Application of biotechnology in aquaculture, nourishment and fisheries

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Introduction

The field of fishery genetics has evolved significantly in recent years, offering a wealth of opportunities to improve the sustainability, productivity, and resilience of fisheries worldwide. By understanding the genetic makeup of fish populations and applying this knowledge to breeding programs, conservation efforts, and management strategies, fisheries can leverage genetic tools to address challenges such as overfishing, climate change, habitat degradation, and genetic diversity loss. This article explores the manifold benefits of fishery genetics and the transformative potential it holds for the future of fisheries. Fishery genetics is a multidisciplinary field that combines elements of genetics, genomics, ecology, and fisheries science to study the genetic composition of fish populations. It involves analysing the genetic diversity, structure, heritability, and evolutionary patterns within and among fish species. By employing advanced genetic techniques, researchers can gain insights into the genetic basis of various traits, population dynamics, adaptation mechanisms, and the overall health of fish populations.

Description

Selective breeding programs leverage genetic information to enhance desirable traits in fish species, such as growth rate, disease resistance, and tolerance to environmental conditions. By selectively breeding individuals with favourable genetic characteristics, fisheries can develop improved strains of fish that exhibit better growth performance, increased disease resistance, and higher productivity, benefiting aquaculture and wild populations alike. Understanding the genetic basis of disease resistance in fish populations is instrumental in developing strategies to combat prevalent diseases. By identifying genes associated with resistance, fisheries can breed fish with enhanced immunity to specific diseases, reducing the reliance on antibiotics and minimizing disease outbreaks in aquaculture settings. This proactive approach contributes to sustainable fish health management and reduces economic losses in the industry. Genetic tools enable accurate monitoring of fish populations, allowing fisheries managers to assess population size, structure, migration patterns, and genetic health. This information aids in developing effective management strategies, including sustainable harvest quotas, habitat restoration, and the establishment of protected areas to preserve genetic diversity and prevent overexploitation.

Conclusion

As climate change alters environmental conditions, fish populations face challenges related to temperature changes, habitat shifts, and altered ecological interactions. Fishery genetics provides insights into the adaptive potential of species, allowing for the identification of genetic variations associated with thermal tolerance, enabling fisheries to breed individuals that are better suited to changing environmental conditions. Marker-assisted selection is a breeding technique that utilizes genetic markers linked to specific traits of interest. By identifying and utilizing molecular markers associated with desirable traits, such as disease resistance or growth rate, fisheries can accelerate the breeding process, improving the efficiency and effectiveness of selective breeding programs.

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Conflict of Interest

The author declares there is no conflict of interest in publishing this article.

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