

INTRODUCTION: -

M.Sc. in Zoology programme intended to develop a learning and understanding the basic theories and principles of ecology, animal anatomy, life processing, marine biology etc.

During the third semester our university has cluster system such as life processing, wildlife biology and aquaculture. So, under this cluster system we had to go for one month internship based on which cluster you had selected. We some students of aquaculture cluster had gone to Madgaon for internship to work under Entrepreneur Mr. Edgar Baptista.

Aquaculture is the controlled cultivation of aquatic organisms such as fish, crustaceans, molluscs, algae and other organisms of value such as aquatic plants (e.g. lotus). Aquaculture involves cultivating freshwater, brackish water and saltwater populations under controlled or semi-natural conditions, and can be contrasted with commercial fishing, which is the harvesting of wild fish.

Aquaculture can be conducted in completely artificial facilities built on land (onshore aquaculture), as in the case of fish

tank, ponds, aquaponics or raceways, where the living conditions rely on human control such as water quality (oxygen), feed, temperature.

Alternatively, they can be conducted on well-sheltered shallow waters nearshore of a body of water (inshore aquaculture), where the cultivated species are subjected to a relatively more naturalistic environments; or on fenced/enclosed sections of open water away from the shore where the species are either cultured in cages, racks or bags, and are exposed to more diverse natural conditions such as water currents, diel vertical migration and nutrient cycles.

Farming implies some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated. The reported output from global aquaculture operations in 2019 was over 120 million tonnes valued at US\$274 billion. Further, in current aquaculture practice, products from several kilograms of wild fish are used to produce one kilogram of a piscivorous fish like salmon. Plant and insect-based

feeds are also being developed to help reduce wild fish been used for aquaculture feed. Particular kinds of aquaculture include fish farming, shrimp farming, oyster farming, mariculture, pisciculture, algaculture (such as seaweed farming), and the cultivation of ornamental fish. Aquaculture is also one of the world's most efficient and sustainable methods to produce high-quality protein. The industry has low carbon footprint and feed conversion ratio (FCR) as well as high protein and energy retention.

Sir Mr. Edgar Baptista is an entrepreneur who has an idea to start his own business .He used to live in abroad but during pandemic he came back to his hometown Goa .He was having interest in fishes from his childhood, when he scored good marks in S.S.C examination his mother asked him what u want as a gift so he said he want a fish tank and his mother had built a cement tank at their home that tank is still there at sir's home with fishes in it.

When sir come back home during pandemic, he had setup some tanks at home instead of seating vacant he tried new experiment related to aquaculture. He had build a huge pond in his farm in which he had a different freshwater fishes. When he started getting profit out of this, he thought why to work under someone when this business from aquaculture is much more sufficient to raise his family. So, he tried different ways related to fishes. He had breed different ornamental fishes such as Platy, Swordtail, Guppy, Tuxedo molly and many more. He had reared different fishes such as Pearl spot, Sea bass, Tilapia, Catfish.

In spite of several risk in this field sir had overcome all this hurdles and achieved all he desire. In starting he had faced major losses but he had recovered all those losses in recent time. From having his own fish tank to having his own fish farm. From breeding ornamental fishes to breeding sea bass. From selling the fishes for hobby purpose to selling for commercial purpose. Having no knowledge in science background to learn on his own through internet and through his own experiences Sir Mr. Edgar has entered the world of entrepreneurship dealing with all risk factors, profit and loss.

So, there is a saying that **"IF THERE IS A WILL THERE'S A WAY"**.

"EXPERIENCE IS THE BEST TEACHER."

So, until and unless you try something, stay positive in any worse situation and if u don't have any interest in what you are doing there is no way to succeed.

THINGS WE HAD DONE FOR OUR INTERNSHIP

1. • SETTING UP TANK
2. • AQUAPONICS
3. • BREEDING OF BETA FISH
4. • CLEANING TANKS
5. • ORNAMENTAL FISHES
6. • TYPES OF AQUATIC PLANTS
7. • FISH POND
8. • FISH TANK SET UP AT OUR HOME

1. Setting up tank

In general, when we set a glass tank, we will buy glass tank then we will rinse that tank with warm water to get rid of any dust particles. Then we will it at one place then we will fill that tank with water add some gravels and aquatic plants. Add filter, heater then when water is normalised for fish you will add fishes in it.

But during our internship we had learnt how to set up a tank of cement, to make a small cement fish tank.

So first we had taken a cement vase, then had filled the cement vase with water and kept it for two days so that access of cement particles should come.

Then after two days we had thrown that water out and had filled that with new fresh stored water and in that vase, we had kept a pot inside that vase with copper coin plant planted in it. Then we had introduced some guppy in that tank.

This way of making aquarium with cement is affordable rather than purchasing those glass aquarium as it is costly and we need to change the water frequently whereas in cement tank there is no need to change the water. The tank we had observed at our internship place was not clean for more than two months but all the fishes were doing well mortality rate was very less. But if it was a glass tank and if we had not cleaned that tank for 2 months then all the fishes would have died.



2. Aquaponics

Aquaponics is a food production system that combine aquaculture

(raising aquatic animals such as fish, crayfish, snails or prawns in tanks) with hydroponics (cultivating plants in water) whereby the nutrient-rich aquaculture water is fed to hydroponically grown plants.

As existing hydroponic and aquaculture farming techniques form the basis of all aquaponic systems, the size, complexity, and types of foods grown in an aquaponic system can vary as much as any system found in either distinct farming discipline.

Following are the important component require for aquaponics set up: -

Rearing tank: the tanks for raising and feeding the fish;

Settling basin: a unit for catching uneaten food and detached biofilms, and for settling out fine particulates;

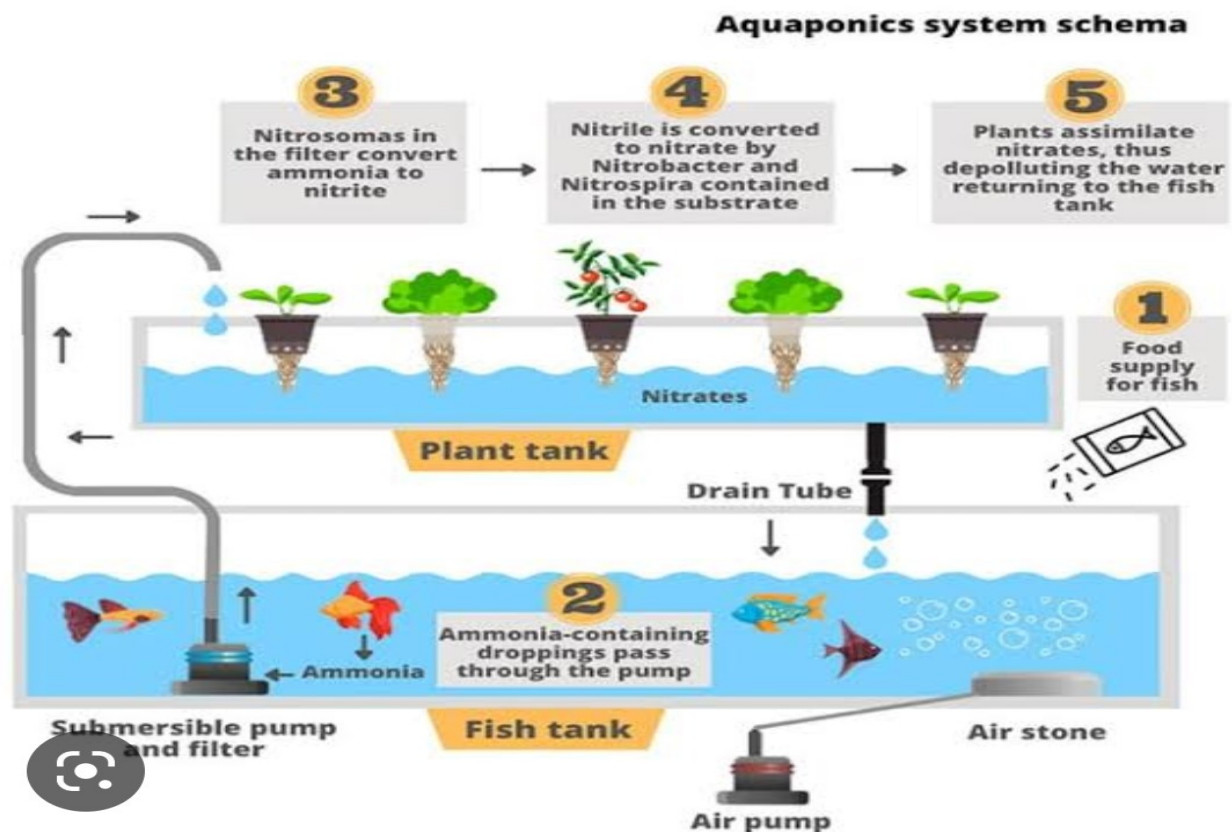
Biofilter: a place where the nitrification bacteria can grow and convert ammonia into nitrates, which are usable by the plants;[18]

Hydroponics subsystem: the portion of the system where plants are grown by absorbing excess nutrients from the water;

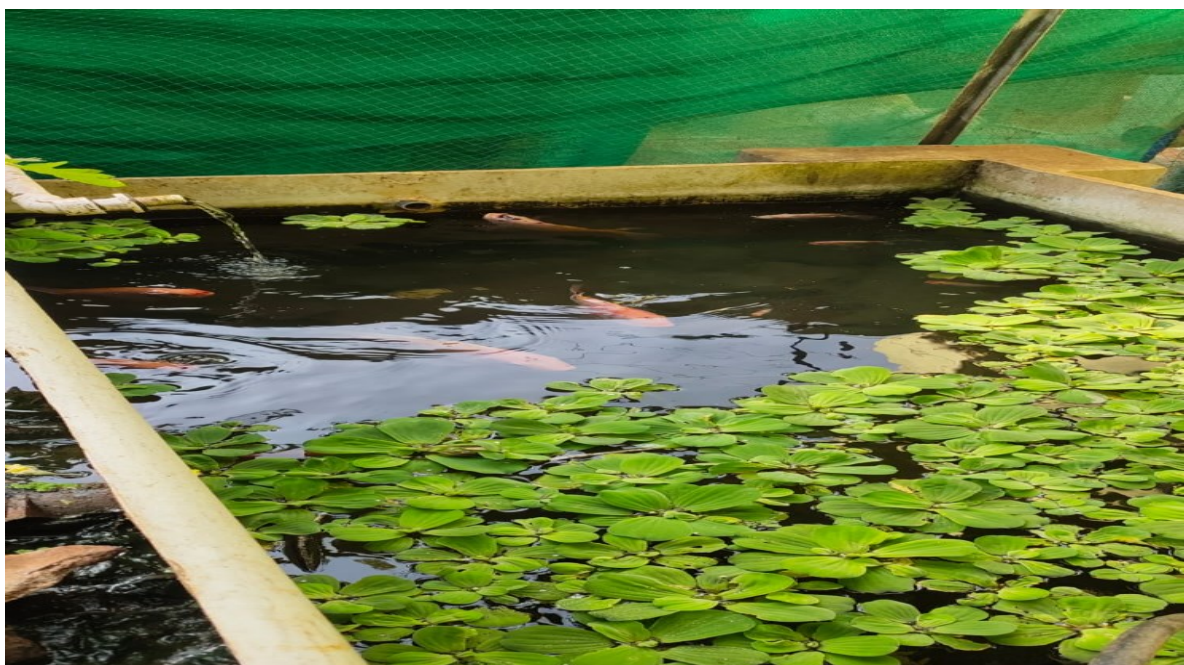
Sump: the lowest point in the system where the water flows to and from which it is pumped back to the rearing tanks.

Although pesticides can normally be used to take care of insects on crops, in an aquaponic system the use of pesticides would threaten the fish ecosystem. On the other hand, if the fish acquire parasites or diseases, therapeutants cannot be used as the plants would absorb them. In order to maintain the symbiotic relationship between the plants and the fish, non-chemical methods such as **traps, physical barriers and biological control (such as parasitic wasps/ladybugs to control white flies/aphids)** should be used to control pests. The most effective organic pesticide is Neem oil, but only in small quantities to minimize spill over fish's water. Commercialization of aquaponics is often stalled by bottlenecks in pest and disease management. The use of chemical control methods is highly complicated for all systems. While insecticides and herbicides are replaceable by well-established commercial biocontrol measures, fungicides and nematicides are still relevant in aquaponics. Monitoring and cultural control are the first approaches to contain

pest population. Biological controls, in general, are adaptable to a larger extent. Non-chemical prophylactic measures are highly proficient for pest and disease prevention in all designs.



At Edgar sir house and farm there were aquaponics set up. He had used radon tank. So here is an image



In this aquaponics setup sir had build the cement tank and filter is made from radon material the plant that are present are tomato plant , ridge gourd plant and in fish tank he had Red Tilapia.

We also had setup aquaponic with the help of sir at sir's farm by using Radon material tank. So here is an image of a tank that we had set up at farm.



3. Breeding of Betta fish

For breeding we require a male and female Betta fish. So first we had set a tank for male betta fish i.e. a amul bowl in that we had kept the male for two days till he produces a bubble nest huge one which shows that he is ready to mate. Then we had selected a female betta fish and put in a small bowl but with a cutted plastic bottle open on both the end so that the male doesnot harm the female and he is familiar with her.

If the initial discovery goes well, and you're confident that your bettas are interested in each other, you can remove the divider and let the male and female meet properly. After they meet, there's a sequence of events that should happen to culminate in successful breeding. Keep a close eye on your bettas in case the male gets too aggressive.

- The female will swim over to the bubble nest to inspect it. If she's pleased with the male's efforts, the courtship will begin
- The male will begin to chase the female around the tank. This can go on for a few hours
- The pair will swim side by side, flaring their fins at each other. This is where the male can get aggressive — if the female doesn't respond, he may bite and nip at her.

. The male's color will darken and he will flare his fins, indicating that he's interested in the female. The female will display interest in the male — her color will darken and she'll display vertical stripes across her body. These stripes indicate that she's ready to breed.

While your bettas are courting, you shouldn't feed them.

To breed, the male betta turns the female upside down and holds her close, so that he can fertilize the eggs as she lays them. The eggs sink to the bottom of the tank, and the male scoops them up and takes them to the bubble nest.

It often takes a few of these embraces before the female starts to lay eggs. It's important to note that the female will likely lie on her side and look ill and lifeless while she's laying the eggs. You can expect around 30–40 eggs to be laid, but some bettas can lay hundreds.

Once the mating is over and all the eggs are laid, the male should let go of the female and start busily taking the eggs to the bubble nest. Now it's time to remove the female.

Courtship is an exhausting process, and there's a chance that your female betta could have been injured. The male sometimes attacks the female after breeding, seeing her as a threat to the eggs. In fact, the male could be right — some females do eat their own eggs. The male is the one who cares for the eggs, so there's no need for the female to stay in the tank.

It's important to keep the tank warm and humid. The best way to do this is by wrapping plastic wrap around the tank and keeping it in a warm environment.

After around 36 hours, the fry will start to wriggle out of their bubble nests. It's too soon for them to hatch, and the male betta will catch them and put them back in the nest. During this time, the male betta will hang around beneath the bubble nest, keeping an eye on his young.

The betta fry should hatch after around four days. They will then be ready for their first feed. Fry feed can be used as a dried egg. The male betta's work is done. At this point, it's best to take him out of the tank, as he might try and eat his children now that they've hatched.

The survival chances of betta fishes fry are very less upto 20 percent.



Introduced male in tank



Male preparing bubble



Female introduce in the tank



Male showing courtship



Male going after female



Male turn upside down female to fertilise the egg



Hatched egg
Pic. From internet

4. Cleaning tanks

We had clean 3 big tanks and 3 small tanks. We had not completely removed the water from the big tanks but use a suction pump to sucks out all the dirt which has been settle down. The tanks were not cleaned for last 3 month so the fish excreta was so much. The water which we had removed from the tank was driven at the root's of trees. While cleaning the small tank we had transferred the fishes into another tank, all water was thrown and was washed with help coconut husk.

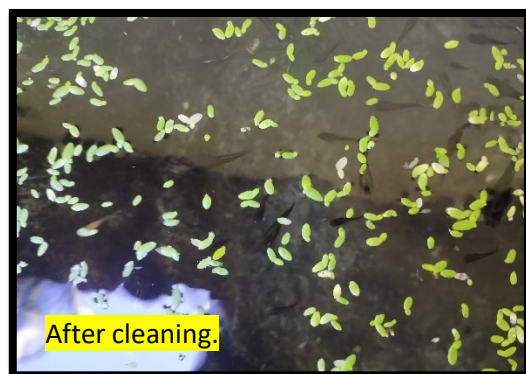
Here are some images while cleaning the tank.



Cleaning of big tank. It is aquaponic setup. Removing the dirt from the tank with help of pump.



While cleaning upper part of the tank



5. Ornamental fishes

Ornamental fish culture is the culture of attractive, colourful fishes of various characteristics, which are reared in a confined aquatic system.

At Edgar sir house there were different ornamental fishes such as

- Guppy: - five – six different types of guppies were present. Rounded tail, Lyre tail, triangular tail, flag tail, forked tail guppies
- Platy: - different es of platy were gold red platy, Dalmatian platy, mickey mouse platy
- Molly: - common black molly, tuxedo molly.
- Swordtail: - orange swordtail, red eye swordtail, asserted swordtail.
- Fighter fish:- halfmoon betta, double tail betta.

Other fishes included are Red Tilapia, Tilapia, Sea bass, Pearl spot, cat fish, ker etc.



6. Types of aquatic plants



Copper Coin plant



Water lettuce /water rose



Azolla



Duckweed



Water wheel plant



Java moss

7. FISH POND

Although there are many kinds of fish ponds, the following are the main features and structures associated with them in general:

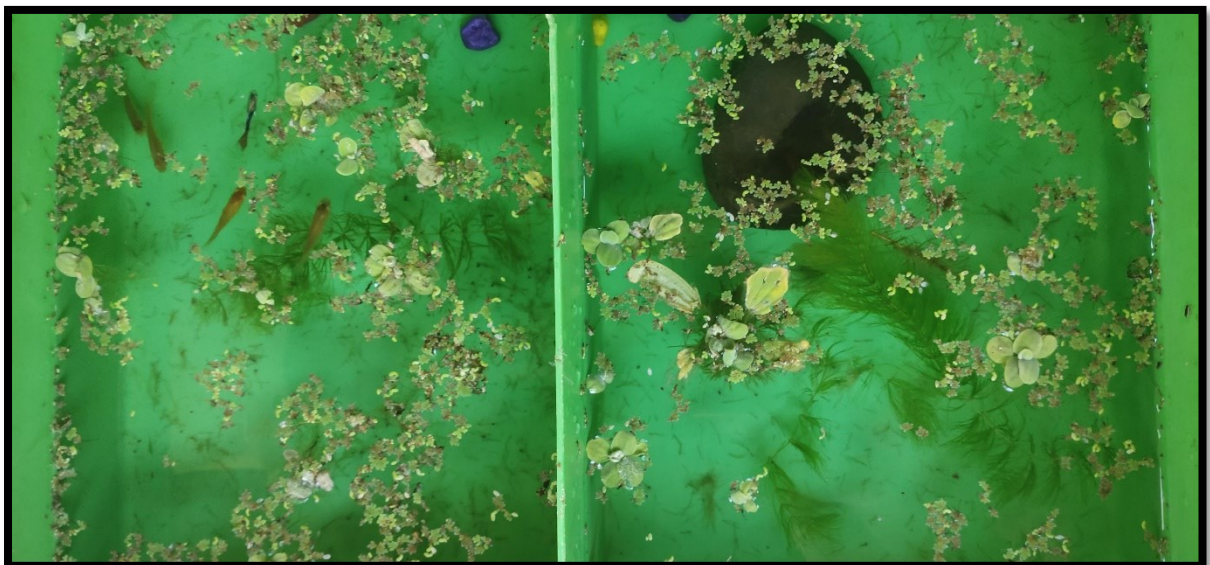
- **pond walls or dikes**, which hold in the water;
- **pipes or channels**, which carry water into or away from the ponds;
- **water controls**, which control the level of water, the flow of water through the pond, or both;
- **tracks and roadways** along the pond wall, for access to the pond;
- **harvesting facilities** and other equipment for the management of water and fish. Sir had built his ponds in the farm by digging tone



8. Small fish tank set up at our home

So according to the guidance of the sir and knowledge which we had gained during our internship we had set up small tank at our home. Also we had breed some fishes at our home.

Guppy and swordtail from fish tank had also given birth. Guppy had given 21 baby and swordtail had given 10 baby. While others are gravid. So here is an image .



Conclusion

During this period of internship I had learnt several things. First is that everything happens for good. Through this internship I had gained so much knowledge plus hands-on experiences. How this aquaculture can help u to earn money with little amount of Investment. Get to see live example of aquaponics got a chance to setup an aquaponics. Also got to learn breeding of different fishes. In every business profit and loss is there similarly every business has risk factor taking the chance and going forward is the main thing and learning through your failure is actual learning. If you have the interest then anything is possible.

All's well that Ends well.

