

## ROLE OF INDIGENOUS TECHNICAL KNOWLEDGE (ITK) IN AQUACULTURE

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**T**he Indigenous technological (ITK) in aquaculture predominantly related to farm inputs has been developed by the farmers themselves, based on their experiences. Farmer's innovation is based on their indigenous knowledge. The indigenous knowledge is the accumulated knowledge, skills, and technology of the local farmer derived from the interaction of the ecosystem. The knowledge has been inherited from generation to generation. This radically changes the use of fertilizers and devised some unique right-hand thumb rule for disease diagnosis and treatment without the costly antibiotics and chemotherapeutic agents, which is mostly useful for middle fish farmers.

### **1. Garlic and Fenugreek- As a fish attractant**

Some farmers are used garlic and fenugreek seed for easier harvesting and fish attractant. For that 1kg of semi-dried garlic mixture with 250g of roasted and grind fenugreek seed. After mixing, both compounds applied in a pond. After one hour, a group of fish gets attracted to it because of aroma release through this compound, and fisher catches the fish easily. This mixture is enough to a water body for the one hectare area. This combination is also used as bait or attractant for angling.

### **2. Application of cattle urine**

Some fish farmers in India collected cow urine and sprinkled on the surface of the fish pond to get control of algal bloom, but this method has been a band in other countries.

### **3. Broadcasting ash in fish pond**

In this system, first of all, burns the paddy straw or hay and after that complete burning gets ash, this ash is broadcasting in the fish pond, Farmers believe that it prophylactic measures to keep out the fish disease.

### **4. Asafoetida (Hing) are used for attracting Magur and Singhi**

Most of the fish farmers in India culture Magur and singhi because there is a lot of demand in the fish market, but there is a lot of difficulty in harvesting it because it burrows inside the mud. For eliminating this problem twigs, leaf or branch of tree are placed in the pond before harvesting. Then the hing is tied in a cloth and is kept in around the leaf or twigs so that the fish becomes attract After 5 to 10 minutes put the net around the twigs and harvest the fish.

### **5. Control of Argulus by gunny bag and bamboo pole**

Some farmers are old gunny bag is kept in bottom of pond, So that the larvae sticks to the bag and the farmer dry and killed eggs of Argulus deposited over them, and some of the farmers used bamboo pole for buried in the pond in several places, the fish rubs own body with this pole and the argulus is leaves the body surface of fishes.

### **6. Using Turmeric in fish ponds as an antibacterial agent**

Turmeric having antibacterial and anticancer properties *curcumin* is the active compound in turmeric which has been shown to have a wide range of therapeutic value, fish farmers broadcast the paste over the water to treat the *Aeromonas hydrophilla* infection. Sometimes also used in an external insecticidal and antifungal agent.

### **7. Uses of Mahua**

Mahua (*Madhuca longifolia*) belongs to family *Sapotaceae*, which is known for its sweet flowers which possess a lot of ethnic values among the tribal people for the development of various fermented and non-fermented food products. In the fisheries sector, it is used for control the weed and predatory fishes, the dose is @250 ppm, because of *saponin* and *mourin* active compound present in Mahua and it is Hematotoxin (toxins that destroy red blood cells, disrupt blood clotting), which breakage the RBC and causes the death of fishes.

### 8. Use of pieces of banana trunk

In villager fish farmers, pieces of the banana trunk place afloat to maintain the alkalinity and to serve as a food supplement, banana trunk having pores containing oxygen which ultimately helps to increase the level of oxygen. Before the rotten of banana trunks its remove from the pond.

### 9. Use of pieces of rachis of jackfruit

Tadpole infestation is a serious problem, primarily due to competition between tadpoles and fish for food and also caused harvest problems and impaired post-harvest sorting and grading. For control this problem Jackfruit is used. Jackfruit rachis is a stick in nature because it's containing gummy shell, farmers utilize the rachis of jackfruit in the pond for relief from tadpole, the tadpole is attached with the rachis, and later tadpole is removed from the water.

### 10. The ripe palm fruit for crab reduction

Some areas of fish farmers are used ripe palm fruit for the reduction of crab from a pond. The smell of the ripe fruit attracts the crab and they aggregate on the fruit to eat and farmers remove them easily by hand or by scooping. In some cases empty earthen pots are also used for removal of crab from shrimp farm because this crab is competition to shrimp for feeding, empty pots are placed at the bottom of the shrimp pond at a different place where feed is usually placed. After 4-5 days the pots are removed from the pond which gets filled with crabs.

### 11. Usage of Haritaki and khayer

Many medicinal plants such as *Acacia catechu* and *Terminalia chebula* are used for the hatching of fish eggs because early hatching of spawn dies due to immature condition, for solving the problem local farmers adopt a solution of 2kg Haritaki and 250g khayer for 100 litter of eggs.

**Procedure:** - mixing the above material in 2 lit of water and keep for one night and heat the mixture for one hour later filtering the mixture through fine cloth and mixture is applied to the eggs in hatchery, after 6-8 hrs of fertilization this fertilized eggs kept in the mixture for 5

minutes, due to the application of this mixture the outer membrane of the fertilized eggs become hard which increase the hatching time.

### **12. Use of paddy straw**

As we know turbidity is common problem during rainy session. For control, the turbidity of pond farmers is used paddy straw, when the hay rots the farmers periodically remove them from the pond the method especially controlling clay particles is found to be effective.

### **13. Akashi fruit for fish tranquilizer**

For harvest the fish from pond tranquilized or anethetized is the best method. The indigenous communities of Jharkhand use the fruit of Akash plant as a fish tranquilizer. This fruit is semi grained and mixed with water @1 kg per 100 liters and sprinkled over the water surface. After half an hour fish start to float on the water surface and they are collected by netting or hand picking.

### **14. Control pH of water**

Someplaces such as Mathurapur and south 24 Parganas use the branches of tamarind and moringa trees for reducing the water pH. The dose is 3-5 pieces of 30-35 cm and keeps it for 3-4 days when they yellowish color of water turnoff then they remove those branches.

### **15. One should not venture into the sea for fishing when ‘Mother Sea’ is in her menstrual period**

During May-Jun month in southwest coast large area of the sea looks like red blood in color and also very bad odor emanating from that area. In this time fishermen do not go for fishing. Traditional fisherman believes that time Mother Sea (*kadalamma*) is in her menstrual period. The good science behind this theory is during the May-June period seawater temperature is high on the west coast of India. In the first few months increase the nutrient content in the sea due to terrestrial drainage. Due to this both factors increase the temperature and nutrient algal bloom produced specially *Gymnodiniumperidinium*. This bloom is called red tide and also called harmful algal blooms (HABs), and they produce a toxin that makes fish and shellfish dangerous to eat. The rapid growth of algae leads to oxygen depletion which in turn leads to mass mortality of marine organisms leading to off odor.

### **16. Presence of sardine shoals**

Oil sardine having to jump in nature according to the traditional fisherman, the splashing of water on sea surface indicates the presence of shoal of sardine. This knowledge is used for encircling the shoal of oil sardine by traditional fishermen.

For the identification of bottom, sardine shoal fisherman looks series of little air bubbles release due to while sardine feeding on the muddy bottom, the oil sardine shoal range from 2-25 meter in length.

### **17. Presence of flock of sea birds is an indication of fish shoals**

When large fish shoal sees in the water surface near the shore, fish-eating birds like *Kadal kakka* (Seagull) fly in the large number over the water for catching the fish.

### **18. Coconut spikes as fish aggregating device**

Especially in fishermen from Kerala use a specific type of fishing method locally called *kolachal fishing* for cuttlefish. A fisherman is set the kolachal in a large number in the selected area of the sea. After 4-5 days aggregating there. Here *kolachal* use as an artificial fish aggregating device (FAD). These FDA provide breeding and hiding places for cuttlefish. Kolachal also serves as an artificial substrate on which periphyton grows in large number; periphyton is an excellent food for cuttlefish hence kolachal serves as a feeding place for them.

### **19. Tannin for preservation of fishing nets**

For the making of fishing net, traditional farmers use natural fiber like cotton, sisal, hemp, manila, and coir. Traditionally tannin is used for the preservation of fishing nets. For the preparation of tannin, the bark is cut in small pieces, crush well and boiled with water in metal vessels till a concentration solution is obtained. The remaining part is squeezed, the liquid is collected and filtered. The net is immersed in the solution for a day or two and dried. To prevent the leaching of tannins fixed by dipping in 1% solution of copper sulfate and ammonia.

## **20. Fishing of snake heads (*Channa spp.*) with petromax and sickle**

In the northernmost part of the state of Kerala, fishing of snakehead by using petromax and sickle. This method used during the monsoon months in paddy fields, associated canals and ditches. In this method, 3-4 persons are required. One person holds the petromax and moved forward. Another member who follows the light bearer bag made of palm leave and carried a hand net with him. Another person carries a sharp sickle. Due to fish attracted to the light, it gets stupefied by the intense light of the petromax. Fisherman catches the fish by using the hand net or the bag.

## **21. Singhi (*Heteropneustes fossilis*) for treating anemia in pregnant women and children**

The coastal people of Kerala ‘Singhi’ are used as excellent food for pregnant and children get rid of anemia. The Asian stinging catfish or fossil cat, *Heteropneustes fossilis*, is a species of air sac catfish found in India, Bangladesh, Pakistan, Nepal, Sri Lanka, Thailand, and Myanmar. It is locally known as *kadu*, *theyili*, *moyya* or *kariin* in different parts of Kerala. Singhi fish containing iron, which is used for the synthesis of hemoglobin for treating the anemia disease.

## **22. Transport and acclimatization of fish**

The state of Assam in the district of Karbi-Anglong fish seed vendors transported seed in aluminum hundies. They add 50 ml of local rice beer for every 10 liters of water in these hundies. The vender says that the survival of fry is better, rice beer is added into hundies during transport because rice beer may act as some sort of anesthetic agent during transport.

## **23. Control of Epizootic ulcerative disease syndrome (EUS)**

Some traditional farmers are applying branch of Neem plant into fish pond for help to control ulcer on the body of fishes.

## **24. Low budget fish Gunabajalam prove effective for crops**

In the farmers of TamilNadu at Kanyakumari district, they use fish gunabajalam of fish hormone produced by Mrs. Thangam with help of some farmers. They use this hormone for growing their rose, chili and paddy crops.

Preparation of fish Gunabajalam: - take 1 kg of fish waste and jaggery and mix well with 10 liters of water in a plastic drum. Stir the mixture in the clockwise and anticlockwise direction for 3 to 4 days and keep the drum in shade. After 15 days filter the solution (1liter of fish hormone in 100 liters of water for one acre) and spray over the crops. Spraying time is early morning or evening because most of the insects attack the crops during this time.

## 25. In Chhattisgarh, Bastar tribes use traditional fishing techniques

**Bisar:** Bisar is made from bamboo splits like a normal mate and weaves with nylon threads across the bamboo splits. Bisar is attached with *Sodiya* they help to collect the fish in flowering water. The uppermost part is open and the lower part is less open when to take out fishes from *sodiya*. For trapping the small and medium size of the fish used.

**Pelna:** It is a triangular shape made of bamboo weave with a nylon net and tied with a triangular frame. One arm had for holding the pelna upright. Under deep water, they move forward keeping pelna upright from the bottom of pond or rivers.

**Dhuta:** Dhuta used for storage of fish it's made up from bamboo splits weaving it as bottle shaped container. The capacity of dhuta is 2-5 kg and 1-3 kg dry fishes and fresh fishes respectively.

## Conclusion

ITK is such knowledge that is presumably eco-friendly; economic and highly credible with a practical point of view, without any side effect. There is also a possibility for combining the indigenous technical knowledge and knowledge of management based on modern science to create effective hybrid management systems. It is imperative to analyze such technologies so that the scientific principle behind them could be properly understood. Once this is done, it will be easier to further refine and upgrade them by blending them with modern scientific knowledge.

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