatchery-reared freshwater prawn (*M. rosenbergii*) PL in two townships (Yangon Region). At that time, 50 million *M. rosenbergii* PL 5-6 were affected. As a consequence, farmers lost about USD 2 million. Because the broodstocks were unhealthy, the larvae and PL were weak. The infection started in the summer time when the temperature was high and the water quality was also poor. Affected freshwater prawn exhibited symptoms including change in the coloration of the dorsal side and eyes and pale body color that eventually turned purple. None of the World Organization for Aquatic Animal Health (OIE)-listed pathogens was detected in the fixed diseased samples sent to the Laboratory of Dr. D. Lightner in Arizona State University, USA. Because farmers speculated that the etiology of the disease was bacterial, they used antibiotics to treat the disease. However, this intervention failed to control the disease; hence, the DoF advised farmers to maintain good water quality, reduce stress and use nutritionally adequate feeds to prevent further mortalities.

Laboratory and diagnostic capacity

The DoF is the responsible agency and competent authority for the management and sustainability of the fishery development in Myanmar. It enhances food security by increasing fish production for domestic consumption and export. Practical and effective strategies aimed at preventing and controlling the occurrence of diseases in hatcheries and grow-out facilities through proper aquatic animal health management have been identified as an important priority area of the DoF to make production of different aquaculture species sustainable. To address this need, the DoF established the Aquatic Animal Health and Disease Control Section (AAHDCS) under the Aquaculture Division. The main laboratory of the AAHDCS is located in Yangon (Yangon Region). The other AAHDCS laboratory is located in Nyaung Don (Ayeyawaddy Region). Figure 2 shows the organizational chart of the AAHDCS of Myanmar.

The AAHDCS has been conducting surveillance using Level-1 disease diagnosis. The activities covered in the surveillance include the following: (a) report from the township fisheries officers; (b) report from the farmers directly to the aquatic animal health section; (c) occasional field visit of township fisheries officers to farm sites; and (d) recording of reports on disease occurrences. The AAHDCS has also the capability to conduct Level-II diagnosis, i.e. through histopathology and microbiology; however, upgrading of equipment and training of staff have to be undertaken. Notably, the AAHDCS laboratory has the capability to conduct Level-III diagnosis such as the use of PCR method to detect shrimp viral diseases including WSD, IHHN, TS and YHD. In addition, the AAHDCS laboratory plans to establish the diagnostic methods for

Figure 2. Organizational chart of Aquatic Animal Health and Disease Control Section of Myanmar.

AHPND following the suggested methods in the OIE Manual.

Disease prevention and control strategies

Because of shrimp diseases, annual shrimp production over the past years has decreased. To mitigate losses, it is crucial to implement precautionary measures to prevent and control the occurrence of diseases and pathogen population in the hatcheries and grow-out ponds. It is also important to prevent water quality from deteriorating and to strengthen the natural resistance of the shrimp stocks.

In Myanmar, the AAHDCS formulates action plans for aquatic animal health and disease control which include: (a) collecting shrimp disease information by active and passive reporting systems. Mobile teams regularly visit premises before export and provide necessary instructions. Also, training on aquatic animal health management is provided to shrimp farmers and students; (b) issuance of health certificate after the animal has been examined to be healthy and free from any clinical sign of disease; (c) checking of transboundary aquatic animal diseases in live aquatic animals for import or export being performed at Yangon International Airport; (d) dissemination of pamphlets for aquatic animal disease information and prevention of aquatic animal diseases; and (f) regular submission of quarterly report on aquatic animal diseases to the Network of Aquaculture Centres in Asia-Pacific (NACA) and OIE. The AAHDCS has prepared a *Handbook of Aquatic Animal Health Management* for fish farmers and students. The manual encompasses topics on aquatic animals susceptible to a particular disease, stage(s) affected, key clinical signs of the disease and concomitant diagnostic methods among others.

Way forward

With the expansion of farming areas for aquaculture, occurrence of diseases will be inevitable; hence, adherence to good aquaculture practices should be observed. Since the AAHDCS of the DoF plays a crucial role in the formulation of the action plans for aquatic animal health and disease control, upgrading of laboratory equipment and facilities, and improving the capacity of the departmental personnel on aquatic animal health management are currently being undertaken to keep abreast with the novel techniques used for the detection and management of previously reported and newly emerging transboundary diseases of penaeid shrimps and other economically important aquatic organisms.

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Table 1. Levels of disease diagnosis and corresponding activities at the Aquatic Animal Health and Disease Control Section of Myanmar.

Level	Site	Activities
I	Field	Surveillance, observation of animal and the environment, clinical examination and extension service
II	Laboratory	Diagnostics (parasitology, bacteriology, mycology, histopathology) and extension service
II	Laboratory	Diagnostics (PCR for WSSV, YHV, TSV using the IQ 2000TMKit) and extension service

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