



**Food and Agriculture Organization  
of the United Nations**



# Prevention and Control of TiLV

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**Project Inception Workshop of GCP/RAF/510/MUL:  
Enhancing capacity/risk reduction of emerging Tilapia Lake Virus (TiLV) to African tilapia aquaculture  
Southern Sun Myfair Hotel, 23-24 October 2018, Nairobi, Kenya**

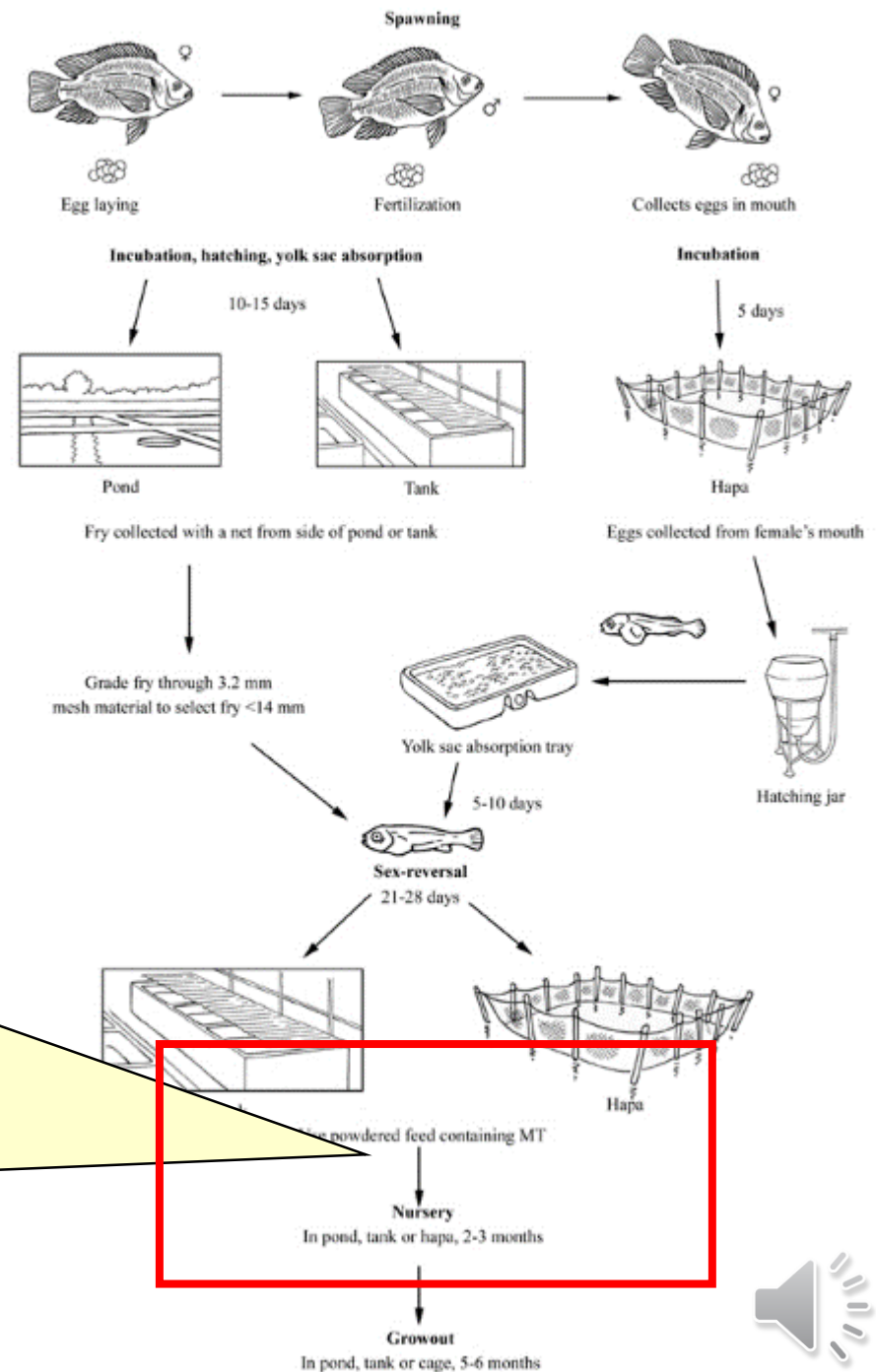
# Critical control points

**Tilapia production cycle**  
**Fish transfer to grow out pond**

**Nursery**  
**(in ponds, tanks, hapas)**  
**2-3 months**



**Growout**  
**(in ponds, tanks, cages)**  
**5-6 months**



# What is biosecurity?

A set of management and physical measures designed to reduce the risk of introduction, establishment and spread of pathogenic agents to, from and within an aquatic animal population



# Identified transmission routes

Infected live fish and eggs

**Potential risk**

Exposure via water

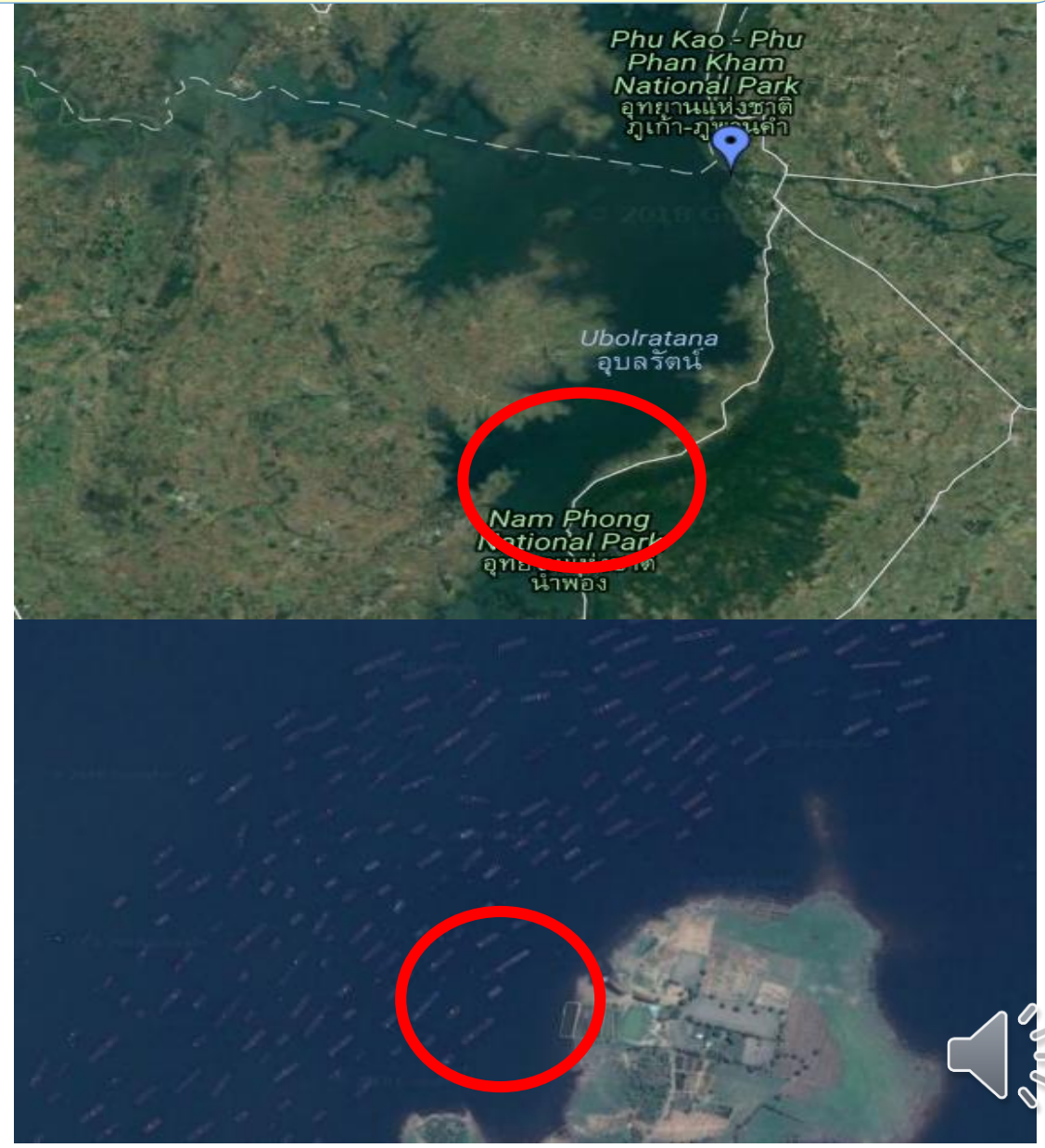
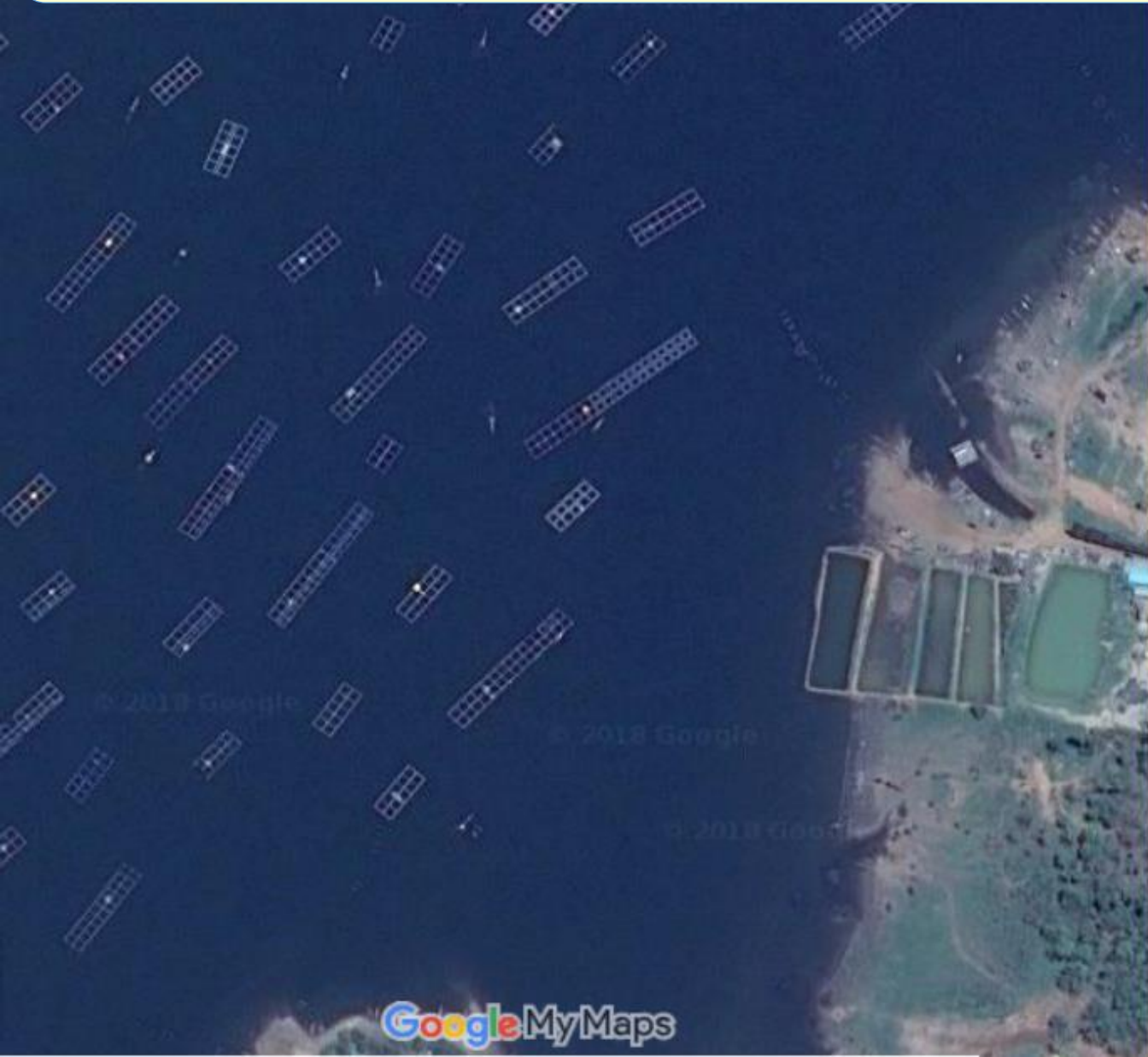


Fish processing on site

Mechanical transmission



# Important of farms location and disease spreading



# Biosecurity to prevent pathogen introduction



**Farm with clear boundary**



**A farm with surrounding wall**



**Disinfecting  
water  
supply**



# Stock only certified disease free eggs/animals



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## ORIGINAL ARTICLE

WILEY *Journal of Fish Diseases*

## Development and validation of a reverse transcription quantitative polymerase chain reaction for tilapia lake virus detection in clinical samples and experimentally challenged fish

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### Abstract

Tilapia lake virus (TILV) is an emerging pathogen associated with high mortalities of wild and farm-raised tilapia in different countries. In this study, a SYBR green-based reverse transcription quantitative polymerase chain reaction (RT-qPCR) assay targeting segment three of the virus was developed to detect and quantify TILV in clinical samples and experimentally challenged fish. All 30 field samples with clinical signs and history consistent with TILV infection were positive for TILV as detected by the developed RT-qPCR method. The RT-qPCR technique provided 100 and 10,000 times more sensitive for virus detection than those offered by the RT-PCR and virus isolation in cell culture methods, respectively. The detection limit of the RT-qPCR method was as low as two viral copies/ $\mu$ l. Moreover, the RT-qPCR technique could be applied for TILV detection in various fish tissues including gills, liver, brain, heart, anterior kidney and spleen. Significantly, this study delivered an accurate and reliable method for rapid detection of TILV viruses that facilitates active surveillance programme and disease containment.

Highly sensitive and specific method for disease screening 

# Routine disease monitoring & biosecurity practice



**Sampling  
&  
Disease  
screening**



**Good biosecurity practices**





# Remove moribund and dead animals properly!





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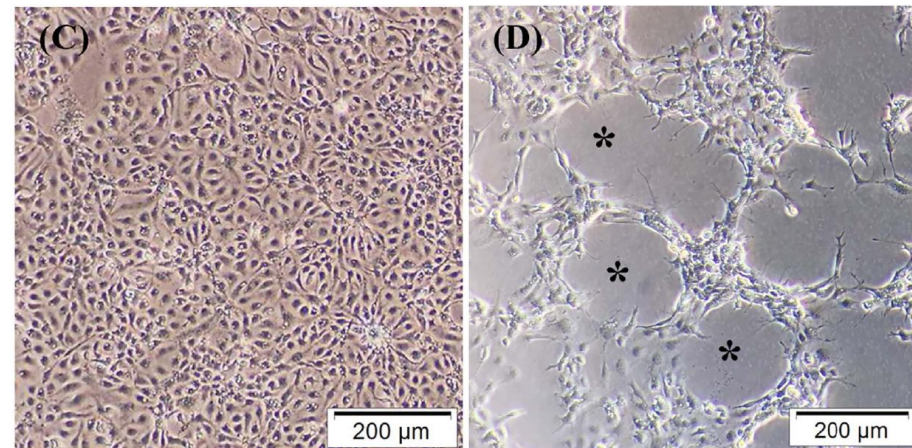
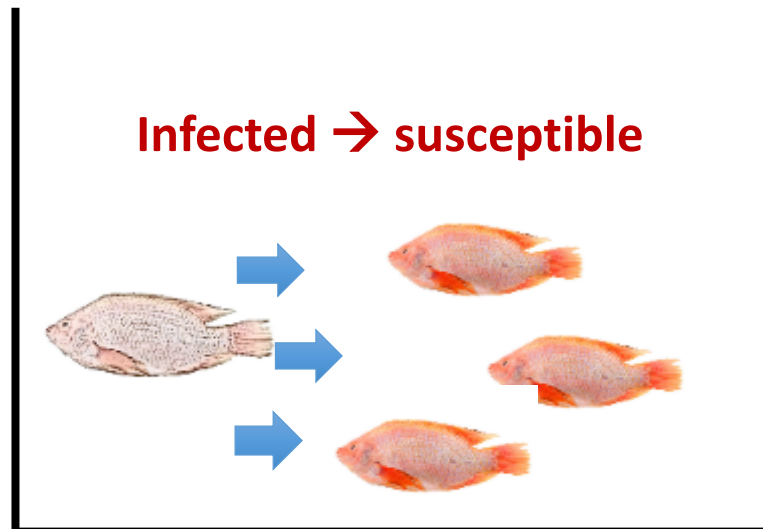


## Non-lethal sampling for Tilapia Lake Virus detection by RT-qPCR and cell culture



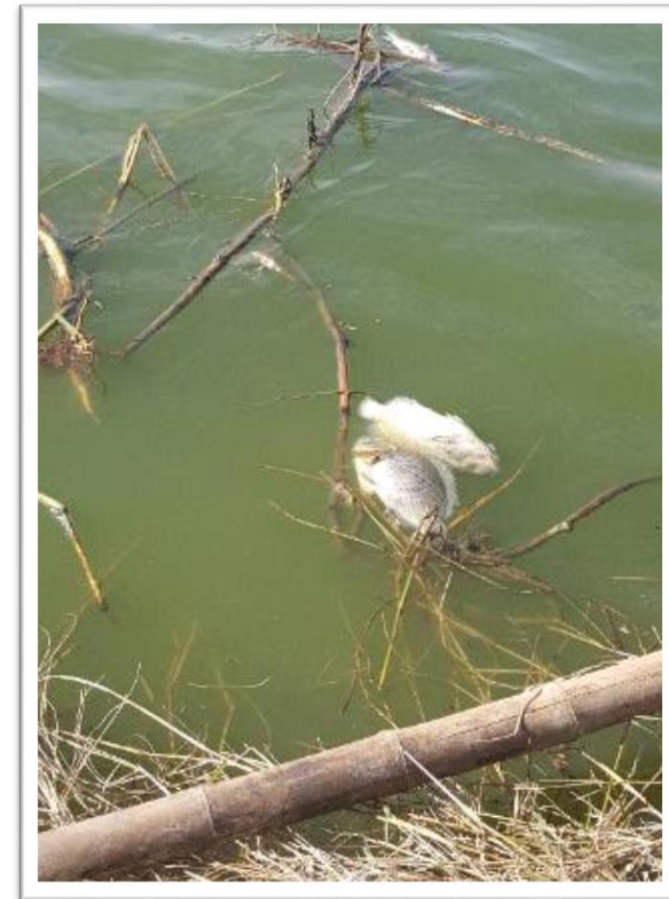
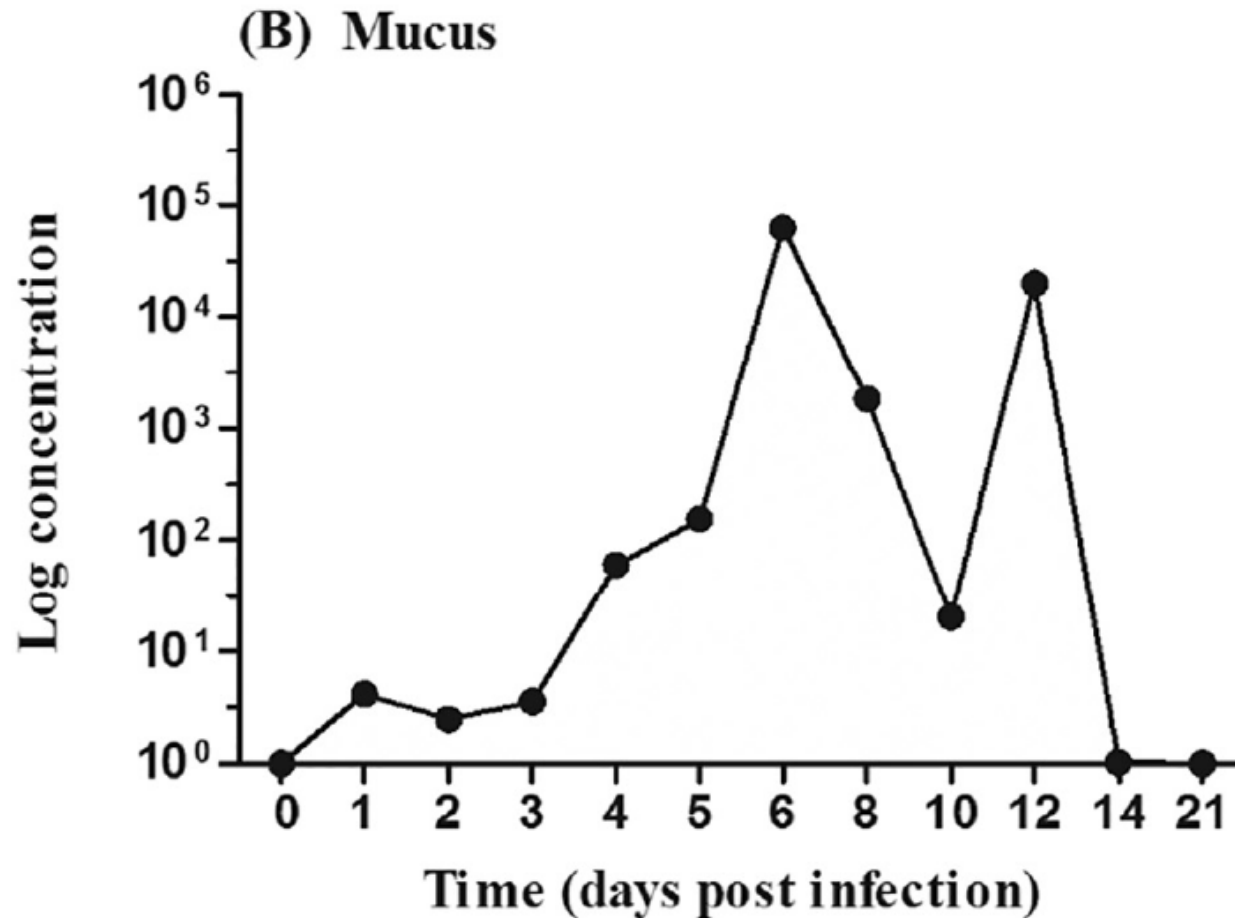
Pavarit Liamnimitr<sup>a</sup>, Worryanee Thammatorn<sup>a</sup>, Sonicha U-thompson<sup>a</sup>, Puntanat Tattiyapong<sup>b</sup>,  
Win Surachetpong<sup>a,b,\*</sup>

- **Virus in mucus is still infective!**

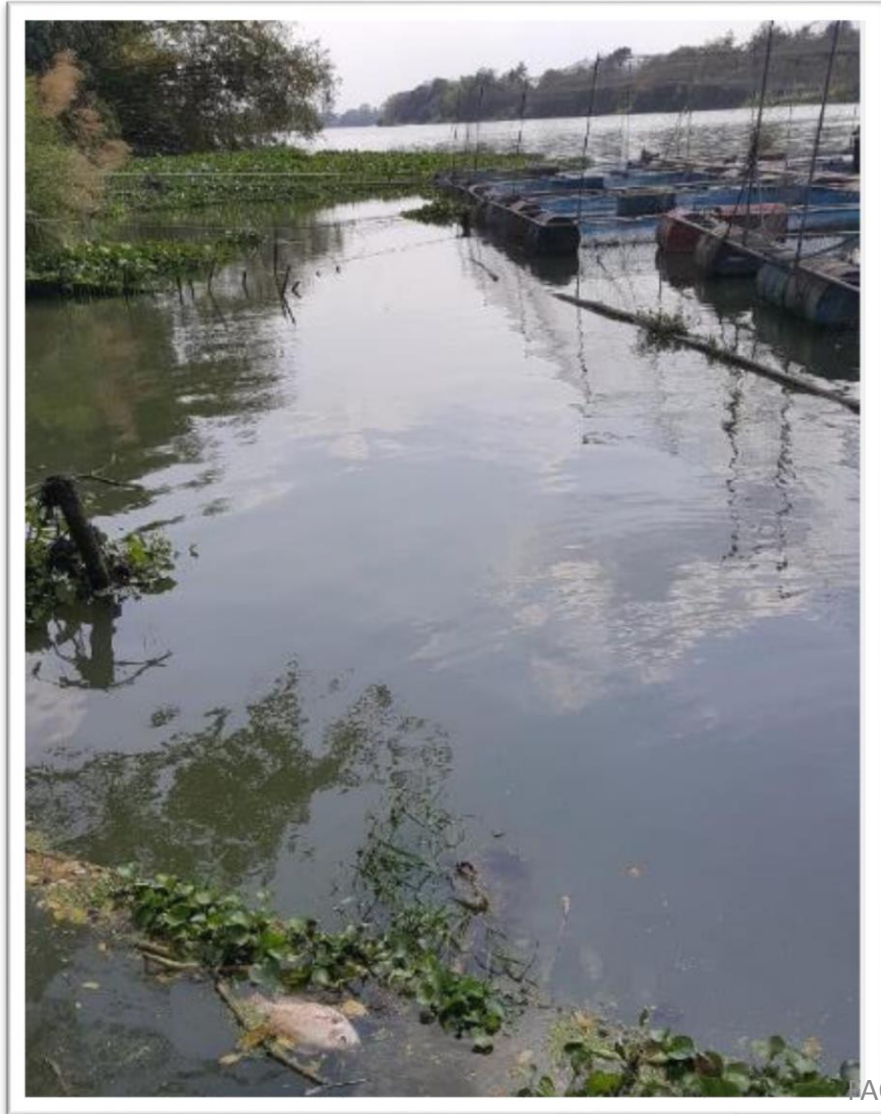


# TiLV presents in mucus upto 12 dpi → shedding

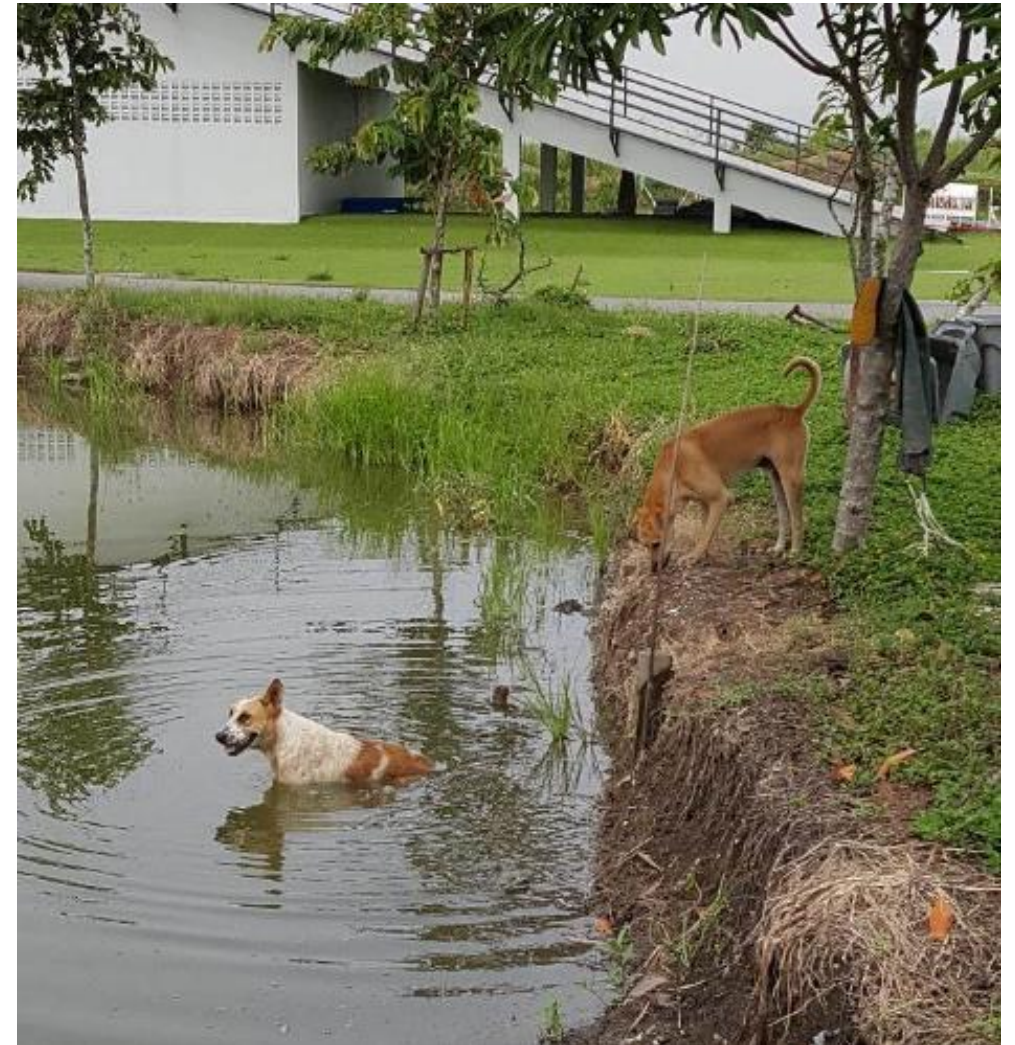
- Management of dead fish is critical.



# *Don't* dump dead fish in public water



# Transmission by carriers?



**Mechanical vectors  
causing disease to spread**



# Vectors?



- **No detection of TiLV in fish *Argulus* and mollusk (prelim study)**
- **How long the virus survive in water?**



# Most important warm water fish species are resistant to tilapia lake virus (TiLV) infection

## Susceptibility of important warm water fish species to tilapia lake virus (TiLV) infection

Phitchaya Jaemwimol<sup>a</sup>, Pattarasuda Rawiwan<sup>a,b</sup>, Puntanat Tattiyapong<sup>a,b</sup>, Patrawut Saengnual<sup>c</sup>, Attapon Kamlangdee<sup>d</sup>, Win Surachetpong<sup>a,b,\*</sup>



*Cyprinus carpio*



*Trichogaster pectoralis*



*Barbodes gonionotus*



*Lates calcarifer*



*Anabas testudineus*



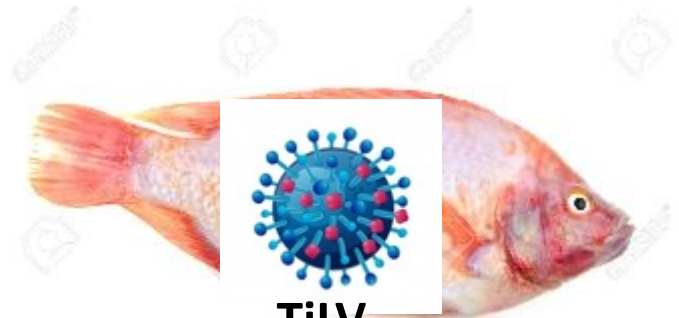
*Clarias macrocephalus*



*Pangasianodon hypophthalmus*

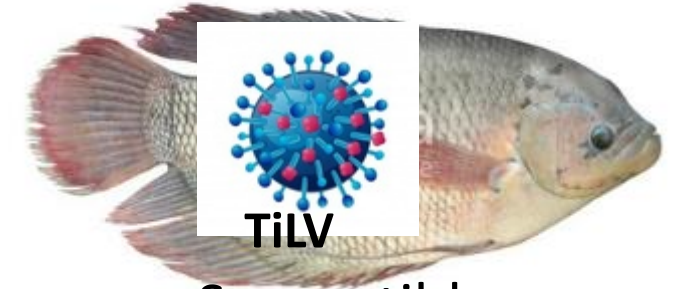


*Chana striata*



TiLV

Susceptible  
*Oreochromis* sp.



TiLV

Susceptible  
*Osphronemus goramy*

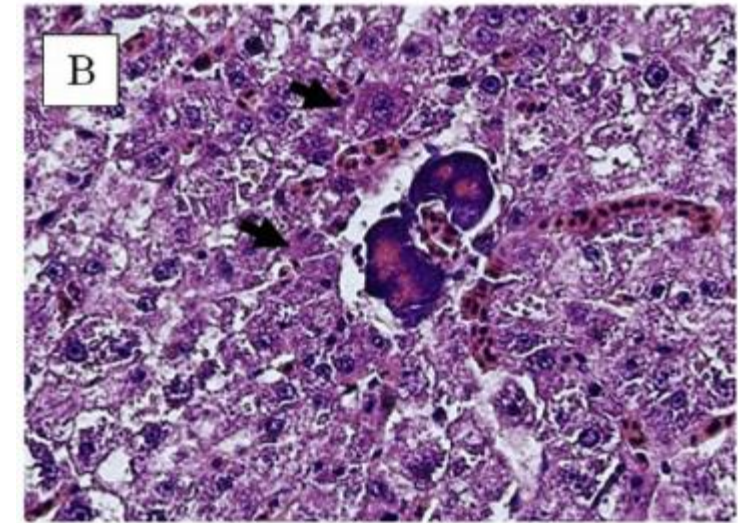
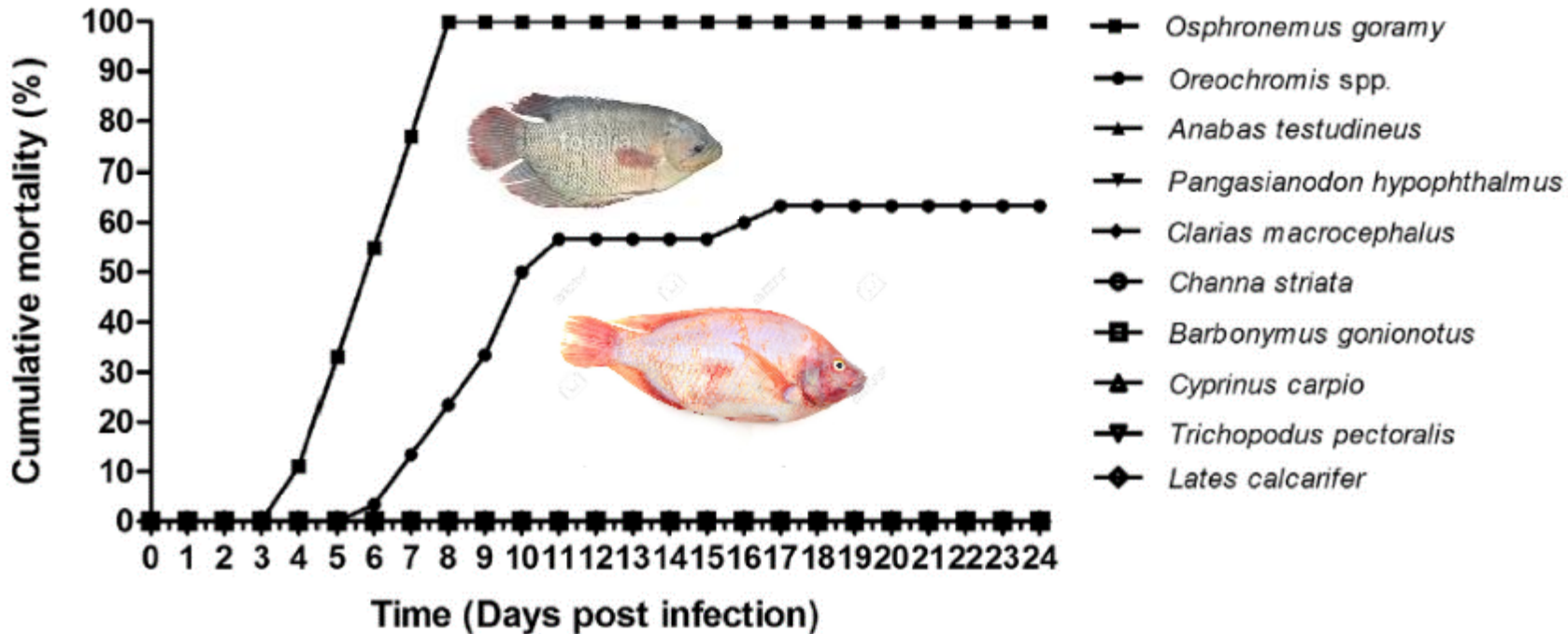




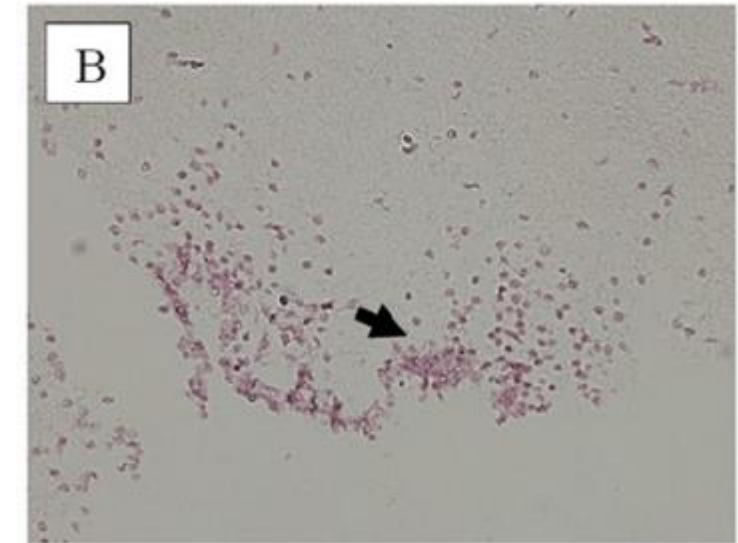
# Susceptibility of important warm water fish species to tilapia lake virus (TiLV) infection

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## Mortality of ten species after TiLV challenge



Syncytial cell in liver of giant gourami



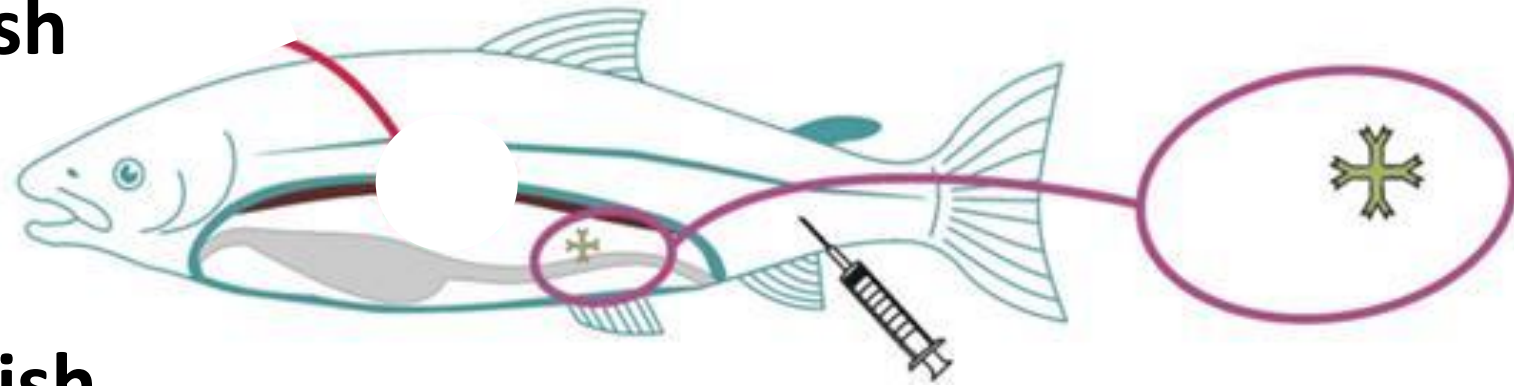
In situ hybridization signal in the brain of infected giant gourami



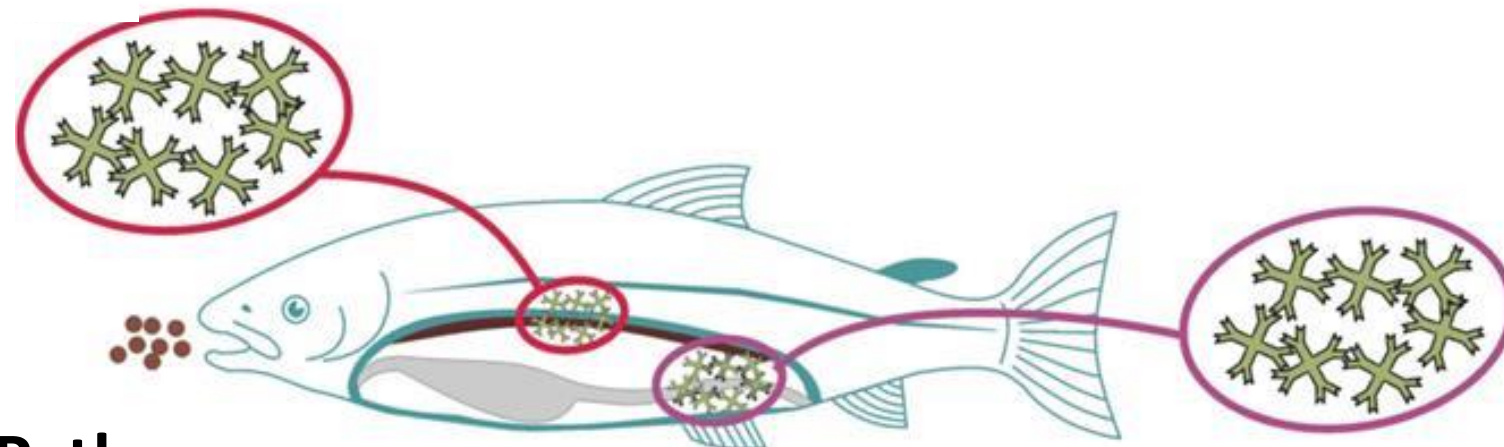
**TiLV vaccine**

# Fish that survive **TiLV** do not have re-infection → develop solid immunity?

Naïve fish



Survived fish



Pathogen

# **TILAVAC:** Vaccine for the prevention of an emerging viral disease in tilapia

- **Live and killed vaccines**
- **Immersion and injection**
- **Currently testing in the field, under natural infection conditions**



# Key considerations for TiLV control

- **Fish movement (between sites)**
- **Sick and dead fish management (quickly remove them)**
- **Trucks, equipment, boats (disinfectants)**
- **Personnel (control facility access)**
- **Potential vectors & other species (???)**



# Take home messages....

- The problem is more complex than just only the virus (**bacteria, parasites or other virus**) may impact on the mortality rate
- Don't panic...the problem is manageable
- **Biosecurity** and Farm management
- **Vaccine** is one of the important priority for this emerging virus



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**If you have suspect TiLV cases,  
please don't hesitate to contact me.**

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