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Popular Article

Nourishing Growth: The Vital Role of Live Food in Ornamental and Food Fish Hatcheries

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Abstract

The global sugar industry is witnessing a paradigm shift towards healthier alternatives like jaggery This article explores live food's critical significance in ornamental and food fish hatcheries. Live foods, exemplified by Tubifex worms, are essential for juvenile fish's health, growth, and development. They provide vital nutrients and stimulation necessary for fish larvae, contributing to overall well-being and survival rates. Additionally, live food organisms exhibit characteristics such as rapid reproduction and adaptability to various environments, making them practical and sustainable options for hatcheries. By incorporating live food into hatchery diets, natural feeding behaviors are mimicked, producing robust and thriving fish populations. Recognizing the importance of live food in fish hatcheries is crucial for fostering sustainable aquaculture practices and ensuring the success of both ornamental and food fish industries.

Keywords: Artemia, Rotifer, Infosuria, Livefood

Introduction

Live food organisms encompass plant (phytoplankton) and animal (zooplankton) life forms consumed by economically significant fish species. Phytoplankton typically serve as the primary food source for zooplankton. Consequently, phytoplankton constitute the foundational level of the food chain. These live organisms possess the ability to move within the water column, ensuring their continuous availability to fish and shellfish larvae, thereby likely triggering a feeding response in the larvae. In aquatic ecosystems, live food organisms represent a critical resource for aquaculture. Nonetheless, natural fish food organisms are typically scarce in clear pond water, whereas they thrive in ponds with a greenish tint, indicating the presence of phytoplankton and

other natural food sources. Within the natural food web, zooplankton plays a significant role in the diet of marine fish larvae, with copepods commonly believed to fulfill the nutritional needs of these larvae. Artificial larval feeds cannot rival live food organisms in terms of acceptance and nutritional value, among other factors. While the feeding habits of fish species vary in natural water bodies, they all necessitate protein-rich live food for optimal growth, effective breeding, and survival. Progress in live food enrichment techniques has significantly enhanced the significance and potential of live food organisms in rearing larval aquatic species. The efficacy of hatchery production of fish fingerlings intended for stocking in grow-out production systems largely hinges on the accessibility of appropriate live food for feeding fish larvae, fry, and fingerlings. The successful production of fry for at least 60 marine finfish species and 18 crustacean species has been facilitated by the abundant supply of live food organisms, including marine rotifers (*Brachionus plicatilis* and *Brachionus rotundiformis*) and Artemia nauplii, catering to various stages of fry development (Dhert, 1996). Live food organisms are rich sources of essential nutrients, including proteins, lipids, carbohydrates, vitamins, minerals, amino acids, and fatty acids (New, 1998). Due to their comprehensive nutritional profile, they are often referred to as "living capsules of nutrition". Identifying and quantifying the nutritional constituents of natural foods is essential for achieving optimal production and profitability.

Importance of live food organisms in aquaculture

The success of aquaculture relies on maintaining a healthy cultured stock. To achieve this, live food should be incorporated into the diet of cultured stock alongside supplemented artificial feed. Artificial feed alone cannot provide all the necessary elements for fish growth, thus live food is essential. A nutrient-rich diet is crucial for a good return from rearing fish and shellfish larvae. Although larval rearing poses significant risks in aquaculture, it also holds the potential for substantial profitability. Effective planning and strategies are necessary to mitigate the high mortality rates during this critical phase of culture. Zooplankton serves as the initial food source for many cultured fish species and contributes to enhanced growth and survival for others. Larvae of fish and shellfish are unable to consume artificial supplemented feed and require small-sized live foods for nutrition. Live foods offer easily digestible, protein-rich diets for fish and shellfish. While purchasing live foods from the market can be costly and availability may be inconsistent, they can be cultured economically and efficiently to reduce production costs.

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Important live feeds

Rotifers

Rotifers are commonly referred to as "wheel animalcules" and are recognized as a crucial group of live food organisms utilized in aquaculture hatcheries. Among rotifers, Brachionus stands out as the most widely recognized form and serves as an optimal initial diet for the early larval stages of numerous fish and prawn species, both in marine and freshwater environments.

Infosuria

Infusoria are microscopic, single-celled animalcules. Apart from their diminutive size, they possess soft bodies and are exceptionally rich in nutrients, making them an ideal starter diet for the early stages of fish larvae. In freshwater environments, Paramoecium and Stylonychia are among the most prevalent forms of infusoria, while Fabrea and Euplotes are commonly found in marine habitats.

Artemia

Artemia, also known as brine shrimp, are a type of zooplankton, similar to copepods and Daphnia. They are extensively utilized as live food in the aquarium trade and for the larval culture of marine finfish and crustaceans. Artemia is the most commonly utilized organism among the live foods employed in aquaculture hatcheries.

Rotifer

Copepods are prevalent zooplankton found in freshwater and brackish water environments. They serve as natural food sources for larvae and juveniles of numerous finfish and crustaceans, with a general consensus that copepods can adequately fulfill the nutritional needs of fish larvae. With exceptionally high levels of highly unsaturated fatty acids (HUFAs) and other essential nutrients, copepods are considered an excellent initial food source for newly hatched larvae.

Cladocerans

Two types of cladocerans, Daphnia and Moina, play significant roles as live food sources. Daphnia, widely distributed in freshwater ponds, tanks, and lakes globally, contains diverse digestive enzymes, including proteases, peptidases, amylase, lipase, and even cellulase. These enzymes function as exoenzymes in the gut of fish and prawns. Due to its larger size compared to Moina, Daphnia is commonly used as live food for more advanced stages of fish.

Tubifex worms

These are frequently observed in sewage drains in clusters. When disrupted, they swiftly

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retract into the mud. While unsuitable for larval and post-larval stages, Tubifex worms provide an excellent diet for the brood of various ornamental fishes. The red worm (Tubifex tubifex) stands out among natural food organisms due to its quick reproductive cycle, wide habitat range, and ability to thrive in diverse environmental conditions.

Key challenges in the cultivation of live feed

Considering various factors, utilizing live feed remains the most viable option for larval rearing in aquaculture species. However, maintaining a consistent supply of sufficient live feed at the correct times within intensive culture systems poses challenges. The primary constraint in microalgae production is its high cost, particularly for smaller hatcheries. Additionally, there are significant concerns in obtaining pure strains and inadequate infrastructure, such as controlled environmental laboratories for culture maintenance. Live feed also poses a risk of transmitting diseases to fish and shellfish larvae, emphasizing the importance of maintaining hygiene during production. The adoption of enrichment processes as a new technology can be financially burdensome for small and medium-scale farmers (Das et al, 2012).

Conclusion

In summary, including live food in ornamental and food fish hatcheries is paramount for the proper nourishment and development of young fish. Live options like Tubifex worms provide vital nutrients and stimulation necessary for the health and survival of fish larvae. Moreover, these live food organisms, such as Tubifex, possess traits like rapid reproduction and adaptability to diverse environments, making them practical and sustainable choices for hatcheries. By incorporating live food into hatchery diets, we promote optimal growth and quality in fish and emulate natural feeding behaviors, resulting in the cultivation of resilient and thriving fish populations. Thus, acknowledging the significance of live food in fish hatcheries is essential for fostering sustainable aquaculture practices and ensuring the prosperity of both ornamental and food fish industries.

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