

ROLE OF BIOFILM IN AQUACULTURE

Introduction

Biofilm can be defined as the organic layers that develop on submerged surfaces of substrates, comprising complex communities of autotrophic and heterotrophic organisms such as bacteria, protozoans, fungi and algae embedded in extra cellular polysaccharide matrix secreted by the bacteria.

Heterotrophic food production starts with colonization of microbes on the substrates in the form of biofilm. This microbial biofilm has great potential to support fish food organisms, in addition to its direct utilization by fish.

It is known that biofilm of microbial community occurs in blocks of 20-60µ in water and sediment, a size range harvestable by many planktonic fish like silver carp, rohu, catla, mullets and milkfish. The microbial community flourishes using organic and mineral fractions of organic manure as source of energy and nutrients. Fish are able to harvest these organisms directly in significant quantities. The microbial film coating, the relatively indigestible substrate of the detritus is digested while the substrate itself passes through the fish gut relatively unaffected which then get recolonised by microbes and reharvested by fish.

Types of substrate used for the development of biofilm

The large quantity of agricultural wastes and low value by products such as sugarcane bagasse, paddy straw, dried *Eichhornea* leaves, coffee residues, banana wastes, rice husks etc. can be used as substrates, either alone or mixed with manures and inorganic fertilizers in fish ponds. Since microbial protein can be produced from a variety of carbon sources and carbohydrate raw materials.

Protocol for the development of biofilm

1. Cement cisterns provided a soil bed of 15cm thickness is used for the production of biofilm.
2. Soil bed should be dried for a week prior to filling with water
3. Dry the substrate properly under sunlight before use
4. Suspend the substrate vertically in the water column with the help of a bamboo pole placed horizontally on the cement cistern. The dosage of substrate is 2000kg/ha.
5. Apply cowdung at a dose of 3000kg/ha.
6. Development of microbial biofilm can be noticed after 8-10days.
7. Stock the fish to the biofilm grown ponds @ 10,000 fingerlings/ha.

Enumeration of biofilm

Total Plate Count

Total plate count of bacteria on substrates is estimated by collecting the substrate samples in sterile physiological saline (0.85%). Wash the substrate thoroughly using saline to remove free bacterial cells. Then transfer 1.0 g (wet weight) of substrate

into 9 ml of physiological saline and mix thoroughly by vortex for 4 min to detach biofilm bacteria. Inoculate the homogenate in replicates by surface spread method on plate count agar after making appropriate serial dilutions with physiological saline (0.85%). Then incubate the plates at room temperature for 24 hrs and estimate the viable bacterial count on substrate as No./g.

Quantitative estimation of attached algae and attached fish food organisms on the substrate

Mark approximately 1 cm² area on substrate and scrape the substrate on to a glass slide and cover with cover slip. Observe the slide under microscope for attached algae and fish food organisms. Express the count as number of plankton per cm² area of substrate.