Fish Nanotagging and Barcoding

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Nanochitosan-Based Enhancement of Fisheries and Aquaculture

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Abstract

Fish nanotags and barcoding are advanced technologies and techniques used in fisheries, aquaculture, and ecological research to enhance the identification, tracking, and management of fish species. Fish nanotags are tiny electronic devices or transponders that are used to tag and track individual fish. These nanotags are embedded or attached to fish, allowing for real-time or periodic monitoring of their movements and behaviours. Fish

nanotags provide a unique identification code for each tagged fish, allowing researchers and fisheries managers to monitor individual fish within a population. Nanotags are typically small and lightweight, making them suitable for a wide range of fish species, from small minnows to large oceanic fish. They can collect data on fish behaviour, migration patterns, temperature preferences, and depth profiles. This information is crucial for understanding the ecology of fish species and their response to environmental changes. Nanotags equipped with environmental sensors can record data on water temperature, salinity, and other parameters, providing insights into fish habitat preferences. Nanotags are valuable for assessing fish stocks, tracking movements, and optimizing management strategies. They help monitor the behaviour and health of endangered or protected species. Nanotags are used in scientific studies on fish behaviour, physiology, and ecology. Fish barcoding is a molecular identification technique that uses standardized DNA sequences, known as DNA barcodes, to identify fish species based on their genetic profiles. Fish barcoding offers a highly accurate method for identifying fish species, even when traditional morphological methods are challenging due to factors like incomplete or processed specimens. Barcoding supports the assessment and monitoring of the biodiversity of aquatic ecosystems, aiding conservation efforts and fisheries management. It ensures traceability in the seafood supply chain, helping verify the origin and species of fish products and complying with legal regulations and international agreements. Barcoding verifies the species, quality, and origin of fish and seafood products, ensuring freshness and safety and detecting adulteration. Fish barcoding helps monitor and manage stocks in aquaculture facilities, ensuring the genetic integrity of farmed fish and detecting unintended hybridization. It aids in studies on the evolutionary relationships and population genetics of fish species, contributing to a better understanding of their genetic diversity and origins. Barcoding facilitates international trade by providing a standardized method for species identification and meeting import/export requirements, enhancing consumer confidence. Barcoding is instrumental in identifying and protecting endangered fish species, contributing to their conservation and management. This chapter focuses on the novelty in the application of nanotags and fish barcoding in comparison to conventional aquacultural practices.

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