

NANOVACCINE FOR TILV IN TILAPIA NEW HOPE TO BOON THE TILAPIA AQUACULTURE

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Aquaculture continues to be the fastest growing food production sector in the world. Fishery related activities are gaining profound significance in providing food, nutrition and socio-economic development for many countries. Asia has a production of 89% of the global total production of fish in volume terms in last 20 years (FAO 2020). Aquaculture is being promoted with various aims like empowering women and young people towards their employment, notably by facilitating women's decision-making on the consumption and provision of nutritious food (FAO, 2017).

However, intensification of aquaculture activities creates issues with environmental sustainability, drainage of wild fish stocks and increased risk of disease outbreaks. Improving fish health management with advanced diagnostic tools and introducing appropriate strategies for sustainable, long-term food production and economic growth is important for fish farming, tilapia farming in India and the global aquaculture.

Tilapia (*Oreochromis* sp.) (Fig 1) provides essential revenue for many low-income families, and is a major trade commodity for many low to middle-income countries (LMIC). Even though tilapia are less prone to infectious diseases compared to other farmed fish species and exhibit good tolerance to the stressful growth conditions, intensification of tilapia aquaculture (Fig 2) has led to the emergence of infectious disease outbreaks. These are proving a major constraint for the sustainable productive expansion of tilapia aquaculture industry.

The disease outbreaks are characterized by significant mortality and morbidity, resulting in massive losses to tilapia industry and a global threat to food security and global economy. We have seen fruitful years of using antibiotics and management practices to combat the onset of diseases. To treat the diseases Vaccination is a proven method for controlling bacterial and viral diseases in aquaculture, with most vaccines delivered by intraperitoneal (IP) injection. Many tilapia farmers will not prefer to vaccinate by injection once the fish have been moved onto the farm and prefer to vaccinate fish in the hatchery. Owing to the technical difficulties in handling fishes during the injection of vaccines, alternative vaccine delivery methods, such as oral or immersion delivery, are therefore needed. Also, injection mode of vaccination will be a difficult task for the common farmers. Tilapia provides essential revenue for many low-income families in Kerala. Pathogenic infections in tilapia aquaculture is responsible for the disease outbreaks seen in tilapia farms, which have significant impacts on the livelihoods of fish farmers and food security in India. Intensification of tilapia farming has promoted severe disease outbreaks, resulting in high mortalities and economic hardship for tilapia farmers. Protecting the industry from emerging infectious threats is of considerable economic and social importance by supporting fish farmers to help control disease spread and to allow sustainable expansion of tilapia aquaculture industry in India.

Tilapia Lake Virus (TiLV), a highly virulent and contagious novel orthomyxo-like virus has recently been associated with disease outbreaks in tilapia aquaculture, resulting in massive mortalities in both wild and cultured tilapines. First reported in Israel in late 2009, TiLV-related disease outbreaks have now been reported across Asia, Africa, and North and South America. In Indian tilapia aquaculture, the virus is associated with mortality levels around 80–90%. The disease has now been identified across 16 countries globally (Surachetpong, 2020). Since TiLV disease is highly pervasive and hence reflects the possibility of being extremely transboundary, we can expect more reports from other geographical regions other than enlisted. This may be largely due to the lack of specific diagnostic tests or less attention towards the mortality occurring in Tilapia industry.

The fast spread of TiLV causing high mortalities demands the urgent requirement of vaccine. There has been some studies which have come up with different mode of vaccination strategies but nothing has been commercialized yet.

Nowadays, nanoparticles are in being used for more efficient way of controlling diseases and TiLV is ahead with nanovaccine to protect. As global aquaculture is enmeshed with the spread of TiLV the findings should not be constricted in the laboratories but to reach the layman for their safety of living is more important. Hence, a cost effective and easily administered vaccine should be available for preventing the disease spread, and to maintain a healthy Tilapia aquaculture.



FIG. 1 TILAPIA
(ORECHROMIS SP)



FIG. 2 (TYPICAL; TILAPIA FARM IN KERALA)