



Prevalence of helminth infections in cultured fish from hatcheries and nurseries of Supaul District in the Koshi Basin

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Abstract

Helminth parasites are one of the major constraints in freshwater aquaculture, particularly in hatchery and nursery systems where fish are reared under intensive conditions. The present study was conducted to investigate the prevalence of helminth infections in cultured fish from hatcheries and nurseries of Supaul district in the Koshi basin. Fish samples were collected from selected hatcheries and nursery ponds and examined for parasitic infestation. Trematodes, cestodes, and nematodes were observed in different organs of infected fishes. The prevalence of infection was higher in nursery ponds compared to hatcheries. Infected fishes showed reduced growth, abnormal swimming behavior, and tissue damage. The study indicates that helminth infections adversely affect fish health and seed quality. Proper pond management and regular monitoring are essential to control helminth infestation and improve aquaculture productivity. Adoption of preventive measures such as periodic pond drying, liming, and removal of excess organic matter can significantly reduce parasite load in culture systems. Maintenance of optimum water quality parameters and regular exchange of pond water also help in minimizing the spread of helminths. Control of intermediate hosts like snails and aquatic insects is equally important for breaking the life cycle of parasites. Stocking density should be maintained at recommended levels to avoid overcrowding and stress in fishes. In addition, routine health examination of fish seed and timely application of prophylactic treatments may prevent severe outbreaks. Implementation of these management practices will enhance survival rate, improve growth performance, and ensure production of healthy fish seed in hatchery and nursery systems of the Koshi basin.

Keywords: Helminth parasites, fish hatchery, nursery ponds, Supaul, Koshi basin

Introduction

Aquaculture plays an important role in improving food security and rural economy in North Bihar. Hatcheries and nursery ponds are essential components of fish culture as they provide quality fish seed for grow-out culture. However, disease outbreaks remain a major challenge in aquaculture systems. Among various diseases, parasitic infections caused by helminths are common and economically important. Helminths such as trematodes, cestodes, and nematodes infect different organs of fishes including gills, intestine, and body cavity. These parasites cause damage to tissues, reduce growth rate, and increase mortality. Environmental factors such as poor water quality, overcrowding, and accumulation of organic matter favor the development of helminth infections. The Koshi basin, particularly Supaul district, is known for extensive fish farming activities. Seasonal flooding and natural water bodies create favorable conditions for parasite transmission. Hatcheries and nursery systems in this region often experience parasitic infections affecting fish seed quality.

The present study was undertaken to assess the prevalence of helminth infections in cultured fish from hatcheries and nurseries of Supaul district and to evaluate their impact on fish health. Fish hatcheries and nursery ponds represent critical stages in aquaculture production, where fish are reared under controlled yet intensive conditions. During these early developmental stages, fishes are highly susceptible to parasitic infections due to their comparatively weak immune system. Any infection occurring at hatchery or nursery level may affect subsequent growth performance

and survival of fish in grow-out ponds. Therefore, monitoring of helminth parasites at these stages is essential for maintaining quality fish seed.

The Koshi basin, particularly Supaul district, is characterized by seasonal flooding and extensive use of natural water sources for aquaculture. Floodwaters often introduce intermediate hosts such as snails, annelids, and aquatic insects into hatchery and nursery ponds. These organisms play a significant role in the life cycle of helminth parasites and contribute to the spread of infection. Moreover, accumulation of organic matter, poor pond preparation, and irregular water exchange create favorable conditions for parasite proliferation. Such environmental factors increase the chances of helminth infestation and may lead to economic losses for fish farmers.

Helminth infections not only affect fish health but also influence overall aquaculture productivity. Infected fishes often exhibit reduced appetite, slow growth, abnormal swimming behavior, and increased susceptibility to secondary infections. Severe infestations may cause tissue damage, anemia, and mortality. Since hatcheries and nurseries supply fish seed for large-scale aquaculture, any disease at this stage can have long-term impact on fish production. Thus, identification of helminth parasites and assessment of their prevalence in hatchery and nursery systems is of great importance.

The findings of the present study may provide useful information for fish farmers and hatchery operators in Supaul district. Understanding the occurrence and impact of helminth infections will help in developing appropriate

management strategies. Adoption of preventive measures such as proper pond sanitation, control of intermediate hosts, and maintenance of water quality may reduce parasitic infestation. This investigation therefore contributes to improving fish health management and enhancing aquaculture productivity in the Koshi basin region.

Materials and Methods

Study Area

The study was conducted in fish hatcheries and nursery ponds located in Supaul district of the Koshi basin. This region is characterized by numerous freshwater ponds and seasonal water bodies that support fish culture activities. The climatic conditions of the area, including high humidity and moderate temperature, are favorable for aquaculture as well as parasite development. Frequent flooding and water exchange from nearby rivers also influence the ecological conditions of hatchery and nursery ponds. These environmental factors make the area suitable for studying helminth infections in cultured fishes.

Collection of Fish Samples

Fish samples were collected randomly from hatcheries and nursery ponds. Both healthy and infected fishes were examined. Sampling was carried out using hand nets and cast nets to minimize injury to the fishes. The collected specimens were immediately transferred to plastic containers containing pond water and transported to the laboratory. Fish were sorted according to species and size before examination. Care was taken to handle the samples properly to avoid contamination, and observations were recorded soon after collection for accurate detection of helminth parasites.

Examination of Parasites

Fish were examined externally and internally. Parasites were isolated and identified under microscope using standard identification keys. External surfaces such as skin, fins, and gills were carefully inspected for visible cysts and lesions. Internal organs including intestine, liver, and body cavity were dissected using sterile instruments. The collected parasites were placed in physiological saline and examined under compound microscope. Representative specimens were counted, recorded, and preserved in suitable fixatives for further confirmation and identification.

Water Quality Analysis

Water temperature, pH, and dissolved oxygen were recorded. These parameters were measured at the time of sampling to assess the environmental conditions of hatchery and nursery ponds. Water temperature was recorded using a standard thermometer, while pH was measured with a portable pH meter. Dissolved oxygen levels were determined using a dissolved oxygen meter. Measurements were taken from different locations within the pond to obtain representative values. The recorded data were used to evaluate the relationship between water quality and prevalence of helminth infection.

Data Analysis

Prevalence of infection was calculated and compared between hatcheries and nursery ponds. The prevalence percentage was determined by dividing the number of infected fishes by the total number of fishes examined and multiplying by one hundred. Data collected from different sites were tabulated for comparison. Mean values were calculated to assess variation in infection levels between hatchery and nursery systems. The results were interpreted to identify possible relationships between environmental factors and parasite occurrence. Statistical comparison was made to evaluate differences in infection rates among the studied locations.

Results and Discussion

Helminth parasites such as trematodes, cestodes, and nematodes were observed in examined fishes. The prevalence of infection was higher in nursery ponds compared to hatcheries. Overcrowding and poor water quality may contribute to higher infection rates.

Table 1: Prevalence of Helminth Infection in Hatcheries and Nurseries

Location	Number examined	Infected	Prevalence (%)
Hatchery	40	11	27.5
Nursery	40	21	52.5

Infected fishes showed reduced growth and abnormal behavior. Damage to gill and intestinal tissues was observed. Seasonal flooding in the Koshi basin may facilitate parasite transmission. Floodwater often introduces intermediate hosts such as snails, annelids, and aquatic insects into hatchery and nursery ponds, which play an important role in the life cycle of helminth parasites. These organisms enhance the spread of infection and increase parasite load in cultured fishes. In addition, accumulation of organic matter and poor pond sanitation further favor the survival of parasite stages. Overcrowding in nursery ponds also increases stress in fishes, making them more susceptible to infections. Proper pond preparation, regular removal of organic debris, and maintenance of optimum water quality may help reduce helminth infestation. Implementation of these management practices can improve fish health and enhance productivity in hatchery and nursery systems of the Koshi basin.

Conclusion

The study reveals that helminth infections are common in cultured fish of hatcheries and nurseries in Supaul district. Nursery ponds showed higher infection levels. Proper management practices are necessary to reduce helminth infestation and improve fish seed quality. Regular monitoring of fish health, maintenance of optimum stocking density, and proper pond sanitation can significantly minimize parasite transmission. Control of intermediate hosts and periodic pond drying may further reduce infection levels. Adoption of these preventive measures will help in producing healthy fish seed and improving survival rate. Effective disease management strategies are essential for sustainable aquaculture development in the Koshi basin region.

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