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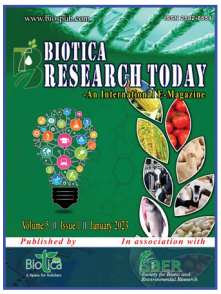

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Integrated Fish cum Duck Farming System

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Abstract

The integrated farming system with livestock and fish has become very popular in wetland and watershed areas in the country. The success of this farming is due to the high demand for fish and fish products, along with meat and animal products. In intensive fish farming, the smallholder farmers cannot afford the concentrated feed requirements of the fish; therefore, they choose integrated fish farming. In this farming system, the waste products from one subsystem provide inputs to another subsystem. The profit is higher when compared to other fish farming systems. The duck excreta contain more nutrients, which can be used for plankton production. It has a high rate of survival for fish and ducks. Integrated fish and duck farming is practised in states such as West Bengal, Assam, Orissa, Bihar, Jharkhand, and Andhra Pradesh, as well as states in the Northeast.

Introduction

The term "integrated fish cum duck farming" refers to the cultivation of fish in combination with ducks. The fish and duck industries are interconnected with each other. In this type of cultivation, a wide range of wastes can be recycled, and we need minimal economic and labour input. In this method of cultivation, both species benefit. The ducks are called "moving carbon machines" because they help in the aeration of ponds. The duck droppings are good fertilisers for the pond, and their padding movement also oxygenates the pond (Ravi *et al.*, 2020).

Integrated fish farming (Figure 1) follows the composite fish culture practice, where 6 or 7 species are grown together in a single pond. Fish with different food habitats are selected to avoid fighting for the same feed.

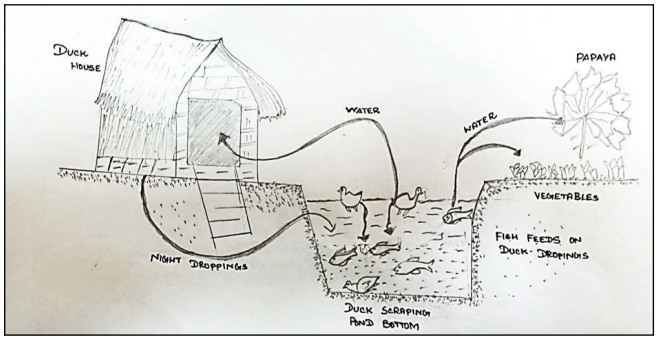

Figure 1: Integrated Fish cum Duck Farming System

Fish Farming

Selection of Fish Species for Integrated System

The selection of species is based on the feeding nature of the fish, and there are three types: surface feeders, column feeders, and bottom feeders. Based on this, 40%

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of surface feeders, 30% of column feeders, and 30% of bottom feeders are stocked in the pond.

Pond Preparation

The pond should be placed near the water resources. The pond was fully drained. Allow the pond to sun dry. It eliminates harmful microbes and predatory fish. Then construct the dikes, inlets, outlets, and pumps for water supply.

Pond Preparation

Apply lime to the pond to maintain the pH. Then the pond was loaded up with water.

The organic and inorganic fertilisers are applied to the pond to increase its natural productivity (Table 1).

Table 1: Soil pH and Lime requirement (kg ha^{-1})

Soil pH	Lime (kg ha^{-1})
4.5-5.0	2,000
5.1-6.5	1,000
6.6-7.5	500
7.6-8.5	500
8.6-9.5	Nil

Stocking

After the application of fertilizers, the pond is ready for fertilization. Based on their feeding nature, the fish species are stocked in the pond.

Post-Stocking

During the post-stocking period, give the fish supplementary feeds that are necessary for their growth. The mixture of rice bran and oil cake in the ratio of 4:1 is one of the supplementary feeds. To maintain the water quality in the pond (Table 2), the following parameters should be followed.

Table 2: Water quality parameters

Parameters	Value
Depth	2-2.5 m
Turbidity	10-40 mg $litre^{-1}$
DO	5-8 ppm
Ammonia	0.002 ppm
pH	7.5-8.5

Harvesting

Fishes are harvested when they attain the maximum growth. Proper management leads to more profit. The harvesting was done by dewatering and repeated netting.

Duck Farming

Duck House Construction

The duck house was constructed above the pond's water with bamboo and wood at low cost. There is a 5 cm^2 hole in the floor. For a comfortable stay, one duck requires a 1 to 1.5 $foot^2$ space. The house should be at least 2.5 m. The pond contains a bridge pattern for the entry and exit of duck into the pond.

Duck Selection

Because of their faster growth rate and high egg-laying capacity, two duck breeds are widely cultured in India. There are Khaki Campbells and Indian runners.

Duck House

At 3-4 months of age, the ducks are introduced into the duck house along with fish seed. Before introducing ducks into the house, provide prophylactic treatment to avoid the viral infection (Ravi *et al.*, 2020).

Feeding Management

The ducks get very little food from the pond. So supplementary feeding is important. The mixture of high quality rice bran and low quality poultry feed is in the ratio of 1:2. This mixture was given two times day^{-1}.

Egg Laying of Duck

At 7 months, the duck begins to lay eggs. One duck lays 150-200 eggs $year^{-1}$. At night, the duck lays eggs. Allow them to go to the pond after they have laid their eggs. At 18 months old, the egg-laying capacity of ducks is reduced.

Health Care

The main problem with duck farming is that they get affected by diseases like cholera, duck hepatitis, and viral diseases. The duck should be vaccinated against all the viral diseases. Diseased duck treatment should be discussed with a veterinary expert.

Production

Approximately, the integrated duck cum fish farming from the pond of 1 ha in one year produces 4,000-5,000 kg of fish, 25,000-30,000 eggs, and 600-700 kg of duck meat) (Abhed *et al.*, 2016).

Conclusion

To summarise this, the ducks are highly compatible. It saves on fertiliser and supplementary feed costs. Ducks act as a biological aerator in ponds. The pond provides 50-75% of the feed for the ducks. It provides significant financial development to low-level farmers. It expands the complete monetary value of the fisheries area's creation.

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