

Current Status of Transboundary Fish Diseases in Myanmar: Occurrence, Surveillance, Research and Training

Saw New Year

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I. Current Status of Koi Herpesvirus Disease (KHVD) in the Production of Common Carp and Koi

I-1. Production of Common Carp and Koi

a. Production of Common Carp

To initiate first development of freshwater aquaculture, Myanmar imported some exotic species such as tilapia (*Oreochromis mossambica*), kissing gouramy (*Trichogaster pectoralis*) and common carp (*Cyprinus carpio*) in 1954. Common carp was imported from Indonesia and in 1965, the mirror carp (*Cyprinus carpio*) was imported from Israel. But up to 1970, culture of common carp was not popular among the fish farmers. The fish was new to the people of Myanmar with its colorful yellow color that they correlated as significant with the Buddhist religion. The Myanmar-Chinese people begun to eat common carp since the fish is rich in fat. Freshwater fish culture is now well established in Myanmar using various species of major carps such as catla (*Catla catla*), rohu (*Labeo rohita*) and mrigala (*Cirrhina mrigala*) that inhabit the surface layer, middle layer and bottom layer of water bodies, respectively. Up to 1995, freshwater fish, including cultured fish, was not allowed for export as it was solely for domestic consumption.

In some areas, common carp is cultured as a substitute fish for mrigala, but not in large quantities. Common carp inhabits the bottom layer of the pond and browse the pond dikes. This habit has been a major constraint for common carp culture because the fish farmers worry that the fish may cause dike erosion. In general, common carp culture comprises only 20% of the volume of other carps being cultured.

After 1995, freshwater fish produced in Myanmar was allowed for export since production exceeded the domestic consumption (Table 1). Myanmar usually exports major carps to Bangladesh where they command a higher price. However, common carp remains for domestic consumption. The fish is normally cultured in earthen ponds and rarely in tanks. In terms of pond sizes, the smallest ponds are 0.1 ha, while the largest ponds are 10-20 ha. Small ponds are located in the upper region of Myanmar and the larger ponds are located in the lower region of the country, especially in river delta areas. Small-scale fish farms normally purchase the fingerlings from government or privately-owned hatcheries. Rice bran and ground-nut oil cake are common feed for the freshwater fish. Recently, a new feed type like the floating pellet was developed and became more popular among the fish farmers.

Table 1. Yearly freshwater fish production record in the last 5 years

Year	Number of fish farmers	Fish pond area (ha)	Fish production (MT)
1998-1999	12,012	49,046.70	84,130.72
1999-2000	12,087	49,234.60	94,008.17
2000-2001	12,907	57,360.98	121,583.33
2001-2002	14,142	90,732.91	189,418.30
2002-2003	14,792	124,112.24	221,006.54

Large-scale fish farm systems include nursery ponds, transition ponds, and rearing ponds in the farm design. The fish fry of 3-5 day old hatchlings are nursed in the nursery ponds. This procedure needs skill and experience to produce about 25-30 % survival. When the fingerlings attain the size of 2-3 inches after about 45 days rearing period, they are transferred to transition ponds where they are grown up to 500 g in one year. They are called yearlings and are used as stockfish in grow-out ponds.

Common carp was found to be the appropriate species to culture in rice fields. The Department of Fisheries has stocked good quality fish seed including common carp into the reservoirs, lakes, natural impoundments, rivers, streams and natural water bodies to maintain the fishery resource. Because of this, the common carp can be found in the wild habitats now.

Aside from this, Myanmar has a local strain of common carp found in the Inle Lake of the Southern Shan State in the northern region of Myanmar. However, the appearance, color, and small size of the fish, and the texture of the flesh make it unattractive for culture. This fish is only consumed by poor people in rural communities near the lake.

Spawners of common carp for seed production are selected from among the largest fish in grow-out ponds. Common carp is easy to breed from February to May each year. Fish farmers can easily produce common carp seed or they may purchase fingerlings from government and private hatcheries. The first common carp fish stock was imported from Indonesia in 1954, but the fish has been domesticated ever since the first import.

Common carp is not included in the fishes that are exported due to lack of demand. Due to repeated inbreeding of cultured common carp, it is assumed that the genetic characteristic has declined and this may lead to poor resistance or susceptibility to diseases in long term.

b. Production of Koi

Koi is also known as colored carp. It is a popular ornamental fish in Myanmar and normally found in aquaria for hobbyists. It has never been reported that koi is produced commercially in Myanmar. Seed production method is similar to common carps, but the colorful koi may command much higher price. There is no information on the fish's genetic management, mutation, and other sophisticated technologies practiced in Myanmar. Some attractive and beautifully colored koi may be imported illegally.

I-2. Koi Herpesvirus Disease (KHVD) of Common Carp and Koi

No information on any outbreak of koi herpesvirus disease (KHVD) has been reported yet. Importation of koi for ornamental purposes is very few and KHVD is not being analyzed since koi trade is not common. Culture of common carp is also small-scale and no report of KHVD outbreak is available.

I-3. Handout on KHVD

Despite the absence of KHVD outbreak in Myanmar, the Disease Section under the Department of Fisheries has published a handout on KHVD as a preventive measure. It is published in Myanmar language (Fig. 1). The handout contains the following information:

- a. External and internal signs
 - Skin becomes tough and abrasion can be found on the skin
 - Gill tissues appear rotten
 - KHVD may affect internal organs like kidney, liver, spleen, heart, intestines
- b. Secondary diseases associated with KHVD
 - Bacterial
 - Parasitic
 - Fungal
- c. Primary cause
 - Koi herpesvirus
 - Cyprinid herpesvirus
- d. Affected age
 - Fingerlings to adults
- e. Diagnostic tests
 - Check external features – Level I
 - Check with PCR – Level III
- f. Transmission
 - Horizontal

- g. Preventive and control measures
- maintain better water quality and pond environment
 - minimize stress during handling and transportation
 - protect the invasion (prevent the entry) of disease carriers
 - send specimens and report suspected cases to Disease Section

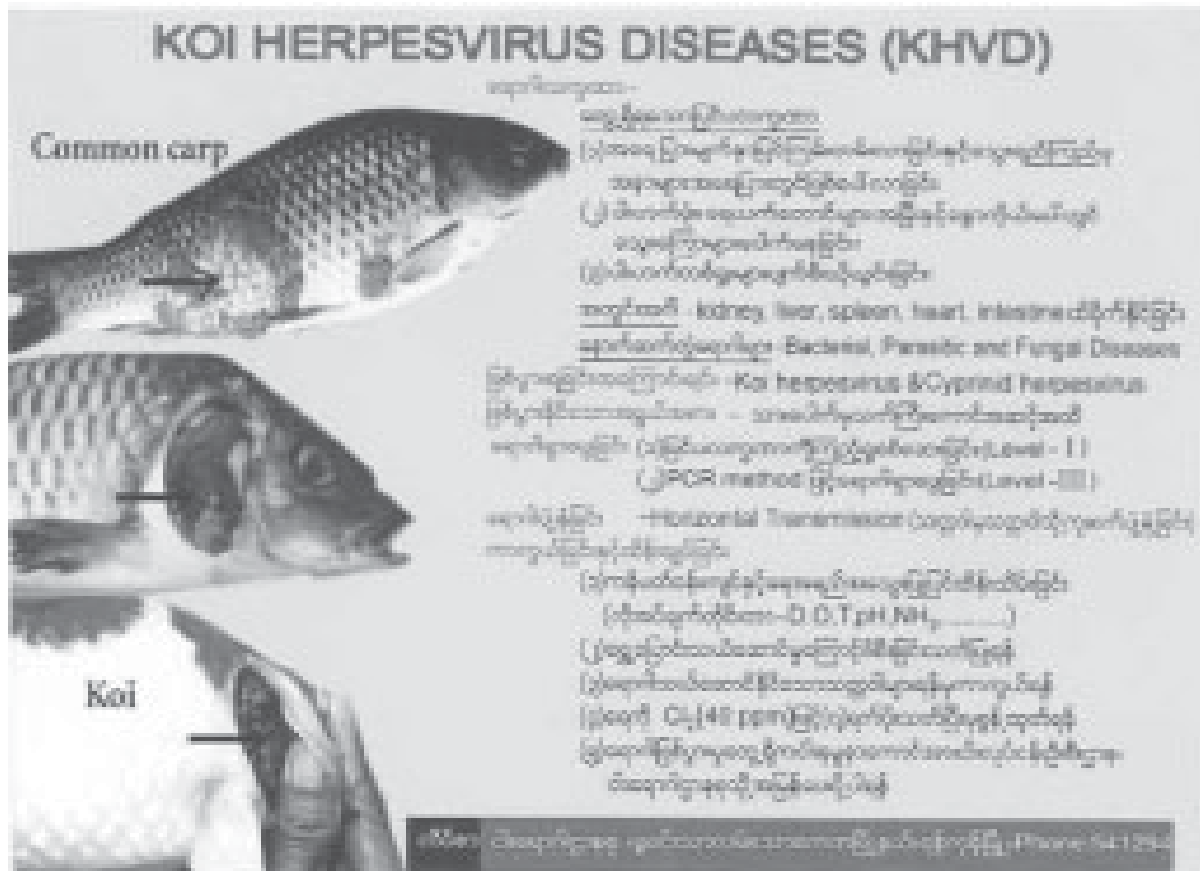


Fig. 1. The handout on KHVD which is distributed free of charge to farmers

II. Current Status of Viral Diseases in the Production of Shrimps and Prawn

II-1. Production of Shrimps

a. Production of Tiger Shrimp (*Penaeus monodon*)

In the 1970s, shrimp production originated from a purely traditional method commonly called “trap and hold”, whereby shrimp production in very large ponds came mainly from postlarvae (PLs) that came in with the tide and derived nourishment from available natural food. In the past, even this method was not popular among the people of Myanmar. However, the number of traditional shrimp ponds increased year by year.

The Department of Fisheries (DOF), under the Ministry for Livestock and Fisheries, implemented a 3-year project on shrimp aquaculture development that was started in 1999-2000 and ended in 2002-2003. This was followed by another 3-year project which the Ministry for Livestock and

Fisheries started implementing in 2003-2004 to last until 2005-2006. The first project included the development of all culture systems such as extensive system, extensive plus system and semi-intensive systems. The second project encourages the development of intensive systems only. The yearly shrimp production recorded from various culture systems is shown in Table 2.

Table 2. Yearly production of cultured shrimp

Year	Number of shrimp farmers	Fish pond area (acre)	Shrimp production (MT)
1998-1999	3,752	62,604.98	4,900.33
1999-2000	4,312	67,446.97	4,967.32
2000-2001	6,925	101,803.64	7,473.90
2001-2002	7,961	119,784.47	11,357.08
2002-2003	11,429	199,961.19	19,120.78

Myanmar has rich resource of tiger shrimp spawners in the Andaman Sea and Bay of Bengal. There are 29 existing shrimp hatcheries owned by the government and the private sector capable of producing about 600 million PLs/year. Existing shrimp hatcheries can supply the requirements of the grow-out farms.

Before the hatcheries were successful, some PLs were imported from Thailand in 1999-2000. Due to uncertified importation, disease outbreak of white spot syndrome virus occurred which was later transmitted horizontally to other farms. Black tiger shrimp spawners have not been imported, but they are exported to some Asian countries like Vietnam, Thailand, Malaysia and Taiwan.

b. Production of Pacific White Shrimp (*Litopenaeus vannamei*)

Generally, Myanmar does not allow the culture of Pacific white shrimp, but some shrimp farmers requested the Ministry of Livestock and Fisheries, and the DOF to allow importation of the species. After several consultations made with NACA, SEAFDEC and other agencies, the DOF decided not to allow importation and culture of *L. vannamei* to prevent the introduction and outbreak of Taura syndrome virus (TSV). Therefore, Myanmar has no problem with TSV outbreak at present.

c. Production of Freshwater Prawn (*Macrobrachium rosenbergii*)

It is indeed fortunate that Myanmar has very good sources of good quality freshwater prawn (*M. rosenbergii*). However, the technology for freshwater prawn culture in Myanmar is not well developed. Generally, the prawns are cultured with freshwater finfishes like Chinese carp and other carps. Monoculture of the prawn was attempted by private companies during the last 2-3 years, but due to the uneconomically viable results, the system was converted again to polyculture or mixed species culture.

II-2. White Spot Syndrome Virus (WSSV)

The first 3-year project of shrimp aquaculture that commenced in the year 1999-2000 triggered a sudden increase in intensive shrimp ponds that caused imbalance in the supply of shrimp PLs from the local shrimp hatcheries. In that year, some shrimp farmers were allowed to import shrimp PLs from Thailand. Due to high stocking density, ignorance of best pond management, and lack of PCR analysis, the shrimp ponds stocked with imported PLs experienced outbreaks of white spot disease that spread to other ponds through horizontal transmission. Shrimp farmers lost tremendously and the disease almost paralyzed the development of the shrimp industry in Myanmar. The disease has become a major threat to shrimp aquaculture development where the *P. monodon* is the only species for culture. Normally, WSSV was found in shrimp stocked after 20-60 days. According to the climatic condition, shrimp culture operations were initially done from December to April. The period between November and February is the winter season and the water temperature goes down to 23-24°C. In that situation, the feeding rate of the shrimp decreases and most diseases occur in that period. The DOF established a laboratory for PCR analysis only in the year 2002. Before that, the local hatcheries sent broodstocks and also PLs to Thailand for PCR check up. Up to year 2000, the broodstocks harvested from the wild were found WSSV-free. However in 2003, some spawners were found positive for WSSV after PCR analysis. This indicates that the disease has already spread to wild stocks. WSSV usually causes 100% mortality in infected stocks.

Currently, DOF has a Disease Section that is equipped with a laboratory capable of conducting PCR analysis. In 2002, trainings and monitoring of WSSV, TSV, IHHNV, MBV and *Vibrio* spp. were conducted in collaboration with the Food and Agriculture Organization (FAO) of the United Nations and Myanmar DOF.

II-3. Taura Syndrome Virus (TSV)

Myanmar has not allowed the importation and culture of *Litopenaeus vannamei* yet and there is no information on TSV occurrence.

II-4. Significant and Emerging Disease of *Macrobrachium rosenbergii*

Culture of freshwater prawn is by polyculture methods with Chinese carps or major carps. As it is very extensive due to very low stocking density, there has been no information on the occurrence of significant disease or disease outbreak in this species.

III. Surveillance, Monitoring and Diagnosis of Diseases of Aquatic Animals

III-1. Responsible Facility and Personnel

Facility location: Department of Fisheries

- a. Fish Disease Section
Shukhintha Road, Thaketa Township, Yangon, Myanmar
- b. Contact personnel
Ms. Nwe Ni Aye
Section Head
Tel : 095-01-541294
Fax : 095-01-228258
E-mail : DOF@mptmail.net.mm

The DOF staff makes occasional visit to fish and shrimp farms, which they monitor and survey. Sometimes, the Fish Disease Section contacts the Township Fisheries Officers, or the farmers, themselves, contact the staff of the Fish Disease Section.

III-2. Diagnostic Capabilities and Major Diseases Aquatic Animals

a. Laboratories

1. Government
DOF, Fish Disease Section – Level I and Level III (PCR)
Tel: 01-541294, Fax: 01-228258
E-mail : DOF@mptmail.net.mm
2. Private-based – Level III PCR
3. University-based – Levels I and II

b. Economically-Important Diseases

Name of disease: WSSV, IHNV
Affected animals: *P. monodon*
Level of diagnosis: Level III (PCR)

IV. Quarantine Services to Prevent Entry of Diseases of Aquatic Animals

IV-1. Responsible Agency and Personnel

The decision maker regarding requests for importation of live aquatic animals is the Director General (DG) of the DOF. Quarantine decisions are made by the Director of Research and Development Division, DOF, while inspections are conducted by the Quarantine Inspection Section, DOF.

Inspection on arrival at airport is conducted. The samples obtained at the airport are examined at the Quality Control Laboratory, Thaketa under the DOF. Levels II and III diagnosis are used.

IV-2. Procedures and Requirements for Importation and Exportation

- a. Importers have to apply to the DG of the DOF. Import and export of live aquatic animals are decided by the DG with the approval of the Ministry after careful determination on whether the animal may cause environmental impact or has a positive effect on national economy.
- b. When the live aquatic animals arrive, the authorized inspectors from DOF inspect health certificates and the live animals at the airport. If necessary, the samples are examined at the Quality Control Laboratory and Disease Section, Thaketa.
- c. Laws and Regulations concerned with import/export of live aquatic animals have been included in the Laws Relating to Aquaculture. The DG is the only authorized person who can make decisions about importation and export of live aquatic animals.
- d. Importers have to apply to the DG of the DOF. Exporters have to hold the Collection License at first and can apply to the Ministry of Commerce for export. An example of a Collection License and its accompanying instruction is in Annex I.

V. Research and Training of Fish Health Staff for Quarantine, Diagnosis, and Surveillance of Diseases of Aquatic Animals

- a. Current research activities – Nil
- b. List of agencies – Nil
- c. List of publications
 - Outbreak of White Spot Diseases in Myanmar by Minn Thame
 - Guidelines to shrimp farmers for the preventive measures of WSSV (in local language)
 - Hand-out on Koi Herpesvirus Disease (KHVD) by Fish Disease Section (in local language)

- d. Agencies Conducting Trainings on Diseases

Research and Development Division (DOF)

U Tin Win, Director

Tel: 095-01-211376, Fax: 095-01-228258

E-mail: DOF@mptmail.net.mm

- e. Training Courses

1. Strengthening of Fish Disease Diagnosis (Mycology, Virology, Bacteriology, Histopathology) (Japan, 1994)
2. Shrimp Health Management Training by NACA (Thailand, 1999)
3. Fish Health Management Training by SEAFDEC (Philippines, 2000)

4. Aquaculture Health Management by SEAFDEC (Philippines, 2002)
5. PCR Training by Private Company Limited (Thailand, 2002)
6. Hands-on Training for Important Viral Disease of Shrimp and Marine Fishes by SEAFDEC (Philippines, 2002)
7. Second Hands-on Training for Important Viral Disease of Shrimp and Marine Fishes by SEAFDEC (Philippines, 2003)

f. Training Needs

Specific trainings on basic diagnosis of parasites, virus, bacteria, fungus on major culture species like, carps, prawns, shrimps, marine finfishes; training on how to conduct surveillance, monitoring and diagnosis.

Annex 1. Example of a Collection License used in Myanmar

GOVERNMENT OF THE UNION OF MYANMAR
 MINISTRY OF LIVESTOCK AND FISHERIES
 DEPARTMENT OF FISHERIES

License No

License for Collection and Marketing of Aquatic Products

In accordance with existing Laws and Instructions herewith attached, the Director General of the Department of Fisheries, Ministry of Livestock and Fisheries, issues this License.

1. (A) Name of applicant
- (B) National Registration
- Card number
- (C) Address
2. (A) Permitted Area
- (B) Permitted Kind of.....
- Aquatic Product
- (C) Quantity/ volume
3. In terms of license duration, it starts the date of and shall end on the date of

Issue Date

Director General
 Department of Fisheries

Instructions

1. This license must be shown to authorities concerned when checked.
2. The license holder must abide by the existing Laws and the Directives occasionally issued by the Department of Fisheries.
3. Permitted aquatic through this license must be carried in the prescribed area and time limit.
4. License holder must submit the monthly report on the collected area and quantity to the fisheries authorities.
5. License holder has the right to collect the aquatic products for marketing.
6. When marketed aquatic products are to be carried, license holder must keep the carry permit which is available at local fisheries authority.
7. Legally allowed aquatic products shall have to be handed over and marketed according the existing laws.