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Popular Article

Bio floc Fish Culture

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Introduction

The global population is expected to reach 9.6 billion by 2050, and with the demand for animal protein increasing year after year, it is a challenge to provide high-quality protein while protecting natural resources for future. In this context, aquaculture plays an important role in promoting health by providing animal protein even while creating huge employment opportunities. Bio floc Technology (BFT) is regarded as a new "blue revolution" because nutrients can be repeatedly reused and recycled in the growth media while benefiting from low or no water exchange. BFT is a low-impact aquaculture technique that relies on in-situ microorganism production.

Bio floc is the suspended growth in ponds/tanks that consists of aggregates of living and dead particulate organic matter, phytoplankton, bacteria, and bacterial grazers. It is the use of microbial processes within the pond/tank to provide food source for cultured organisms while also acting as a water purification solution. As a consequence, this system is known as active suspension ponds, heterotrophic ponds, or green soup ponds.

How BFT works?

The bio floc system is a wastewater treatment system that has grown in importance as an aquaculture technique.

The method works on the basis of maintaining a relatively high C-N ratio by adding carbohydrate sources, while improving water quality through the production of high-quality single cell microbial protein.

In such conditions, heterotrophic microbial growth occurs, which assimilates nitrogenous waste that can be used as a feed by cultured species while also acting as a bioreactor controlling water quality.

The growth rate and microbial production per unit substrate of heterotrophs are ten times greater than that of autotrophic nitrifying bacteria, toxic nitrogen species are immobilised more quickly in bio floc.

This technology is based on the principle of system flocculation.

Composition and Nutritional Value of Bio floc

Bio floc is a diverse aggregate of suspended particles and micro - organisms linked by extracellular polymeric substances. It is made up of microorganisms like bacteria, algae, fungi, invertebrates, and detritus etc.

It is a protein rich live feed formed as a result of conversion of unused feed and excreta into a natural food in a culture system on exposure to sunlight and vigorous aeration.

Each floc is held together by a loose mucus matrix secreted by bacteria and held together by filamentous microorganisms or electrostatic attraction. Although large flocs can be seen with the naked eye, the vast majority are microscopic. Floc sizes range from 50 to 200 microns.

Biofloc has a high nutritional value. The dry weight protein ranges from 25–50%, while the fat ranges from 0.5–15%. It is high in vitamins and minerals, especially phosphorus. It has a similar effect to probiotics. Dried biofloc is proposed as a feed ingredient to replace fishmeal or soybean meal.

Advantage of BFT

I. It is an eco-friendly culture system that reduces the environmental impact.
II. Judicial land and water use
III. System with limited or no water exchange
IV. Increased productivity (It enhances survival rate, growth performance, better feed conversion in the culture systems of fish).
V. Increased biosecurity.
VI. Reduces water pollution and the risk of pathogen introduction and spread
VII. It lowers the utilisation of protein-rich feed and the cost of standard feed.
VIII. It relieves pressure on capture fisheries by utilising less expensive food fish and trash fish for fish feed formulation.

Species suitable for Bio floc Culture

Major cultivable fish species in BFT

A basic factor in designing a bio floc system is the species to be cultured. Bio floc system works best with species that are able to derive some nutritional benefits from the direct consumption of floc. Bio floc system is most suitable for species that can tolerate high solids concentration in water and are generally tolerant of poor water quality. Some of the species that are suitable for BFT are:

- Air breathing fish like Singhi (Heteropneustes fossilis), Magur (Clarias batrachus), Pabda (Ompok pabda), Anabas/Koi (Anabas testudineus), Pangasius (Pangasianodan hypophthalmus)
- Non air-breathing fishes like Common Carp (Cyprinus carpio), Rohu (Labeo rohita), Tilapia (Oreochromis niloticus), Milkfish (Chanos chanos)
- Shellfishes like Vannamei (Litopenaeus vannamei) and Tiger Shrimp (Penaeus monodon)

How to Prepare the Inoculum?

Method 1:

For 15000 Litres of fresh water 150 Litres of inoculum is required for the floc development

Step 1

Take clean tub/can with 150 Litres of water and continue vigorous aeration

Step 2

Add 3 Kg of pond soil + 1.5 gm of Ammonium sulphate /Urea + 30 gm of carbon source (Jagerry /Wheat flour /Tapioca flour)

Step 3

Mix it well with water in tub and provide adequate aeration

Step 4

The inoculum will be ready after 24-48 hrs and it can be transferred to main tank 5

- Daily addition of carbon source is required for the development of floc. For every 1 kg of feed given (with 25 % of crude protein), 600 gm of carbon source is to be added to the system to maintain C: N of 10:1.
- Once the floc volume reaches 15-20ml further addition of carbon source is not required

Conclusion

Bio-floc technology doubles the farmer's income with efficient use of available resources. In this system adding supplementary feed is reduced to half as the culture species mostly feed upon the floc biomass in water thus the input feed cost is minimized. Unlike the conventional fish farming, frequent exchange of water is minimum or zero in this system; this reduces the labour cost, saves time, prevents the entry of pathogens and also environmental degradation caused due to aquaculture effluents can be controlled by using the bio-floc culture system

References

Avnimelech Y. (2012) Biofloc Technology – A Practical Guide Book (2nd edn). The World Aquaculture Society, Baton Rouge, Louisiana, USA 272pp

Avnimelech Y., Verdegem M.C.J., Kurup M. &Keshavanath P. (2008) Sustainable landbased aquaculture: rational utilization of water, land and feed resources. Mediterranean Aquaculture Journal 1, 45–55.

Hari B., Kurup B.M., Varghese J.T., Schrama J.W. & Verdegem M.C.J. (2006) The effect of carbohydrate addition on water quality and the nitrogen budget in extensive shrimp culture systems. Aquaculture 252, 248–263.

Ju Z.Y., Forster I., Conquest L., Dominy W., Kuo W.C. &Horgen F.D. (2008) Determination of microbial community structures of shrimp floc cultures by biomarkers and analysis of floc amino acid profiles. Aquaculture Research 39, 118–133.

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