SEM IV ZOOA/ZOOG

SEC (B)
Unit 5: Maintenance of Aquarium

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Setting of aquarium-

- ✓Place the aquarium tank on an even surface preferably on one inch thickness Thermocol sheet.
- ✓After placing tank carefully insert under water gravel filter plate into the tank along with air lift pump. Then spread gravel mixture above the filter.
- ✓Modulated rocks and drift woods are firmly fixed in the land scape position. Air stones can be placed behind rocks for good visual effect.
- ✓Decorate with aquarium plants depending upon your imagination.
- ✓Fast growing plant and tall plants like vallisneria, cobomba, sagittaria are ideal for background planting.
- ✓Bushy plants should be used to fill the corners and plants like amazon sword, small mint, water fern can be used in front portion.

Setting of aquarium-

- ✓While planting the long rooted species, assure that the roots are not damaged.
- ✓Bushy plants should be tied with a stone to fix them in position.
- ✓Before planting, the plants must be thoroughly washed in running water to remove any unwanted snail ,eggs and larvae attached with this plants.
- ✓Dip the washed plants in 0.1% KMno4 (Potassium permanganate) solution one to five minute and again wash in running water.
- ✓Once the planting is over, the aquarium tank is filled with water without tilting the plants and other settings.
- ✓Then cover the tank with the lighted hood.

Tank conditioning-

- Air pump and other electrical fittings (power head, filter, heater etc) are switched on and allow to run continuously for three to five days.
- During this time water will be cleared and the plants roots will take their position.
- Flow rate should be adjusted to 18 to 20 times per day for proper functioning of biofilter and the consequent removal of ammonia with the help of nitrifies.

Introducing the fishes-

- When purchasing fishes it is essential to make sure that they come from reliable source and are free from disease.
- Keep the bags containing fishes in the aquarium tank for an hour to acclimatize.
- After half an hour gradually acclimatize the fish by adding tank water into the fish bag for better survival of fish in the tanks.
- Stocking density can be adjusted as) 75 cm^2 space for a 2.5 cm fish.
- As a thump rule-Total surface area (Length x Breadth) of the tank divided by (3x2+6x+3)/2, where 'x' is size of the fish.

Water quality parameters

- The key to a successful, healthy aquarium is in maintaining good water quality for the creatures in your care.

- Most fish health problems are caused by poor water quality and many factors can cause this including type and frequency of the maintenance you carry out, inadequate filtration, stocking levels, overfeeding, and so on.

- The most important water quality parameters for a tropical community aquarium, or goldfish aquarium are as follows:

Ammonia –

excreted by fish into the water; ammonia is poisonous and must be removed. If the filter is working properly, there should be no ammonia in the water. It is recommended to test for ammonia every week.

Nitrite –

bacteria in the filter turn ammonia into nitrite, which is also poisonous. If the filter is working properly, this is also removed, and there should be no nitrite in the water. It is recommended to test for nitrite every week.

Nitrate –

bacteria in the filter turn nitrite into nitrate, which is harmless to most fish. It is however an algae nutrient, and should be controlled if it gets very high. It is worth testing the nitrate level if you have a problem with algae in the aquarium or pond. Very low nitrate levels are only important for sensitive freshwater fish and marine aquariums.

pH –

A measure of the water's acidity. Fish do not respond well to rapidly changing pH levels, and therefore a stable value is important. Pond fish, goldfish, and hardy tropical fish require a stable pH between 6.5 – 8.5.

Sensitive tropical fish and marine fish have more particular pH requirements.

Oxygen –

Like all animals, fish require a plentiful supply of oxygen. Because water contains much less oxygen that air, it is important to provide some form of aeration in an aquarium. Extra aeration can also be provided with aerators, air-pumps.

Ideal water quality conditions are as follows

	Freshwater	**Marine**
Ammonia	0	0
Nitrite	0	0
Nitrate	0	0
pH	6.8 - 7.2	8.1 - 8.4
Carbonate Hardness	40 - 60	120 - 180
General Hardness	60 - 150	N / A
Phosphate	<0.5	<0.5
Calcium	N / A	N / A
Salinity	N / A	1.002 - 1.024 (30 - 35g/l)

Aquarium foods

- Properly feeding your fish helps them to stay healthy and is helpful in maintaining your aquarium. It is important to know the types of foods your fish need and how much food they need, which differs from species to species.

- In most cases, fish only need to be fed once a day, and you only need to feed a small amount. Small, regular feedings provide fish with the nutrients they need and keep your tank cleaner than large or more frequent feedings.

- Over feeding can also contribute to algae growth, which can be unsightly, remove vital oxygen from the water, and increase your tank maintenance routine.

- There are a number of food options available for aquarium fish, and a combination of foods is necessary to provide fish with the nutrients they need.

- All of these foods fall into two broad categorizations of fish food: live and processed.

(a) live feeds –

Tubifex worms, Blood worms, earth worm, Daphnia, Copepods, Rotifer, Artemia and infusoria.

(b) Processed feeds-

Pellet and flakes.

Live feeds

Artificial feed

Filtration

- Selecting the correct filtration system for aquarium is an important factor that will impact not only the type and quantity of fish that is to keep, but also the amount of maintenance that the system will require.

- The filtration system is responsible for keeping the water clear and free of particulate matter and toxic compounds that are dangerous to the inhabitants.

- There are three types of filtration that are necessary for the health of any aquarium:

  Mechanical : Mechanical filtration is the process in which particulate matter is removed from the water.

Filters

Chemical : Chemical filtration removes toxic or unwanted chemicals as the water passes through a chemical media or resin.

Biological: In biological filtration, different types of bacteria convert the toxic chemical byproducts produced by the aquarium inhabitants into less toxic nutrients. This breakdown process by the bacteria is called the Nitrogen Cycle.

Types of Filters:

(a) Biofilter

(b) Foam filter

(c) Powerfilter

Biofilter:-

- Harmful substance like ammonia and nitrites are gradually accumulated in the tank due to biodegradation of food remains and fecal matters.

- The accumulated ammonia and nitrates can be removed by the action of nitrifying bacteria attached to the biofilter.

- The other parts of filter mechanically prevent the turbidity of the aquarium water.

Parts of Biofilter:- Oyster shell or zeolite, charcoal, blue metal, river sand and water lifting system.

Function of bacteria:-

- The bacteria synthesize ammonia into nitrate leaving H+ ions into the water. This H+ ions reduced the PH of water (lethargic condition of the fish).
- The oyster shell present in the biofilter neutralize the H + ion.
- Charcoal act as a deodorant in the water

The steps involved in aerobic nitrification can be summarized as follows

$$NH3^{+} + 1.5\ O_2 \rightarrow NO_2^{-} + H_2O + 2H^{+}$$

$$G = -65\ \text{Kcal mol}^{-1}\text{N}$$

$$NO_2^{-} + 0.5O_2 \rightarrow NO_3^{-}$$

$$G = -18\ \text{Kcal mol}^{-1}\text{N}$$

The overall reaction is $NH_4^{+} + 2O_2 \rightarrow NO_3^{-} + 2H + H_2O$

- This 2H+ions react with OH group of calcium hydroxide and neutralize the PH of the water.
- Use of scavangers as tank cleaners:- Scavangers are creatures which takes undesirable matter out off aquarium water.
- Snails, Armored catfishes, Shrimps and Mussel are the common scavangers used in the aquarium.

General disease and treatment:-

Disease	Symptom	Treatment
Constipation	Feces of the fish are long and stringy and remain attached to the fish went.	Keep the fish on fast
Branchitis (Inflammation of the gills)	The gill become inflamed and swollen	Potassium Permanganate 3 ppt for 10 minutes or 1ppm salt solution
Fin rot and tail rot	Fins and tails become frayed	3ppm oxytetracyclin for half to one hour
hite spot	Irritating tendency	4 to 5 drops of formalin in 10ml of water or Methylene Blue 2mg per 10 liter water, Keep the fish for one weak

Regular maintenance

1. The fishes are fed one or two times a day ad-libitum
2. At the time of feeding air pumps and power filters switched off
3. Daily switch off aerator, heater, power filter etc. for half an hour to avoid overheating.
4. Monitor the tank regularly during winter season especially the heater.
5. Do not spray insecticide near the tank
6. Assure sufficient light
7. Check air connectivity to the tank
8. Remove dead animals from the tank immediately
9. Use magnetic cleaner
10. Use chlorine free water always.

Reference

Venugopalan, K. M. ***Aquarium Making and Maintenance*****.** Manual published for Winter School on Technological Advances in Mariculture for Production Enhancement and Sustainability**.** Central Marine Fisheries Research Institute, Kochi.

Photo/Plates Courtesy:

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