

Increasing Fish Production by Use of Recent Trends in Fisheries

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SUMMARY

Food is the essential need for every organism on this planet and so humans depend upon agriculture and animal farms for their main source of food. Even though the above-said sources fulfil the food scarcity to some extent, they failed to meet the nutritional demand of the world population. In that point of view, fish and fishery product has the potential to meet the demand. Over the period, both capture and culture fisheries have been developed to increase their production and maintain their sustainability. Some of these advancements are still not yet reached to the local fish producers because of the lack of education and transfer of technology. The use of non-conventional feed sources, characteristics of culture species and other elements of culture fisheries are discussed. The recent advancements which enhance fish production are playing a vital role in the emerging fisheries sector are elucidated as follows.

INTRODUCTION

Aquaculture, one of the emergent industries in the world, which is considered as food sector would fulfil the nutritional demand among the people. The total fish production in 2018 was 178.5 million tonnes of which aquaculture contribute about 49.5% (82.1 million tonnes). Over time, the production by capture fisheries is declining because of overfishing and several environmental factors and so the future fish production mainly depends upon aquaculture. Due to the increasing population, the aquaculture sector is also in need of an increase in production to meet the demand. The possible ways of optimizing and increasing production in the aquaculture sector and capture fisheries are discussed below.

Use of non-conventional feeds

Nowadays, the increase in population drastically increases the demand for conventional foodstuffs but they are being used as the main ingredients in the formulation of fish feed. The conventional food sources such as soya bean meal, groundnut cake, palm kernel cake, Brewers dried meals, brewers dried grain, maize, sorghum, etc. It causes an increase in the price of the feed ingredients. The only way of decreasing the cost of feed is using the non-conventional feed ingredients in fish feeds. Here, the lists of non-conventional feed ingredients are given as animal and plant sources, leaf extract. Concerning the feeding habit of the fish species cultured, the choice of source will vary.

Animal source

These feed sources are taken from either animals or their processing wastes. Examples are as follows: Tadpole meal is a cheaper source of rich animal protein since it contains 50% crude protein. They are cultured in water like fish until they attain metamorphosis to become adult frogs or toads. They can be given as either processed meal or whole tadpole. Housefly larvae (*Musca domestica*) contains 45% protein and it has a good amount of amino acids such as Phenylalanine, Lysine and Leucine. The earthworm has 56.1% of crude protein and it can be processed into a meal by drying with oven, kiln-smoking or they can be pulverized and given as feed ingredient. Even though toad contains 99% protein, they are avoided because of their disgusting moist skin. The toad meal can be used as feed for catfishes when they are fermented to remove the poison in the skin. Other animal sources include shrimp waste, crab meal and blood meal of cow (contains 85% crude protein) can also be used. Animal wastes such as pig and poultry droppings are having rich sources of nitrogen and are used as organic fertilizer. They are mainly used in Tilapia and polyculture of catfishes.

Plant sources

The non-conventional plants that can be used as a fish-feed ingredient are plenty unlike animal sources and they are more sustainable. If we make use of it, we can decrease the price of fish feed. The plant sources of fish diets however include leaf protein, leaf meal, aquatic macrophytes, cultivable pulses such as mucuna bean, yam beans, bread beans, etc. All plants contain different protein levels, shares an inexhaustible and inexpensive source of nutrient for fish. The plants with high nutritional value leaves which are used for the feed preparation include Groundnut, cassava, soya bean and plantain, etc. The plants such as *Azolla pinnata*, *Eichhornia crassipes* (Water hyacinth) can be effective feed for culture species. *Azolla pinnata* is a potential fish feed component in the diet of Nile Tilapia, *Oreochromis niloticus*, as it contains 23.5% crude protein level. Water hyacinth can be used in the diet of Bagrid catfish *Chrysichthys nigrodigitatus* and other cultivable fish species e.g., *C.niloticus*, *Heterotis niloticus* etc. Some of the grasses can be used as non-conventional feed.

Characteristics of culture species

The culture fish species should have a high growth rate and lesser DOC (days of culture) so that farmers can yield a better annual turnover. For Eg: *Catla catla*. The species should have disease-resistant ability. It should accept the artificial feed and other non-conventional feed, by the only farmer can spend less cost for feed. It should be compatible with other species only by that poly-culture can be done. The species with short food chain can be cultured, so the culture species can yield more energy from the producers. Eg: *Ctenopharyngodon idella*. The species should show a wide range of resistance to fluctuations in physio-chemical factors such as DO, salinity, turbidity, etc. Eg: catfishes. It should have high or specific nutritional value. Eg: murrel. It should have consumer preference by the way of taste or by having fewer spines.

Introduction of new candidate species

Introducing the new species to the region may increase the demand for the species and increase the cost of the fish species. The species should have the above-said characteristics. It should not be invasive and should not collapse the ecosystem. Olive barb (*Puntius sarana*) is one of the emerging candidate species in polyculture with the carps like Catla, Rohu, Silver carp and it is believed to substitute Mrigal with its compatibility. Other fish species like Tilapia are blooming in the freshwater aquaculture industry as they are prolific breeders, low trophic level feeders (being omnivorous and feeding on algae and other detritus, have good market demand and demand the low cost of production. It also has the characteristic of tolerating poor water quality. All these things make them a very important species to be considered as candidate species of aquaculture in tropical countries.

Boosting of Marine Fish Culture

When compared to the culture of freshwater fishes, the marine fish culture is lagging by many folds. According to FAO, In Global aquaculture production, inland production accounts for 51.3 million tonnes whereas marine production is 30.8 million tonnes in 2018. While talking about India, the plentiful marine resources have to be utilized furthermore to increase marine fish production. The Seed production of Orange Spotted Grouper (*Epinephelus coioides*) and Indian Pompano (*Trachinotus mookalee*) is carried out in Visakhapatnam regional centre of CMFRI. In Vizhinjam centre, the seeds of Silver Pompano (*T.blochii*) and Indian Pompano are produced. In Mandapam centre, in addition to Silver Pompano, the seeds of Cobia (*Rachycentron canadum*) are also produced. The techniques for cage culture of these species are developed by the same institute and so the training for culturing the species can be obtained in the institute. In the case of shellfish, the mud crab culture is promoted by Rajiv Gandhi Centre for Aquaculture through seed production.

Appropriate marketing channel

The farmer's income is effectively increased by the way of an appropriate marketing channel. By decreasing the number of middle-man between consumers and farmers will be economically beneficial for both of them. The government can introduce the fish farmer's market to enhance the sale. Central Institute of Fisheries Technology, Cochin has introduced a refrigerated mobile fish vending Kiosk called 'Chillfish'. It is suitable and affordable for small retail fish vendors.

Energy conservation in farms

We know that the fish farms and in particular, shrimp farms are mainly dependent upon electricity for aeration and other purposes. So, we can reduce their expenditure by conserving the electricity. By installing solar panels, we can easily get electrical energy from sunlight, the ultimate energy source. Using the Gobar gas, we can obtain the energy by burning the cow dung off. We can obtain it on the farm by making a pit in the corner of the farm. In that, we can put biodegradable wastes like cow dung, poultry wastes, and rotten and wasted vegetables into the pit.

Introduction of new gears and crafts

In the reservoir, commonly used crafts are coracle and non-mechanized boats. This requires more time to catch the fish. So, vessels that are fueled by renewable energy like solar energy should be used for conserving energy and being eco-friendly. The best example is 'Sun boat' launched by the Central Institute of Fisheries Technology, Cochin. Though the installation cost is high, it can be compensated by saving the future fuel cost. It can be used for fishing in the reservoir along with gillnet, line fishing. Also, it can be used for tourism. When talking about gears, Bycatch reduction devices should be installed in the gears, as they are conserving the biodiversity and they minimize the operational cost of fishing.

Introduction of Artificial Intelligence

Today, the modern world is running with the help of Artificial Intelligence, which drastically improved the productivity of every field, whereas aquaculture is not an exceptional case. With the help of Artificial Intelligence (AI), productivity can be increased with efficient results and also reduces the operational cost spent for feed management and disease surveillance. There are different kinds of AI technologies used in feed management. The feeding system has either full control over the feed distribution or does partial activities which are related to the feeding activities. 'eFishery', an AI-assisted feed dispenser is used in the farms helps the farmers to reduce the feed cost by 21% with the attribute of sensing the appetite of cultured animals and providing the optimum amount of feed at right time. AI camera and acoustic sensors in the water helps to analyse the fish behaviour and environment and it feedbacks the data to the dispenser for feeding them.

In disease diagnosis, AI performs more efficiently and give more accurate results. Nanotechnology has been used to diagnose WSSV in shrimp ponds. They can be used for regular monitoring of fish growth and environmental conditions.

CONCLUSION

Decades before, fish production was less due to the underdevelopment of scientific technologies. Later, it was exponentially increased as the technologies were developed and adapted successfully. By following those above-mentioned recent advancements, fish production can be improved. The Transfer of Technology should be properly done, only by which fish producers can increase their production.

REFERENCES

- Chrispin, C. L., Jothiswaran, V. . V., Velumani, T., Agnes, D. A. S., & Jayaraman, R. (2020). Application of Artificial Intelligence in Fisheries and Aquaculture. *Research Today*, 2(6), 499–502.
- Govindaraju, K., Dilip Ittroutwar, P., Veeramani, V., Ashok Kumar, T., & Tamilselvan, S. (2020). Application of Nanotechnology in Diagnosis and Disease Management of White Spot Syndrome Virus (WSSV) in Aquaculture. *Journal of Cluster Science*, 31(6), 1163–1171.
- ICAR. <https://icar.org.in/content/refrigerated-fish-vending-kiosk-%E2%80%9Cchillfish%E2%80%9D-prompts-un-compromised-freshness-and-quality>
- Jena, J., Das, P. C., Kar, S., & Singh, T. K. (2008). Olive barb, *Puntius sarana* (Hamilton) is a potential candidate species for introduction into the grow-out carp polyculture system Olive barb, *Puntius sarana* is a potential candidate species for introduction into the grow-out carp polyculture system. September 2017.
- Kubiriza, G. K. (2018). A review of conventional and unconventional feeds in fish nutrition. *Aquaculture Nutrition*, 24(1), 703—808.