

# Tilapia Parvovirus: A Potential Risk to Tilapia Culture

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Tilapia is native to Africa and is being cultured in large-scale in more than 145 countries worldwide. It is a popular fish due to its low cost and taste. Once, tilapia was considered as “a poor man’s fish” but now it has been emerged as the world’s most productive and internationally traded fish. The world production of tilapia has been estimated about 6.5 million tonnes.

During the last three decades, the global demand for tilapia consumption has driven the considerable development of tilapia aquaculture. However, global expansion of tilapia farming, extensive movements of live fish and their products across countries, together with climate change events, may contribute to the emergence and spreading of new emerging diseases that could affect aquaculture. Extensive tilapia farming in different countries due to global market demand may be responsible for emerging new diseases in tilapia farming as evidenced from the recent reports on the occurrence of tilapia lake virus (TiLV), infectious spleen and kidney necrosis virus (ISKNV) and Tilapia parvovirus (TiPV).

## Tilapia Parvovirus (TiPV)

Tilapia parvovirus is a single-stranded DNA, spherical, non-enveloped virus with a diameter of 30 nm belonging to the genus Chapparrivirus, family Parvoviridae. The genome size of TiPV is 4269 bp which includes 208 bp 5' UTR, 396 bp ORF1 and 1875 bp non- structural protein 1 (NS1), 504 bp NS2, 216 bp ORF2 and 1665 bp capsid protein 1 (VP1), and 46 bp 3' UTR9. This virus was localized in the gills, heart, brain, liver, pancreas, spleen, intestine, kidney, eyes and muscles of tilapia. Initially, the virus was thought to be non-infectious as it was identified from the intestinal sample of healthy tilapia and faecal samples from tilapia-fed crocodiles. But subsequently, it was observed that the virus can be lethal to the tilapia and cause mortalities up to 90%.

## Emergence and Impact

- First reported in China in 2019 and Thailand in 2021. India is the third country to report the occurrence of TiPV.

- TiPV has caused mortality rates ranging from 30% to 50% on fish farms.
- In laboratory settings, it has led to 100% mortality, highlighting its devastating impact.

## TiPV in India

In India, tilapia farming is being carried out in different parts of Andhra Pradesh and Kerala, and is sold in domestic markets as whole fish. In 2022, the tilapia production was estimated at about 70,000 tonnes, of which 30,000 tonnes come from aquaculture.

Considered as “a poor-man’s fish”, Mozambique tilapia was introduced to Indian freshwater bodies in the 1950s. Capable of surviving in low oxygen levels in water, the fish has turned invasive across the country. Nile tilapia introduced in the 1970s is a little bigger and is cultured on a large-scale and available in the market for ₹100 to ₹150 per kg.

During September 2022, a huge mortality of tilapia was observed in Balasore District, Odisha, India. Further, during the summer of 2023, mass mortalities of tilapia were also reported from several tilapia farms located at different distant locations of Odisha. TiPV was found to be the only pathogenic organism present in those infected fishes causing large-scale mortality in the pond aquaculture.

The occurrence of tilapia parvovirus (TiPV) affecting farm-bred tilapia, a freshwater fish species, and causing a huge mortality rate has been reported at ponds in Walajah in Ranipet district of Tamil Nadu. The virus has already been identified as posing a threat to tilapia aquaculture in several countries and in India also it may be a great threat in the coming days.

Tilapia parvovirus infection can have significant economic consequences associated with high morbidity and mortality in the aquaculture industry. Not only monetary loss, dramatically slower growth and reduced fish production are evident in a few reports. It can be devastating to tilapia farms. The

disease has the potential to lead to disruptions in local and international trade of tilapia products.

## Clinical signs

- Abnormal swimming
- Scale protrusion
- Skin and muscle haemorrhaging
- Exophthalmia
- Generalized anaemia
- Loss of appetite

## Disease transmission

TiPV spreads through direct contact with infected fish or contaminated water sources.

- Rapid transmission is common in densely populated fish ponds within aquaculture environments.
- The introduction of infected fish or contaminated equipment accelerates the virus's dissemination.
- Early detection and proactive prevention are crucial to controlling TiPV due to its highly contagious nature.

## Detection of TiPV

Various diagnostic tools such as histopathology, *in-situ* hybridization, PCR and TaqMan probe-based qPCR are available to detect TiPV in infected fish samples. The detection of TiPV in Nile tilapia for the first time in India based on the results of PCR using TiPV-specific primers, sequence analysis, reproduction of infection, tissue distribution and TiPV isolation using fish cell lines

## Consequences of TiPV Outbreak

- TiPV outbreak can also pose a threat to the biodiversity and ecology of freshwater bodies as tilapia is an invasive species that can compete with native fish for food and space.
- TiPV outbreak can also affect the food security and nutrition of the people who depend on tilapia as a source of protein and income.

## Preventive measures

- Proper management of water quality, including regular monitoring of parameters such as pH, temperature, and oxygen levels, is crucial.
- Proper stocking density and regular thinning of populations can prevent the rapid spread of TiPV.
- Ensuring that fish are sourced from reputable and disease-free hatcheries minimizes the risk of introducing infected individuals into existing populations.
- Quarantining new fish before introducing them to established ponds will prevent the spread of infections to the existing population.
- Dead fish should be promptly removed and properly disposed of to prevent the virus from contaminating the water and other fish.

Implementing strict biosecurity measures, such as disinfection protocols and controlling access to aquaculture facilities, can prevent the introduction and spread of TiPV.



Source: Paul *et al.*, 2023



Source: Badhusha *et al.*, 2023

**Fig 1 & 2: Clinical signs of tilapia infected with TiPV**

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