Cage Culture

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ABSTRACT

Cage culture aquaculture technique known to raised fishes or other aquatic organism in enclosed enclosures submerged in natural water bodies. The core ideas, benefits, difficulties, and sustainable elements of cage culture are all covered in this article. We want to provide readers a thorough grasp of this cutting-edge practice by looking at its adaptability, advantages and environmental effects.

KEYWORDS

Aquaculture, Farming, Environment, cultivation.

Introduction

Fish are raised in net cages that are suspended in water, such as lakes, rivers, reservoirs, and coastal areas, under the practice of cage culture. Fish are commonly raised in cages because they are relatively affordable and simple to maintain. Due to the fact that it doesn't consume fresh water or land, it is also an environmentally sustainable technique of aquaculture. The ability of cage culture to produce sustainable seafood while reducing the environmental impact of conventional fishing and land-based aquaculture has received respect. Different sizes and shapes of cage culture systems are possible. Typically, nets that are supported by a frame make up the cages. The frames may be made of plastic, metal, or wood. Using anchors and ropes, the cages are fastened to the water body's bottom.

Types of cage culture

Since they were first created, cages have advanced significantly, and there are now many different types and designs available. There are numerous ways to categorize different kinds of cages; Beveridge (1996) suggests four fundamental types:

a) Fixed
b) Floating
c) Submersible
d) Submerged

Fixed cages

Used most frequently in deep, protected waters, fixed cages are anchored to the ocean floor. They can be used to cultivate a wide range of fish species and are the most popular kind of cage culture system.

Floating cages

Usually used in shallow, exposed waters, floating cages are anchored to the bottom of the body of water using floats. They are not appropriate for all fish species and are less stable than fixed cages.

Submersible cages

Depending on the needs of the fish being raised, submersible cages may be lowered below the water's surface or raised above it. Although they are expensive, they are the most flexible kind of cage culture system.

Submerged cages

These are used in deep, swiftly moving waters and are suspended below the water's surface. They are more challenging to manage and less common than other kinds of cage culture systems.

Criteria for cage culture

Site selection

Choosing a suitable location for the cage culture system is the first step. The location ought to have good water quality, enough depth, and wind and current protection.

Construction of the cages

A variety of materials, including wood, metal, and plastic, can be used to create the cages. The fish should have enough room to grow in the cages, which should be built to be sturdy and long-lasting.

Stocking

Fish fingerlings or young fish are placed in the cages as a stocking measure. Depending on the size of the cage, the species of fish being raised, and the desired water quality conditions, a specific number of fish will be stocked in each cage.

Feeding

Fish are fed a high-quality diet that is suitable for their species and growth stage. Fish are fed multiple times per day.

Fish condition

Fish are watched for symptoms of stress or disease to manage their health. Fish that are injured or ill should be taken out of the cages and treated.

Harvesting

When the fish are large enough to be sold, they are harvested. In order to catch the fish, nets or traps are used.

Species that can be grown in cage culture

Fish cage culturing is adaptable and suitable for a variety of species. fish Fish that are frequently produced in cage culture systems:

- Tilapia
- Carp (IMC & EMC)
- Catfishes (*Clarias magur*, *Singhi* etc.)

Stocking density

For carps

- Fry: 50-100/m^3
- Fingerlings: 25-50/m^3
- Brooders: 10-20/m^3

For Tilapia

- Fry: 100-150/m^3
- Fingerlings: 50-100/m^3
- Brooders: 25-50/m^3

For Catfishes

- Fry: 150-200/m^3
- Fingerlings: 75-100/m^3
- Brooders: 30-50/m^3

Water quality Parameters

Dissolved oxygen (DO): Fish respiration depends on DO. To thrive, fish require a DO concentration of at least 5 mg/L.

Temperature: Fish metabolism, growth, and reproduction are all impacted by temperature. Most fish species thrive at temperatures between 25°C and 30°C.

pH: The pH scale measures the water's acidity or alkalinity. The pH range that fish prefers is 6.5 to 8.5.

Salinity: The amount of salt in the water is referred to as salinity. A salinity depends on different types of fish species. Examples is salinity of freshwater is <0.05ppt

Ammonia and nitrite: These substances are poisonous to fish. Nitrite concentrations should be below 0.1 mg/L and ammonia concentrations should be below 0.05 mg/L.

Nitrates: Although less damaging to fish than ammonia and nitrite, nitrates can still be dangerous in large concentrations. Nitrate levels ought to be less than 30 mg/L.

Advantages of cage culture

High output: Cage culture systems are capable of producing large quantities of fish per square foot. This is because the fish can swim freely and have access to a lot of water, both of which encourage growth.

Resource efficiency: Cage culture systems employ feed and water in an effective manner. The fish are able to filter their own food from the water, and they can fertilize the nearby waters with their waste.

Flexibility: A range of various water sources, including lakes, rivers, and reservoirs, can be used to set up cage culture systems. They are therefore a versatile choice for aquaculture farmers.

Simple administration: Cage culture systems are comparatively simple to administer. The cages can be cleaned and maintained as necessary, and the fish can be frequently fed and seen.

Reduced environmental impact: Compared to some other aquaculture techniques, cage culture systems have a lesser environmental impact. For instance, they don't call for chemical use or land removal.

Disadvantages of cage culture

Impact on the environment: There are several ways that cage culture can harm the ecosystem. For instance, unconsumed food and fish excrement can contaminate the water, and cages

can obstruct sunlight and alter the flow of natural water.

Disease: Fish kept in cages are highly susceptible to diseases that can swiftly infect the entire population.

Predation: Fish kept in cages are susceptible to attack by other fish, birds, and mammals.

Escapement of fishes: Fish cages have a tendency to allow fish to escape if the fish are under stress, which could result in the introduction of invasive species into new environments.

Social conflict: Fish farmers and other users of water bodies, such as fishermen and boaters, may come into conflict due to cage culture.

Pollution: Water bodies where cage culture is practiced may get contaminated. This is due to the fact that fish produce waste and that uneaten food can decay and contaminate the water.

Environmental effects of cage culture

The following are a few environmental effects of cage culture:

- **Eutrophication:** The over-nutrient enrichment of water bodies is known as eutrophication, and cage culture can contribute to it. Algae and other aquatic plants may grow as a result, lowering the water's oxygen level and endangering other aquatic life.
- **Impacts on biodiversity**: By introducing new species to a region or by competing with native species for food and resources, cage culture can have a negative influence on biodiversity.
- Coral reefs and seagrass beds are two delicate environments that can be damaged or destroyed as a result of cage culture.

Conclusion

Aquaculture has advanced significantly thanks to cage culture, which offers a variety of benefits in terms of species diversity, environmental sustainability, and economic viability. This approach offers a potentially effective way to meet this need while reducing the drawbacks of conventional fisheries and land-based aquaculture. However, careful management, consideration for environmental stewardship, and adherence to ethical farming methods are necessary for cage culture to be effective. Aquaculture professionals, decision- makers, and academics must work together to handle cage culture's obstacles and seize its opportunities if it is to continue to be successful. In conclusion, cage culture is positioned to be a key player in the development of sustainable aquaculture, enhancing global food security, economic growth, and environmental preservation.

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