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Perspectives and Aspects of natural Fish Farming

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Abstract

Natural farming has emerged as a sustainable and environmentally friendly alternative to conventional chemical-based agricultural practices. In recent years, increasing concerns over environmental degradation, declining soil fertility, water pollution and health risks associated with synthetic fertilizers and pesticides have led to renewed interest in natural farming approaches. The present article highlights the perspectives and various aspects of natural fish farming as an ecological approach to sustainable aquaculture. Natural fish farming emphasizes the use of locally available resources, indigenous fish species, farm-made bio-inputs and traditional knowledge systems to maintain the ecological balance of pond ecosystems. The system relies on the natural food web dynamics of aquatic environments and discourages the use of external inputs such as chemical fertilizers, antibiotics and commercial feeds. Various practices including the preparation and application of biofertilizers such as Jeevamrut and Vermiwash, integration of livestock and the use of herbal and botanical treatments for disease management are discussed. Traditional phytotherapeutic approaches using plants such as neem, garlic, turmeric and marigold have also been highlighted as eco-friendly alternatives for controlling fish diseases and improving pond health. Additionally, indigenous techniques practiced by farmers for managing pond ecology, controlling predators and improving fish survival are described. Natural fish farming not only reduces production costs but also enhances environmental sustainability, biodiversity conservation and farmer income. The integration of ecological principles with traditional knowledge makes natural aquaculture a promising strategy for sustainable fish production and rural livelihood improvement.

Keywords: Natural fish farming; Sustainable aquaculture; Biofertilizers; Phytotherapy; Indigenous fish culture practices; Pond ecosystem management

Introduction

Natural farming is defined as “Farming with Nature” to produce healthy food, where the work is done by nature itself. Subhash Palekar is known as the father of natural farming in India which is based on ancient Indian farming techniques such as cow dung and cow urine. Natural farming is also known as Bhartiya Prakritik Krishi Pradhati (BPKP) in India. Sikkim became the first state in India to officially announce the adoption of organic farming. Madhya Pradesh has covered the largest area under organic certification followed by Rajasthan.

Farmers use a variety of chemical fertilizers to increase production and manage weeds and insect pests in order to meet the demand for agricultural products and to feed the growing population. Synthetic pesticides and fertilizers have been utilized excessively, which has had a negative impact on both the environment and human health thus to overcome such situation

natural farming is the best alternative.

Natural Farming improves soil fertility, environmental health as well as helps in the reduction of greenhouse gas emissions and also promises the enhancement of farmer's income. In this farming actual physical work and labour has been seen to reduce by up to 70-80% compared to other farming system. It is considered as agroecology based diversified farming system which integrates crops, trees, fish and livestock with functional biodiversity. In natural farming, neither chemical nor organic fertilizers are added to the soil.Natural farming is a system where farming is done in accord with laws of natural environment that are relevant to fish farming practices. Natural farming is a chemical-free farming method that works with the natural biodiversity of pond ecosystem which is made up of complex food web of producers, consumers and decomposers that supports a variety of aquatic life.

Benefits of natural farming:

i. **Minimized Cost of Production**: Natural Farming aims to drastically cut down production costs by encouraging farmers to prepare essential biological inputs using on-farm, natural and homegrown resources.

i. **Ensure Better Health**: Natural Farming does not use synthetic chemicals. Thus, the process does not involve health risks. The food has higher nutrition density and therefore offers better health benefits.

ii. **Ecological balance:** Natural farming practices promote the return of microbial life and other living organisms in the soil, which improves soil health and a more judicious usage of water with much smaller carbon and nitrogen footprints.

iii. **Reduced pollution**: Natural farming helps in maintaining the purity of water bodies including groundwater without pollution.

iv. **Growth in farmer's income:** Natural Farming aims to make farming viable and aspirational by increasing net incomes of farmers on account of cost reduction, reduced risks, similar yields, incomes from intercropping.

v. **Employment Generation**: It is regarded as a profitable agricultural method with the potential to boost employment and rural development and production of safe food.

vi. **Livestock Sustainability:** The integration of livestock in the fish farming system plays a important role in Natural farming and helps in restoring the ecosystem. Ecofriendly bio-inputs, such as Jeevamrit and Beejamrit, are prepared from cow dung and urine and other natural products.

Natural farming practices in Pisciculture:

Natural farming is an ecological farming approach where farming system works with the natural biodiversity, encouraging the soil's biological activity and managing the complexity of living organisms both plant and animal to thrive along with food production system.

The management practices in fish farming as a component of Natural Farming includes:

- External inputs such as chemical fertilizers, commercial feed, antibiotics etc should not be used.
- Local indigenous fish species native to a specific region should be given importance in culture practise.
- Traditional medicines produced on farms to cure fish diseases
- .Farm made probiotics or microbial inoculants for increasing productivity of water.
- Promoting composite fish culture or mixed species farming.
- Integration of native livestock -fish farming especially for cow dung and cow urine as essential inputs for increasing natural production.
- Control of disease and pest management by practicing botanical concoctions such as neemastra, agniastra, neem ark etc.
- Practicing use of farm made liquid fertilizers such as Jeevamrita and Vermiwash for increasing the production of natural fish food organisms

Preparation of biofertilizer in pisciculture

Jeevamrut is derived from two words "Jeevan" and "Amrit". Jeevan means life and Amrit means medicine. It isa eco-friendly biofertilizer bio-fertilizer rich in microorganisms such as nitrogen-fixing and phosphate solubilising bacteria that help improve the mineralization of the soil. Jeevamrut is prepared from native cow urine, dung, jaggery and pulse flour. The fungal infections and tick burning are effectively kept under control by Jeevamrut. It promotes sustainable agriculture by reducing the dependence on synthetic fertilizers and pesticides. It is cost-effective and will helps the farmer to save money which has been spent on purchasing chemical fertilizer.

Ingredients :

Cowdung-10 kg, cow urine -10 liters, jaggary- 2 kg, pulse flour – 2 kg, pond soil – 1 kg and water-100 litres.

Preparation

- Take 100 litres of water in a barrel, add 10 kg of cow dung and 10 litres of cow urine is stirred and mix well with a bamboo stick.

- Add 2 kg Jaggary and 2 kg of pulse in the mixture.
- The prepared solution is is kept for fermentation for 5-7 days.
- The solution is shaked with a bamboo stick or wooden stick three times a day.

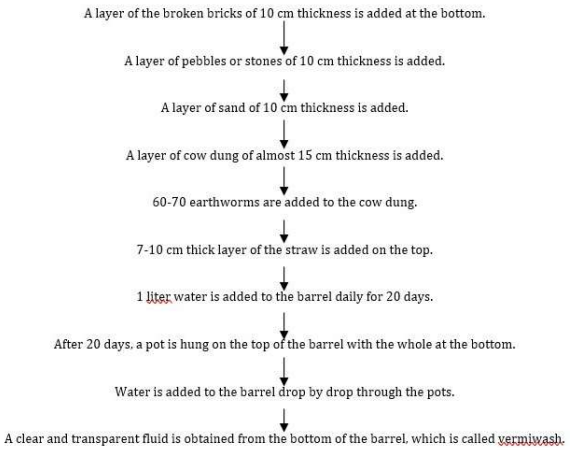
Dose and use

The prepared solution is used as liquid fertilized. The solution is again mixed with 5 -10 % water before application. 200 liters of jeevamrut is required for 1 acre pond area. For better results spray every 7-14 days depending on the colour of the pond water.

Vermiwash

Vermiwash is a liquid extract produced by earthworms. It is basically a combination of secretion and wash of earthworms, present in the medium, honey brown in colour. It contains2.5-3.0% Nitrogen, 1.0-1.5% Phosphorus and 1.5-2.0% Potash and plant growth hormones like auxins and cytokinin apart from nitrogen, phosphorus, potash and other micronutrients. It increases in pH and dissolved oxygen levels in the water and helps in multiplication of zooplankton.

Vermiwash unit: A barrel which has capacity to carry 25 liters is used for the vermiwash preparation. A tap is added at the bottom of the barrel or a whole is made at the bottom to collect the vermiwash. The followings steps are followed for the vermiwash preparation:



Dose and rate of application in fish pond :

Vermiwash should be mixed @ 10-20% level with freshwater and to be applied in fish ponds at 7-10 days interval in addition to cow dung application.

Phytotherapy for treating fish disease:

Farmers often use antibiotics and other chemical drugs to mitigate infectious diseases. Phytotherapy without side effects is an eco-friendly, socio-economic and modern approach to mitigate disease. Phytotherapy or the use of herbal medicines, is important in fish farming because it can help treat fish diseases without the use of antibiotics and chemicals.

Herbal medicines for treatment of bacterial diseases in fish:

i. **Use of *Allium sativum* (garlic) and eucalyptus extract:** Use of *Allium sativum* (garlic) and eucalyptus extract @ 100-300 mg/L when given bath treatment to fish *Carracius auratus* reduced parasitic infections and healing of ulcers.

ii. **Application of Neem leaf paste and turmeric in fish pond:** For treatment of fishes showing lesions, reddening areas and other external disorders in their bodies. Neem leaves are ground to make a paste. Turmeric is added (250gm) in to the paste and mixed properly. The paste is then mixed with 25-30 liters of water and sprayed in the cultured fish pond evenly. This is practiced as prophylactic measure while there is disease outbreak in the locality. Used materials are readily available and cheap

vii. **Application of garlic paste to control disease:** It is a popular practice to treat the fishes to cure whirling motion and balance lost due to viral attack particularly yearlings and fry-fingerlings of fishes. About 1Kg of garlic (Allium satium) is ground to make a paste then it is thoroughly mixed with about 20 lit of fresh water. This solution is then sprayed over the infected pond.

viii. **Use of turmeric and lime for treatment of bacterial disease**: Application of agricultural lime with turmeric powder @ 9:1 ratio in fish ponds act as a preventative measure against Epizootic Ulcerative Syndrome (EUS) disease.

ix. **Control of algal bloom and turbidity:** Application of cattle urine @ 17 L / ha spreading it evenly throughout the pond surface helps to control algal bloom formation in pond water. Pond turbidity is also controlled by using paddy straw in shape of ball to remove the clay particles. The hay rots are then removed periodically.

x. **Use of water hyacinth**: Introduction of Water hyacinth (*Eichhornia crassipes*), which is locally known as *panimeteka*in the pond helps in rectifying the foul

odor of the water and absorbs the heavy metal particularly Mercury (Hg) Lead (Pb) and Arsenic (As) and also it also helps in protecting the dykes from regular erosion due to the waves.

xi. **Broadcasting of ash in fish pond:** Ash of paddy straw is used as prophylactic measure to check fish disease in culture pond. It is broadcasted into fishpond or sometimes heaped in one corner of the cultured pond.

xii. **Koi fish for snake control:** Operculum spine of koi fish (*Anabus testudeneus*) is strong and sharp enough to injure the mouth of the water snake (*Chekered keelback*) while engulfing it. Once the snake is injured, the chances of attack were reported to be reduced.

xiii. **Leach control**: To control leaches, the farmers throw peels of cucumber or leaves of bitter gourd made into paste form. The farmers believe that these plant materials are bitter and, therefore, help in eradication of leaches.

xiv. **Control of Argulus**: Farmers believed that fishes infected with Argulus can get rid by rubbing their bodies against split bamboo pieces. Besides, farmers reported to use gunny bags in submerged condition in pond water and removed them periodically to dry and thus, killing the eggs of the Argulus deposited over them.

xv. **Control of tadpole**: Presence of tadpole in fish culture pond effect the growth of culture fish as it competes for food and habitat in pond ecosystem. Farmers reported to apply ash or lime around pond periphery. Approximately 60 – 62 kg ash (Fig. 3) or 20 kg lime was applied for one ha water area and disappearance of tadpole was observed after two weeks of ash application and when lime is applied to control tadpole, it took lesser time (10 – 12 days) after application.

xvi. **Control of jungle cats:** the animals usually stay in the pond periphery and attack the fishes during night so to manage the problem elephant apple (*Dillenia indica*) is cut into different pieces and is distributed in pond water. The pieces resembles the floating fish head and when the cat catch up it experienced a bitter taste and avoid catching fish. Plantation of turmeric plant (*Curcuma longa*) alongside the pond periphery to avoid the attack of wild cat.

xvii. **Removal of harmful *g*as from pond sediment:** for removal of humus or harmful gas from pond bottom bamboo poles are weight with tied bricks or stone and is manually dragged horizontally.

xviii. **Use of fermented local rice beer for transportation of fish seeds:** Local rice beer prepared from fermented rice is added @1 ml per packet in the polyethylene bags used for transportation for better survival and less mortality by the tribal people of Assam.

xix. **Marigold flower extract**: Marigold flowers contain carotenoid pigments that help form pigments in fish. Studies have shown that feeding fish with marigold-based diets can increase the concentration of carotenoids in their muscle tissue and improve their coloration.

xx. **Control of leeches**: The farmer used peels of cucumber or leaves of bitter gourd in paste form to control leeches in fish pond.

xxi. **Use of earthen pot:** crab in the pond make holes water flowing through crab holes can cause dikes to wash out, which can be expensive to repair and also Crab holes can allow predators and competitors to enter the pond. Empty earthen pots having long necks are paced in different places where feed is usually placed. The earthen pots are then removed after 4-5 days when the pot is filled with crabs.

xxii. **Reduction of water turbidity**

Many fish pond encountered the problems of turbidity, since most of soil of the state has red clay soils and bathing was common. To control the turbidity farmers applied considerable pieces of banana leaf/stem after cutting into several pieces (Fig. 6). When farmers remove these periodically they got better result.

Conclusion:

Natural fish farming represents a holistic and sustainable approach to aquaculture that works in harmony with natural ecological processes. By minimizing the use of synthetic chemicals and relying on biological inputs, indigenous knowledge and locally available resources, this system promotes environmental sustainability, improved water quality and healthier fish production. The adoption of practices such as biofertilizer application, livestock integration

and phytotherapeutic treatments not only enhances natural productivity of pond ecosystems but also reduces dependency on costly external inputs. Furthermore, natural fish farming contributes to biodiversity conservation, ecological balance and the production of safe and nutritious aquatic food. The indigenous practices documented from farmers demonstrate the importance of traditional ecological knowledge in maintaining pond health and managing fish diseases effectively. In the context of increasing environmental concerns and rising input costs in conventional aquaculture, natural fish farming offers a viable alternative for sustainable fish production and improved farmer livelihoods. Wider awareness, scientific validation and extension support will further strengthen the adoption of natural aquaculture practices and contribute to the long-term sustainability of the fisheries sector.