Periphyton Based Aquaculture

(PBA)

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Basic Introduction

- **Feed** is one of the most important criteria for aqua farming. In aquaculture, 60% of the production cost is incurred as feed.

- In extensive & semi intensive systems, natural food like **planktons & bottom organisms** play the most vital role in fish production.

- Aquaculture is not always a truly sustainable practice, so far the supply of external feeds, chemicals & energy inputs are highly concerned.

- **Periphyton** is considered as an important food component for fishes.

Periphyton grows on various substratums in aquatic environment & support fish production.

Periphyton may contribute **substantially to primary productivity** especially in shallow freshwater ecosystems & thus provide an important energy input to both detritus & grazing food chains of the ecosystem.

What is PERIPHYTON?

The term periphyton, **'Peri'** means **round** & **'Phyton'** means **Plant.** *(Behning,1924).*

Periphyton is defined by Azim *et. al.* (2002) as:

'a complex of sessile biota attached to submerged substrata such as stones & sticks & includes algae, invertebrates, detritus & micro organisms.'

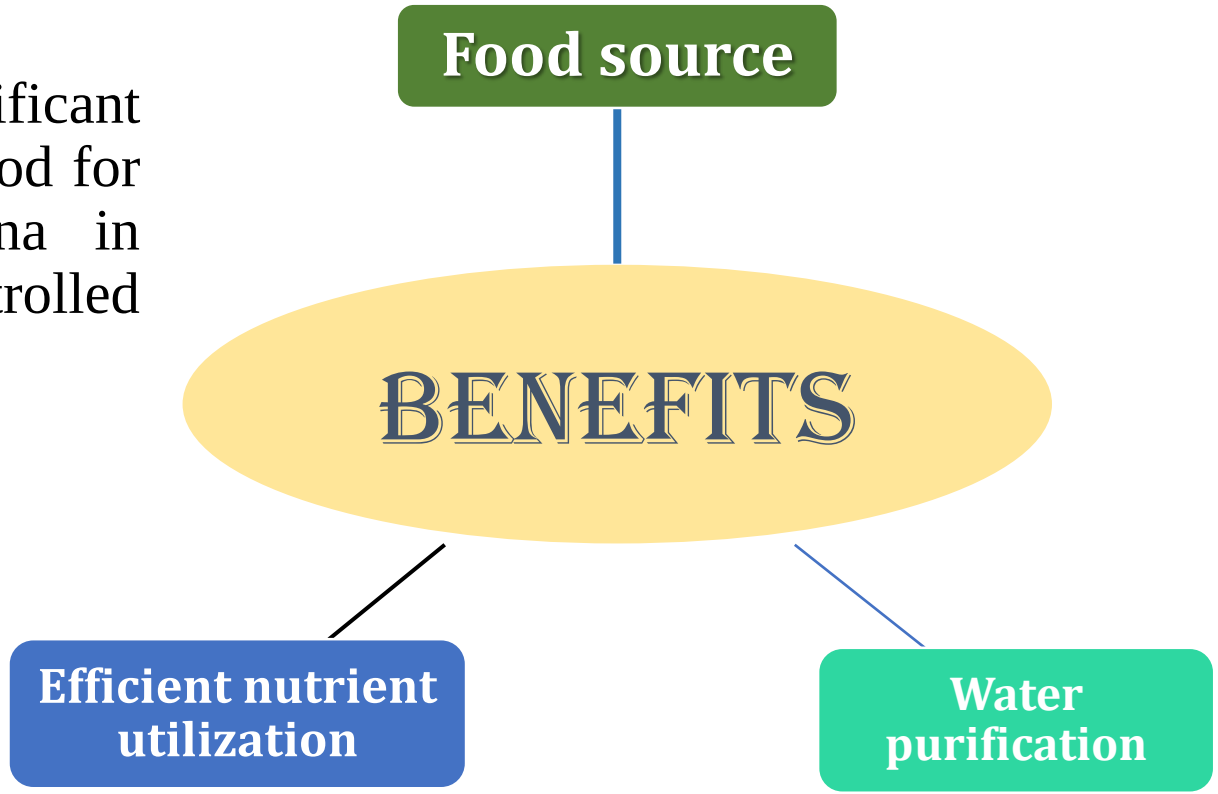
It as an assemblage of organisms like **algae** & **minute animals** growing upon the free surfaces of submerged objects of water & covering them with a slimy coating**.** *(Young 1945, Hunt et. al. 1952)*

It includes **sessile algae**, **micro fauna** & **other bottom organism** in combination with **microbial bio-films** *(van Dam et. al., 2002).*

Biofilm/periphyton-based fish culture offers a new direction, especially since periphyton is effectively utilized by many fish species which thrive low in the food chain *(Van Dam et al., 2002).*

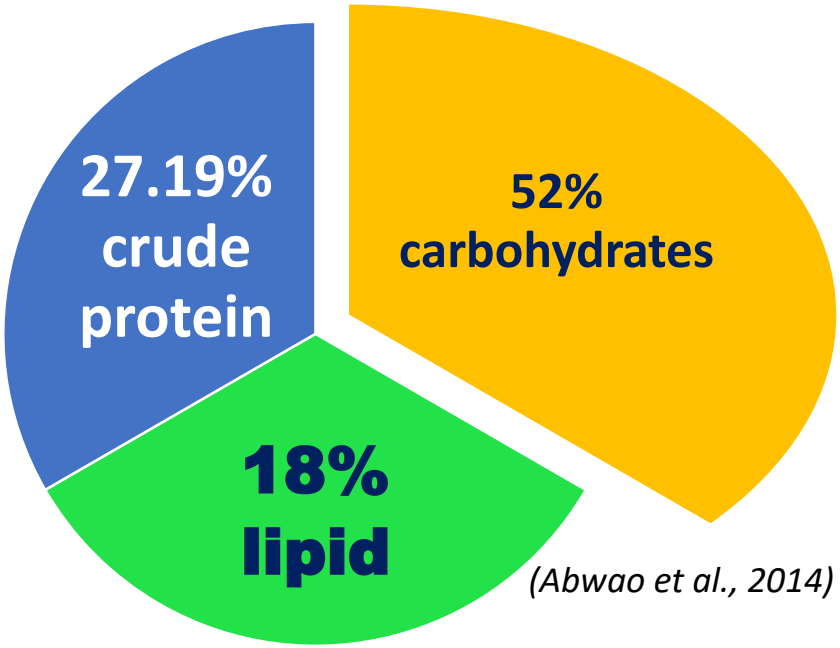
It can bring about major advances in the development of **low cost farming** in aquaculture with **no additional feed & reduction of pollutants**.

Periphyton has significant role of providing food for fish & other fauna in natural & controlled environment.



- **Who eats** : wide range of fish & benthic invertebrates including snails, chironomids, mayflies, oligochaetes & several groups of crustaceans.

Proximate Value



(Abwao et al., 2014)

The recorded protein level of **19.27- 35.56%** has been found in periphyton grown on **bamboo substrate**.

How this idea has came from????

The idea was originally derived from various traditional fishing methods…

Different Types Of Substrates Uses In PBA:

In aquaculture, the substrate can be anything ranging from **coral reefs, stones, branches of any tree** or **higher aquatic plants, bamboo, plastic**, etc.

- **Some traditional substrate based fisheries**

Name	Place	Attachment medium	Comments
ACADJAS	West Africa	tree branches	➢ a group of installations of dense masses of branches that are artificially planted in the muddy bottom in shallow coastal lagoons. ➢ Dense clusters of branches are placed in lagoons to attract fish. ➢ The tree branches are known to promote the growth of periphyton, which is an excellent food for many different species of fish. ➢ In addition, tree branches also provide shelter for the fish.

Name	Place	Attachment medium	Comments
Athkatu	Sri Lanka		in the shallow coastal waters with more than 3000 brush parks established during the season to attract fish & shrimp
Xeng	Assam, North eastern India	Bamboo 	✓ Bamboo branches, locally known as xeng are used as natural substrate in fish culture ponds in Assam. ✓ Primarily done to protect fish ponds from unauthorized fishing.
Samarahs	Cambodia	tree branches & bamboo shoots accompanied with floating aquatic weeds like Eichornia crassipes	➢ The tree branches are submersed in rivers & the surface is covered with floating aquatic vegetation. ➢ Fish begin to inhabit these structures after about two months.

Name	Place	Attachment medium	Comments
Katha	Bangladesh	*Colocasia esculenta* & branches of bamboo (Kanchi), mango etc	katha can increase biological production in three ways by i) creating more secure & diverse spawning habitats; ii) creating more secure nursery habitats by lowering predation rates & increasing survival; iii) creating large food resources.

Name	Place	Attachment medium	Comments
Phum	Manipur (Lok Tak Lake)	constructed by trimming the fronds of weed mats to a width of 1-2 meters & these trimmed fronds are bent in a circular format to give a diameter of 10 to 30 meters	Floating islands formed through the dense growth of aquatic weeds & grasses are spread throughout the lake & are used as the natural fish aggregating devices.

Advantages

Reduces poaching
Improves water quality
Biodegradable substrates can be used as substrates
Improves the health of culture stock
Cost effective
Makes farming sustainable
Simple technology & Less input required

References:

Aquafind
Aquatic Fish Database est. 1991

Periphyton Growth On Natural Substrates And Its Efficacy In Aquaculture

Manas Pratim Dutta[1], Kamaleshwar Kalita[2], Bipul Phukan[3], Sangipran Baishya[4] and Ranjit Bordoloi[5]

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J. Sci. Res. **1** (3), 624-634 (2009)

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Review Paper

Potentiality of Periphyton-based Aquaculture Technology in Rice-fish Environment

S. K. Saikia[1] and D. N. Das[2]

Aqua

International Journal of Aquaculture, 2017, Vol.7, No.13, 86-93
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Research Article **Open Access**

Periphyton Growth on Three Bio-substrates and Its Influence on the Performance of Jaraqui (*Semaprochilodus insignis*)

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