

## **The double-edged sword effects of nitrite nitrate and agricultural pollution in fish**

As the human population grows, there is an increasing need for high agricultural output to satisfy food demands. This increase in agriculture leads to the frequent use of inorganic fertilizers, which pollute freshwater systems with high concentrations of nitrogenous compounds such as nitrate and nitrite. This presentation will summarize my research for the last year, abroad and at TXST, focused on the effects of nitrogenous water-borne pollution in the sense of smell, using fish as a model species. One of the most unexplored issues of water-derived nitrate and nitrite is the chronic consumption (months/years) of these compounds at environmental (low) concentration levels in the vertebrate nervous system. Our preliminary work showed that long-term nitrite treatments had a dramatic effect on sensory organs like the vertebrate nose, brain, and embryo neural development. Conversely, no other known nitrate/nitrite acute physiological effects were detected at the sublethal concentration tested (methemoglobinemia, loss of appetite, behavior, etc.). Interestingly, we also detected an interesting double-edged sword effect in the nitrite effect. Very low concentrations of nitrite improve cognitive function in fish, which points to an adaptation to the use of environmental nitrite. These results point to a delicate balance between physiological and toxicological concentrations of nitrite in aquatic vertebrates. Thus, studies of nitrogenous compounds balance in aquatic ecosystems are critical.

Fish populations are experiencing a global decline, and environmental pollution, like nitrogenous waste from agriculture, has been identified as one of the main culprits. Also, it is known that nitrates and nitrites are often found in drinking water, which can have significant effects on human health. Thus, understanding how water-borne nitrite acts as a toxin at specific concentrations has a broad biological significance with impacts on neurobiology, animal behavior, aquaculture, and conservation biology.