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| Title | Transboundary movement of exotic shrimp species in the Asian region. |
| Author(s) | Lavilla-Torres, Celia R. |
| Citation | Laviall-Torres, C.R. (2004). Transboundary movement of exotic shrimp species in the Asian region. In: Promotion of mangrove-friendly shrimp aquaculture in Southeast Asia (pp. 108-110). Tigbauan, Iloilo, Philippines: Aquaculture Department, Southeast Asian Fisheries Development Center. |
| Issue Date | 2004 |
| URL | http://hdl.handle.net/10862/960 |

This document is downloaded at: 2013-07-02 02:14:05 CST



TRANSBOUNDARY MOVEMENT OF EXOTIC SHRIMP SPECIES IN THE ASIAN REGION

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This compiled information were based on presentations at the AQUAMARKET Shrimp Session in Manila, Philippines, 2-6 June 2003, made by T.W. Flegel (BIOTEC), C.V. Mohan (NACA), P. Chanratchakool (AAHRI), and C.R. Lavilla-Torres (SEAFDEC).

Motives for Shrimp Introduction

The known motives for the introduction of exotic shrimp species in the region are:

1. strong market demand;
2. there is no suitable native organism;
3. culture of the native stock crashes; and
4. expansion, intensification and diversification of aquaculture

T. W. Flegel compiled the reasons for species introduction in the following table:

| Cause of import | No. of records | % |
|--------------------------------|----------------|-----------|
| Known and intentional | | |
| Aquaculture | 1386 | 39 |
| Fisheries | 299 | 8 |
| Ornamental | 263 | 7 |
| Research | 104 | 3 |
| Other reasons | 272 | 8 |
| Total intentional | 2324 | 65 |
| Known but unintentional | | |
| Angling/sport | 283 | 8 |
| Diffused from other countries | 139 | 4 |
| Accidental | 267 | 8 |
| Bait | 14 | >1 |
| Total unintentional | 703 | 20 |
| Unknown | 552 | 15 |

The movement of healthy shrimps between countries “with a species’ range” is allowable. However, the movement of aquatic animals outside biological barrier needs careful consideration and high level of vigilance because of various reasons that include the following factors:

1. Crustaceans can carry unknown viral pathogens as innocuous but active infections;
2. These viruses may be deadly to other species or the same species at distant locations;
and
3. Greater geographical separation implies greater danger.

Shrimp viruses are not harmful to humans but their outbreaks have raised concerns that viruses could spread from aquaculture facilities to wild shrimp stocks.

T.W. Flegel identified the following particular dangers from shrimp viruses:

1. Viruses are responsible for the most severe losses in shrimp aquaculture;
2. Shrimp and other crustaceans are characterized by persistent viral infections;
3. These infections often produce no gross signs of disease and no mortality; and
4. Many of these “hidden” or “cryptic” viruses are still unknown.

He also outlined the dual and multiple viral infections in shrimps as follows:

1. Dual, triple and multiple viral infections are often seen in shrimp, but rarely reported;
2. Rarely are “healthy” shrimp examined; and
3. A cryptic virus tolerated in one host or location may not be tolerated in another host or location.

As for the moment, a checklist of Asia’s Shrimp Virus has been compiled and compared with the Western Hemisphere’s Shrimp Disease Checklist.

| Asia’s Shrimp Virus Checklist | Western Hemisphere’s Shrimp Diseases |
|--|---|
| White spot syndrome virus (WSSV) | Taura Syndrome Virus (TSV) |
| Yellow head virus (YHV) | Reo-like viruses |
| Infectious hypodermal and hemapoietic necrosis virus (IHHNV) | Baculovirus penaei type virus (BP) |
| <i>Penaeus monodon</i> -type baculovirus (MBV) | Necrotizing hepatopancreatitis |
| Hepatopancreatic parvovirus (HPV) | |
| Baculoviral midgut gland necrosis type virus (BMN) | |

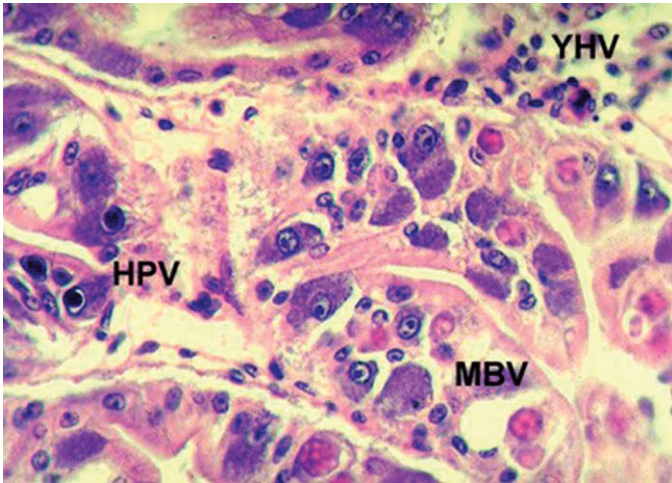
In a study of six ponds in Thailand, T. W. Flegel, et al, made an analysis on how healthy are “grossly healthy” shrimps. The results are shown in the following table:

| Infection status | No. of shrimps | % Total |
|-------------------------|-----------------------|----------------|
| Uninfected | 14 | 5. |
| Infected | 223 | 94.1 |
| Total tested | 237 | 100.0 |
| Single infections | 50 | 21.1 |
| MBV | 8 | 3.4 |
| HPV | 13 | 5.5 |
| WSSV | 19 | 6.0 |
| IHHNV | 10 | 4.2 |
| Dual infections | 69 | 29.1 |
| Triple infections | 80 | 33.8 |
| Quadruple | 24 | 10.1 |
| Dual to quadruple | 173 | 73.0 |

White Spot Disease (WSD)

The most serious pathogen of cultivated shrimp in the world is the white spot disease carried by the White Spot Syndrome Virus (WSSV). This was first known in China during its serious outbreak in 1993. The disease led to the 70% production drop of cultured shrimps in China from 135,000 mt to 30,000 mt in a period of one year. As a result of the WSD, the global estimate of cumulative lost production to date exceeds 1.0 M mt. Thus, questions on the origin and spread of WSSV, i.e., seeds, broodstock, frozen shrimp, feeds, etc., need careful investigation.

T.W. Flegel also recommended the following diseases avoidance approaches: (1) no introduction, (2) inspection at source, (3) inspection upon entry, (4) quarantine, (5) Introduction of stock known to be clean.



Shrimp hepatopancreas showing triple viral infection (left) and presumably healthy shrimps (right)



The Asian WSSV pandemic (left) as portrayed by C.V. Mohan of NACA:

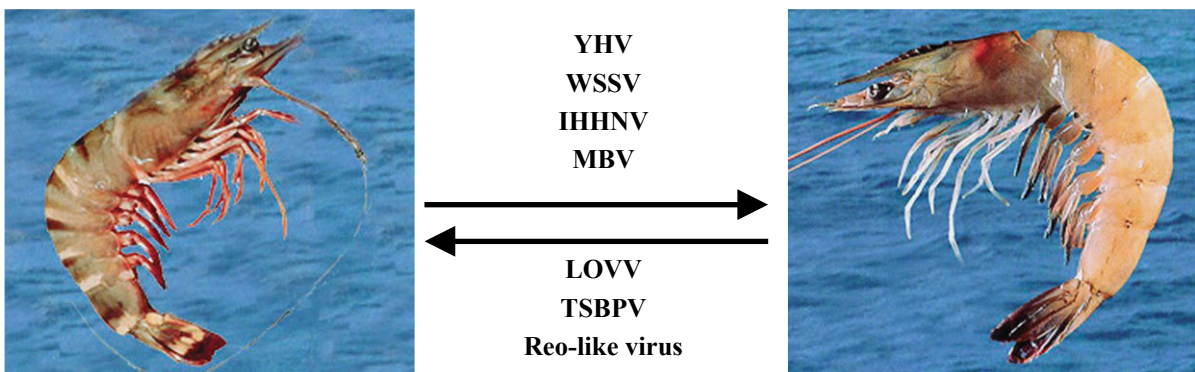
1991/1992: Taiwan

1993: Japan and Indian Ocean, India, China

1994: Thailand, Cambodia

1999: Philippines

T.W. Flegel presented an example of dangerous exchanges of shrimp species, in the following diagram (*P. monodon* (left) and *P. vannamei* (right)):



Thus, the consequences of movement of exotic shrimp species include: (1) parasites and diseases that organisms suffer from travel as well; (2) exotic organisms may escape from culture facilities either in the form of adults or larvae; (3) native species may be more susceptible to the exotic disease; and (4) these exotic species can interbreed or out compete the native species and destroy the natural stocks.