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Maintenance of Aquarium (Part -1)

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Introduction:

Ornamental fishes indeed are nature's magnificent creation. Ornamental fish keeping is the second most favoured hobby in the world and the number of hobbyists for ornamental fish keeping is growing steadily because it provides a great chance for entrepreneurship development and income generation.

There are a many of promotional schemes from several government agencies, which would lift up seeking entrepreneurs. The technology is quite clear-cut and easy to adopt and achieve success.

Definition:

The culture of **ornamental** fishes is known as aquariculture. Ornamental fish **farming** or culture is the culture of attractive, colorful fishes of various characteristics, which are reared in a confined aquatic system.

Categories of Aquarium fishes:

Aquarium fishes are categorized basically into two main groups these are : **egg layers (oviparous)** and **live bearers (viviparous)**. Most of the aquarium fishes are egg layers and thus have external fertilization.

A detailed classification is as follows:

1. egg scatter laying non-adhesive eggs.
2. egg scatter laying adhesive eggs.
3. egg buriers.
4. mouth incubators.
5. nest-builders and.
6. egg-carriers.

Commercially important species of indigeneous and non-indigeneous aquarium fishes that are commonly cultured

Scientific Name of species	Common Name of Species
<i>Botia lohachata</i>	Reticulated loach.
<i>Brachydanio rerio</i>	Zebrafish.
<i>Chandra nama</i>	Glassfish.
<i>Colisa chune</i>	Honey gourami.
<i>Labeo nandina</i>	Pencil gold labeo.
<i>Lebeo calbasu</i>	All black shark.
<i>Notopterus notopterus</i>	Black knife fish.
<i>Oreochthys cosuatis</i>	Hi fin barb.
<i>Puntius conchonius</i>	Rosy barb.
<i>Puntius denisonii</i>	Deninson, S-barb.

Commercially important species of exotic egg layer exploited as aquarium fishes that are commonly cultured

Scientific Name of species	Common Name of species
<i>Astronotus ocellatus</i>	Oscar.
<i>Balantiocheilus melanopterus</i>	Bala shark / Silver Shark.
<i>Betta splendens</i>	Siamese Fighting Fish.
<i>Carassius auratus</i>	Goldfish.
<i>Cichlasoma meeki</i>	Firemouth Cichlid.
<i>Colisa lalia</i>	Dwarf gourami.
<i>Cyprinus carpio var koi</i>	Koi carp.
<i>Helostoma temmincki</i>	Kissing gourami.
<i>Labeo bicolor</i>	Red-Tailed Black Shark.
<i>Paracheirodon axelrodi</i>	Cardinal Tetra.
<i>Paracheirodon innesi</i>	Neon Tetra.
<i>Pterophyllum scalare</i>	Angelfish.
<i>Rasbora heteromorphy</i>	Rasbora, Harlequin Fish.
<i>Scleropages formosus</i>	Asian arowana.
<i>Symphysodon discus</i>	Discus / Pompadour fish.
<i>Trichogaster trichopterus</i>	Three spot gourami.

Commercially important species of exotic live bearers aquarium fishes that are commonly cultured

Scientific Name	Common Name
<i>Poecilia reticulata</i>	Guppy.
<i>Poecillia sphenops</i>	Marble Molly.
<i>Poecillia velifera</i>	Sailfin Molly.
<i>Xiphophorus helleri</i>	Swordtail.
<i>Xiphophorus maculatus</i>	Platy.

Source: <https://www.agrifarming.in/ornamental-fish-farming-beginners>

PREREQUISITES FOR ORNAMENTAL FISH CULTURE :

The success of ornamental fish culture significantly depends on the location and layout of the unit with implementing proper aquarium management protocols in the breeding and rearing. The basic requirements are like adequate amount of fresh water, quality brood stock and continuous electric supply.

For this reason, one has to plan precisely while starting an ornamental unit. There are also numerous other parameters, which are need to be take into consideration to have achievement in this culture practice.

Some of these parameters are discussed below:

Ø For small scale culture a minimum of 500 sq.ft land area is essential where the fish farmer can build a small number of rectangular concrete tanks. For big projects over 1ha land area is essential and a numbers of earthen ponds compulsory in addition to cement tanks for the culture of koi carp, catfish, gourami and barbs.

Ø A shade facility is needed over the cement tanks and anti-bird nets are also essential above the earthen ponds for breeding and rearing of ornamental fishes.

Ø Adequate water and electricity supply at the breeding and rearing units are vital.

Ø Choice of the quality brooder is the most essential aspect for the success of the unit. Some species breed in soft acidic water, whereas a few others favour hard alkaline water to breed.

Ø Livebearers usually choose to breed in hard alkaline water, while fishes like Angel, Discus, Tetra, Oscar and Loaches desire soft acidic water. But other egg bearers like goldfish, danio, catfish, rosy barb, and fighter fish can endure a wide range of water.

Ø Bio-filter is crucial for proper water quality management in the production unit.

Ø To boost breeding viability, breeding of same fish for more than 2 years needs to be avoided. As an alternative of that, fishes must be collected for far different places.

Ø Farm made aqua pellets can be made by using various agricultural byproducts, through the use of small pelletizer. The farmer can also employ the commercial fish/prawn feed obtainable in the market.

Ø Live fish food like Zooplankton, Tubifex, Blood worms, Chopped Earthworms etc. are also very much vital for brood fishes and larvae.

Ø For proper marketing of fish, better communication facility such as roadways/ rail/ air transport is essential nearby to the farm. Continuous link with small, middle, or large traders will help the farmer in marketing of his product.

Ø Potential farmers can gain training and new methods exhibition to get awareness about the new expertise in their corresponding field of interest and expertise. Integrated units like Ornamental fish-vermicompost, Vegetable cultivation/ backyard kitchen garden, Aquaponics can be accepted for better profit.

Ø Few concrete and glass tanks are to be constructed at the entry of all fish farms for proper observation and quarantine before improving to the prevailing stocks.

Ø Any unpleasant situations like mass mortality or unidentified signs and symptoms among farmed fish must be attended without delay by taking guidance from a specialist.

Ø Highly alkaline or iron containing water must not be used, as many fish don't breed in such water

Source: http://cifa.nic.in/sites/default/files/ORNAMENTAL%20FISH%20CULTURE_0.pdf

Status of Ornamental Fish farming in India (Domestic and International Market)

- ❖ India is yet in a fringe position just providing 1% of total ornamental fish trade.
- ❖ An estimation carried out by Marine Products Exports Development Authority of India reveals that there are one million ornamental fish hobbyists in India.
- ❖ The internal trade is estimated to be about 3.26 million US \$ and the export trade is about 0.38 million US \$ in India.
- ❖ The annual growth rate of ornamental fish trade is 14%. A rich diversity of species and favourable climate, cheap labour make India appropriate for ornamental fish culture.
- ❖ Tamilnadu, Kerala and West Bengal are the major states occupied in ornamental fish farming. Two categories of ornamental fishes are being marketed from India - exotic and native.
- ❖ The exotic varieties have been vended domestically and dominating with 99%.
- ❖ Already 288 exotic varieties have been on record in Indian market. Over 200 species of these freshwater fish are bred in various part of India. Generally native ornamental fishes are exported.
- ❖ North eastern states, West Bengal, Kerala and Tamilnadu are blessed with highly indigenous ornamental fishes. Around 85% of native fishes are from North eastern states. 90% of native ornamental species are collected and reared to meet export demand. Presently about 100 native fish species have been earmarked as aquarium fish.
- ❖ Kolkata, Mumbai and Chennai are key exporting centres. About 90% of India exports go from Kolkata followed by 8% from Mumbai and 2% from Chennai.
- ❖ Around 4000 peoples engaged in this trade comprising breeding, live food collection, trading and exporting. There are about 20 registered exporters.

Ornamental fish tank is otherwise called an **aquarium**. An aquarium is a set up in which ornamental fishes of aesthetic value are demonstrated for recreation.

Glass tank

They are either all **glass tanks** or **metal framed** ones. In the metal (steel or iron) framed tanks glass panels are retained in place with putty (battery compound). Instead in all glass tanks, glass walls are fitted together edge-to-edge using silicone rubber adhesive. These days, all-glass tanks have fully vanished due to the acceptance of metal-framed tanks, which are known for their slim look and appropriateness for keeping marine fishes also.

Shape of aquarium tanks

The shape of the aquarium tank may be circular, square, rectangular, oval, hexagonal or octagonal. Nevertheless, rectangular tanks are ideal as they provide adequate area for free swimming of the fishes.

Materials Required for construction of tank:

- Silicon gel
- Squeezing gun
- Glass panes (5 no's) with required size

Constructing the tank:

- These are built with only glass sheets. Rectangular glass tanks are made with a glass wall thickness of about 5 – 10 mm.
- In all glass tanks, the glass walls are cut and fitted with one another with synthetic rubbery sealant called silicone gum. Prior to assembly of the tank, side walls of the tank are put together so as to have the preferred shape.
- The glass walls are tied with a rope so as to keep the correct shape of the tank. Then the bottom sheet of the tank is kept flat under the arranged sidewalls so as to get the chosen and correct shape of the tank.
- A cut thermocol sheet is placed at the bottom to rest the temporarily tied glass sheets. Now the silicone sealant is evenly applied all along the inner vertical and horizontal cut ends with the help of a hand applicator.
- Care must be taken to see that the joining ends of the glass pieces are free of oil, moisture or stains. A good sealant compound fixes the glass walls in 10 to 20 minutes. Though, a curing time of about 10 hours is required to keep the set tank in position and water should be poured only after a time lag of 24 hours.

Seating the tank

Soon after curing, the tank is placed on a stable wooden or slotted iron stand. The base of the stand should be even and smooth, as uneven placing of the stands would break the tank bottom. A uniform sized thermocol is also employed in between the tank and stand surface to safeguard the tank from pressure.

Setting up of an aquarium:

Setting up of an aquarium is alternatively called **aquascaping**. Aquascaping of an aquarium has two purposes.

- i) To make the bare tank more eye-catching for the viewer.
- ii) To mimic natural environment by keeping [aquatic plants](#), rocks, gravels, etc.

Choosing a location

The tank should be set up in an attractive and suitable place, which should be directly exposed to direct sunlight. Aquarium can be set up in home, schools, colleges, hospitals, restaurants, hotels and other public places. The aquarium should be set on a very firm base in order to avoid jerking and toppling.

Steps involved in setting up of an Aquarium:

i) Fitting an under gravel filter

The objective of the filter is to eliminate dirty materials from the aquarium. Under gravel filters are alternatively called as biological filters. Toxic substances like ammonia and nitrite are converted to comparatively harmless substances like nitrate by the beneficial bacteria developed on the gravel added in the biological filter.

ii) Adding the gravels

Gravels with a particle size of 3-5 mm are employed to permit good water circulation and to enable the plants to root.

iii) Installing the air pump

Air pump is installed to run biological filter for the purpose of air lifting and aeration.

iv) Adding rocks

Suitable rocks are tightly laid down on the gravel. The rocks are assembled for creating natural look. Several rock pieces can be fixed together with silicon gel to create a cave like structure, which is vital for maintaining cichlid fishes.

v) Filling the tank

Tank can be filled with water by means of hose pipe fixed over a rock so as to avoid displacement of gravels.

vi) Keeping plants

Tall plants are retained at the back and sides. The corners are occupied with short species. The roots are buried in the gravel.

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vii) Putting the cover glass into position

Cover glass or plastic sheet are used to overlay the top. This type has holes for cables and for feeding access.

viii) Fitting the electrical wiring

Electrical wiring in regard to light and filters are appropriately connected.

ix) Setting up the hood and lighting

This is the last stage before introducing the fishes. Fluorescent tubes are used which is fitted inside the hood. The hood may be made of metal, wood or fiberglass sheets.

x) Adding the fishes

Companionable and compatible fishes are introduced in order to circumvent fighting between the fishes. The endorsed stocking density of fishes in ornamental fish tank is given below. Surface area of the tanks is taken into consideration for calculating stocking density.

Source: <http://ecoursesonline.iasri.res.in/mod/page/view.php?id=47845>

Guidelines for stocking density of fishes:

- To make the stocking density or stocking strength in the aquarium dependent on a rule of thumb is therefore anything but recommendable, nonetheless a guideline value can be advantageous for ascertaining the quantity of fish in selected cases.
- If one proceeds here after the guideline value that per centimeter of edge length one centimeter of fish can be a standard, i.e. with 100 centimeters of basin length 100 centimeters of fish can be kept.
- Thus with an average fish length of 4 centimeters of swarm fish of for example 4 centimeters we can maintain 25 specimens (100 cm of edge length / 4 cm of fish length / fish = 25 fish) – a healthy and quite representative value according to which one can certainly follow.

❖ Rule of thumb:

Tropical freshwater species

For 1 cm length of fish, 30cm² surface area is required.

Freshwater (Cold water) species

For 1 cm length of fish, 75cm² area is required.

Number of fish that can be kept in an aquarium

aquarium size	Fish bottom	Fish middle / top	Max. Body length of animals
54 – 60 litres Aquarium	8-12 animals depending on size	8-12 animals depending on size	4-6 cm
112 – 120 litres Aquarium	8-12 animals depending on size	10-15 animals depending on size	4-6 cm
180 – 240 litres Aquarium	12-20 animals depending on size	15-25 animals depending on size	8-10 cm
350 – 450 litres Aquarium	15-25 animals depending on size	30-45 animals depending on size	12-14 cm

Aquarium filters:

A healthy, successful aquarium needs the proper filtration. Three stages are necessary.

- ❑ *Mechanical Filtration* traps solid debris such as unconsumed food and fish waste. Filter cartridges are an perfect source of both mechanical and chemical filtration.
- ❑ *Chemical Filtration* employs media (activated carbon) to adsorb (attract and hold) dissolved pollutants that can cause water discoloration and odor. For mechanical filtration, there's a poly-fiber pad to lock in dirt and debris. For chemical filtration, each cartridge is filled with premium activated carbon.
- ❑ *Biological Filtration* is the third type of filtration. It depends on a culture of beneficial aerobic bacteria to remove toxic ammonia and nitrite that gather in aquarium water.
The bacteria culture biologically alters the ammonia and nitrite into nitrate, which is removed with once-a-month partial water changes. Helpful bacteria will grow naturally on many surfaces within the aquarium (including gravel, decorative rock and plastic plants) and will offer biological filtration.

Maintenance of temperature and illumination:

- ✓ A heater may be employed to retain water temperature in your aquarium. Most tropical fish need a constant water temperature between 75° and 80° F. Goldfish and several other cold water species are the exception to the rule. They can survive quite comfortably without a heater.

- ✓ Lighting exhibits the natural colors of fish and is crucial for live plant growth. There are many diverse types of aquarium light fixtures available. Fish dealer can help to select the suitable light fixture for your individual needs. An aquarium hood or cover is always a good idea since it helps keep fish in and airborne pollutants out.
 - Important Note: To evade excessive algae growth, the lighting of one's aquarium to be limited to 7 to 10 hours per day. It's reasonably easy to plug lighting fixture into a standard timer.

- ✓ Before plugging in aquarium heater, hood or any other electrical equipment, special care to be taken to read all written safety precautions in owner's manual(s) and be sure to use a drip loop. A GFCI-protected to be used outlet whenever possible.

- ✓ Source: <http://www.bangaloreaquarium.com/beginners-guide-successful-fish-keeping/>