Digital Tool for APY Analysis of Carp Farming

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Almost 70 percent of India's population lives in rural areas, the main occupation for the people is agriculture [2], but inland aquaculture makes significant contributions to their livelihoods. Mostly about 85 percent of the aquaculture is contributed by carp polyculture [2]. Coastal rural people can cultivate them in their own seasonal, largely underutilized, small homestead ponds with low input and understanding. However, the major problems faced by people with fish production in the coastal region may need some appropriate cultural techniques [1]. Therefore, the Area, Production, and Yield (APY) analysis of carp farming is carried out. So, farmers will be able to know how to use the resources efficiently, and how the cultivation should take place.

Key Words: Aquaculture; Carp polyculture; Carp farming; Salinity; Yield; Production.

1 Introduction

After China, India is the second largest producer of fish in aquaculture production. In India, the major carps, Catla (Catla catla), Rohu (Labeo rohita) and Mrigal (Cirrhinus mrigala) [5] are the main species cultivated in freshwater aquaculture. These carps are preferred because of their fast growth and high acceptability to customers. Indian major carps account for 85 percent of total freshwater aquaculture production.

Due to the increasing demand for fish as a nutritious protein source, some of the challenges of population growth and limited land resources involve developing innovative and efficient carp farming practices. So a digital tool designed to analyze and optimize carp can give a significant contribution to the sustainable growth of the aquaculture sector, ensuring efficient usage of resources and maximizing production [3].

The main objective of this research article is to develop a digital tool that gives valuable aid in the analysis of carp farming in the Godavari and Hooghly river regions, where farming has high potential in India. This tool mainly focuses on providing almost accurate assessments of the area given to carp farming and the production levels achieved. By using technology, this tool assists farmers, some policymakers, and researchers in making informed decisions and enables them to implement effective strategies to enhance carp farming practices.

By using data available on carp farming area production and yield, the digital tool will provide insights into the current state of the industry. It enables stakeholders to identify patterns, trends, and further areas for improvement, ultimately contributing to

the sustainable growth and development in the carp farming sector. The tool's user-friendly interface and data analysis capabilities may empower users to explore various parameters and make optimization according to their farming practices.

2 Methods

The above-mentioned species' seeds are taken and followed by some methods for cultivation. They include pond preparation, how the feed is managed, and some water quality parameters.

2.1 Pond Preparation and Fish Seed Stocking

[1] To ensure successful carp farming, good pond preparation is needed. This involves running soil tests to assess the suitability for farming, followed by needed modifications if required. Pond fertilization is very important to promote plant growth, which gives natural food sources for the fish. Additionally, weed control measures should be taken to prevent other species. Once the pond is ready, selecting healthy fish seeds is crucial. Farmers must choose species suitable for the region and make sure that the acquisition of disease-free and high-quality seeds. Stocking densities should be determined based on the size and water-holding capacity of the pond to achieve optimal growth and prevent overcrowding.

2.2 Feeding Management

Feeding must be started right away once the pond was stocked with the seed. Farmers must try formulating a nutrition-rich balanced diet for the specific growth stages and nutritional requirements of the carp species that are being farmed. Farmers should be keen on feeding frequency so that no overfeeding or underfeeding is done. Monitoring feed consumption is important to adjust feeding rates and optimize feed utilization.

2.3 Water Parameter Monitoring

The parameters that are required to monitor for better cultivation are pH, temperature(°C), dissolved oxygen(mg/L), salinity(PSU), TDS(mg/L), and Conductivity(µS/cm). Farmers must be able to get accurate measurements. Maintaining optimal water quality conditions is important for the well-being and good growth of carp.

2.4 Assessment of Fish Growth Performances and Yields

Some percentage of the stocked fish from each experimental pond were sampled using a cast net once in a period to assess the health and growth of the fish.

3 Observations

Based on the above methods followed we are able to get the underlying optimal parameters for the carps to get cultivated. And observing natural and hatchery cultivation analyzed which one is going to give a good yield.

3.1 Optimal Parameters

Water quality parameter values were discovered to be within the usual range for carp fish farming, such as 6-9 (pH), 4-8 mg/L (DO), 25-40 cm (transparency), and 10-35 °C (temperature). The salinity values were fairly low because the water source in the culture system was primarily rain and groundwater. Major carp can withstand a maximum salinity of 9 PSU without experiencing stress to their bodies. The ideal salinity for large carp culture is 0-5 PSU.

3.2 Carp Yield

In polyculture situations, carp seed from wild sources outperforms hatchery-sourced seed in terms of growth, adult size, and survival. However, findings were consistent on the impact of feeding frequencies, stocking density, native carp introduction, environmental variables, and cultural management.

4 Future Scope

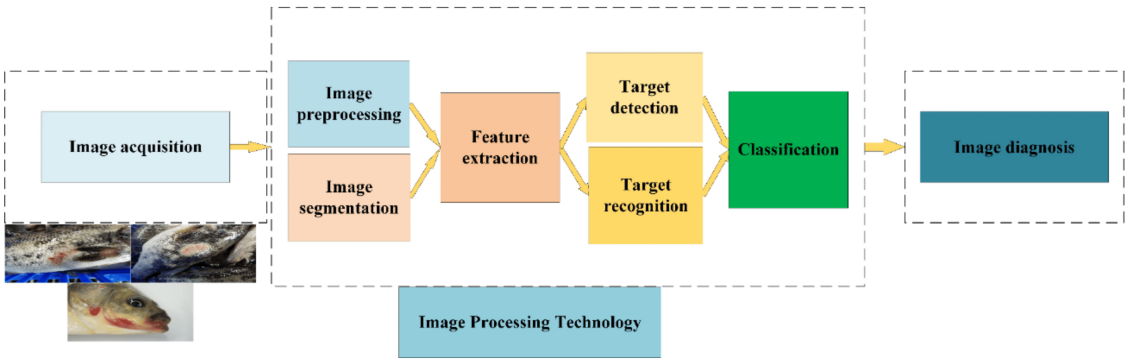

Figure 1: Illustration of the flow from acquisition of fish disease images through image-processing techniques to diagnosis.

Artificial Intelligence (AI) for Disease Detection: The usage of AI in disease detection in carp farming can significantly improvise disease management and prevent outbreaks. By data analysis from different sources including water quality sensors, fish behavioral monitors, and image recognition systems, AI algorithms may identify patterns prior and give early signs of diseases. This makes farmers make active measures, following adjusting of water parameters, and isolation of infected fish. This disease detection can save time, reduce losses, and ensure the overall health and well-being of the carp population.

There is significant research going on AI for disease detection that involves image acquisition, processing technology, and diagnosis. See Fig 1 for an example of how image detection takes place [4],[6].

5 Conclusion

In conclusion, the development of a digital tool for analyzing and optimizing carp farming practices marks a significant milestone in the aquaculture sector. This tool provides valuable insights into the state of carp farming in India's Godavari and Hooghly river

regions, empowering farmers, policymakers, and researchers to make informed decisions and drive sustainable growth. By focusing on key factors such as pond preparation, fish seed stocking, feeding management, water parameter monitoring, and fish growth assessment, farmers can enhance their practices, increase production, and ensure the long-term viability of the sector.

References

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