Urgent update on possible worldwide spread of tilapia lake virus (TiLV)

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Tilapia lake virus disease (TiLVD) (also known as syncytial hepatitis of tilapia-SHT) is a newly emerging viral disease of tilapia caused by tilapia lake virus (TiLV), a novel *Orthomyxo-like* virus (Ferguson et al. 2014; Eyngor et al. 2014; Bacharach et al. 2016; Del-Pozo et al. 2017; NACA, 2017; OIE, 2017). Occurrence of the disease was officially documented earliest in Ecuador and Israel in 2013 and 2014, respectively (Ferguson et al. 2014; Eyngor et al. 2014). The virus, however, is believed to have been responsible for massive mortalities in farmed tilapia in Israel since 2009 (Eyngor et al. 2014). Infection of TiLV was later reported from Colombia (Kembou Tsofack et al. 2017) and Egypt (Fathi et al. 2017) and most recently from Thailand (Dong et al. 2017a; Surachetpong et al. 2017). Natural disease outbreaks result in variable mortalities ranging from 9.2 to 90%, with tilapia fingerlings and juveniles being more vulnerable than larger fish (Ferguson et al. 2014; Fathi et al. 2017; Dong et al. 2017a; Surachetpong et al. 2017). Unlike other viral diseases of tilapia, TiLV appears to be widely spread and so may be present in many countries where it is not yet recognized.

Recently, we released a warning of TiLV in Thailand, including an improved semi-nested RT-PCR method for rapid detection and we urge those involved in Tilapia culture to test for the virus in their country (Dong et al. 2017b). The Fish Health Platform in Centex, BIOTEC/Mahidol University) has also obtained positive test results for TiLV from other countries in Asia where it has not yet been reported, supporting our appeal for wider testing. Further, the majority of our archived samples collected from previous disease outbreaks in several tilapia hatcheries in Thailand during 2012-2017 have tested positive for TiLV (unpublished data), indicating the presence of TiLV in Thailand even before the virus became known to science in 2013. The origin of the disease is currently unknown, but many countries have been translocating tilapia fry/fingerlings prior to and even after the description of TiLV. Based on records we could obtain about such translocations, we have prepared a map that contains a list of 5 countries with confirmed reports of TiLV infections (red, Fig.1) and a list of 43 other countries that we believe have imported tilapia that may have been infected with TiLV (blue, Fig. 1). We hope that widespread surveillance for TiLV in the Tilapia industry and in translocated fish will help reduce the impact and spread of this disease. To this end, we

repeat our willingness to provide on request a free positive control plasmid for use with the method we have developed to detect TiLV by semi-nested PCR (Dong et al. 2017b).

List of countries with confirmed evidence of TiLV: Ecuador, Israel, Colombia, Egypt and Thailand

List of countries we believe at high risk of TiLV: Algeria, Bahrain, Bangladesh, Belgium, Burundi, Canada, China, Congo, El-Salvador, Germany, Guatemala, India, Indonesia, Japan, Jordan, Laos, Malaysia, Mexico, Mozambique, Myanmar, Nepal, Nigeria, Pakistan, Philippines, Romania, Rwanda, Saudi Arabia, Singapore, South Africa, Sri Lanka, Switzerland, Tanzania, Togo, Tunisia, Turkey, Turkmenistan, Uganda, Ukraine, United Arab Emirate, United Kingdom, United States, Vietnam and Zambia.

Recommendations

- We recommend that the 43 countries we have listed quickly initiate surveillance for TiLV in cultured Tilapia, since the virus may have been introduced via direct or indirect translocation of fry/fingerlings from the 5 countries where it has been reported.
- Biosecurity should be applied to prevent wider spread of the disease especially by countries with no predictive record of TiLV risk.
- Since TiLV infects very early developmental stages of tilapia (fertilized eggs, fry, and fingerlings) when fish immune system is not fully developed, the use of vaccines may not be an effective control approach.
- Research should be promoted for the development of methods to clear TiLV from infected tilapia broodstock and allow production TiLV-free fry/fingerlings.
- Programs should be promoted to develop Tilapia stocks specific pathogen free (SPF) for TiLV and other pathogens as a potential approach to limit impact of Tilapia diseases globally.
- Since TiLV infections result in highly variable mortality (9.2-90%), it is urgent that research should be promoted to discover the underlying reasons (e.g., research on the correlation between TiLV virulence and genetic types or other factors).

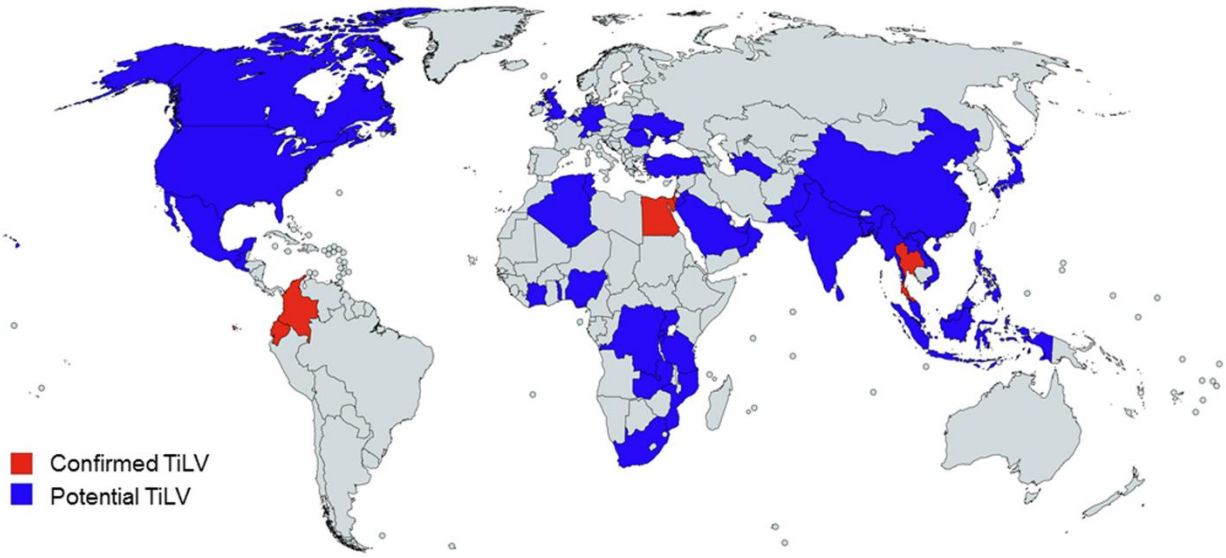

Fig. 1 Possible worldwide distribution map of TiLV. Countries with confirmatory evidence of TiLV circulation (red colour). Blue colour indicates 43 countries that we believe have imported tilapia that may have been infected with TiLV.

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