Exploring the Depths of Aquascaping Techniques Vivarium

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ABSTRACT:
The main aim of this project is to explain, through scientific research, nature's forms or the various activities in organisms and the hidden entities behind them by observing and controlling the biodiversity of different environments. The fauna and flora of the vivarium are dependent on each other. Decomposers live in the mud and aid in decomposition. It also has direct application in the field of education. Through this, the teacher can give his students an idea about the ecosystem. Students are also encouraged to create their vivariums and collect different plants for them. Saving it is more difficult than building a vivarium. And while doing this, we have to control everything from the nitrogen cycle to the pH value of water. At the same time, we have to control airflow, bacteria, fertilizer, macrophytes, temperature, humidity, light, lighting hour, soil, sand, etc. If the quality of any one of its elements is slightly reduced or decreased, then the whole ecosystem is affected. A vivarium owner must be nature-loving, careful, affectionate, sensitive, and caring. It teaches us that bacteria are of particular importance in the vivarium. Inert elements include water, light, carbon dioxide (CO2), oxygen (O2), calcium (Ca), phosphorus (P), etc. By controlling any one of these components of an ecosystem, the entire biodiversity can be controlled. Nothing can be better than this to directly understand biodiversity. Research on plants and various animals is required to enjoy the beauty of nature.
Keywords: moss, plants, aquarium, crab, grow light.

INTRODUCTION:

A vivarium (Fig. 1) is an ecosystem, a part of nature that helps to know nature [6]. Through it, we can perceive nature. Along with this, it enhances the beauty of the home and office. Its beauty encourages critical thinking. To enjoy the beauty of nature, one needs to interact with nature's various creations, but in the hustle and bustle of the city, only a vivarium or such a small ecosystem can be an alternative. It is believed that the idea of creating such a dwarf form of nature was first conceived by Chinese monks more than 300 years ago, inspired by the Five Agent Theory. They kept different big trees artificially in the form of bonsai only on rocks. Then, in the first half of the 18th century (around 1856), the term vivarium originated in ancient Rome; later, in the 19th century, it was known as an artificial ecosystem [3].

Fig. 1- vivarium ecosystem

MATERIAL AND METHOD

There are no specific rules for creating a vivarium. It is a small form of nature, but we have to keep some things in mind. Such as-

1. Low-light and high-light plants cannot be kept at the same time.

2. There should be a system of mist for plants in humid areas.

3. The plant cannot be planted before the nitrogen cycle is complete.

4. Disinfect before adding a new plant.

Ferns, orchids, and mosses are examples of epiphytes that thrive in damp environments. Flowing plants, java mosses, and other plants are examples of aquatic plants. They help fish

reproduce and keep the water's oxygen levels stable. The warm environment of the vivarium is ideal for bog plants. Pitcher plants, sundews, and other carnivorous plant species are examples of bog plants that are carnivorous and contribute to the vivarium's diversity while controlling pests. Filling the voids in the vivarium are vines like pothos, philodendrons, and creeping figs. Covering the ground Plants proliferate quickly and cover foliage. These consist of mosses, dwarf hairgrass, and dwarf baby tears. Crabs and shrimp, so consume them.

When choosing plants for your vivariums, it's essential to consider their growth habits, light requirements, and compatibility with the other inhabitants of the setup, such as fish, amphibians, or reptiles. Additionally, regular maintenance, including pruning and fertilizing, will help keep your vivarium plants healthy and vibrant. [5]

Oxygen (O_2) is very important for all fish. That's why there should always be a flow in the floating plant and water. Fish will have a hiding place thanks to the floating plant. Floating plants help with fish reproduction. For vivarium water, it is best not to have a Ph value above 5. The pH value can be changed by the neutralization reaction.

$HCl(aq)+NaOH(aq)—NaCl(aq)+H_2O(l)$

But in this case, the temperature of the water can rise rapidly.

Grow light:

LED lights can be used for lighting (Fig .2). The wavelength will be between 425 nm to 700 nm [4]. However, if there are multiple light sources, the wavelength must be fixed. Multiple colors of light are a threat to plant growth.

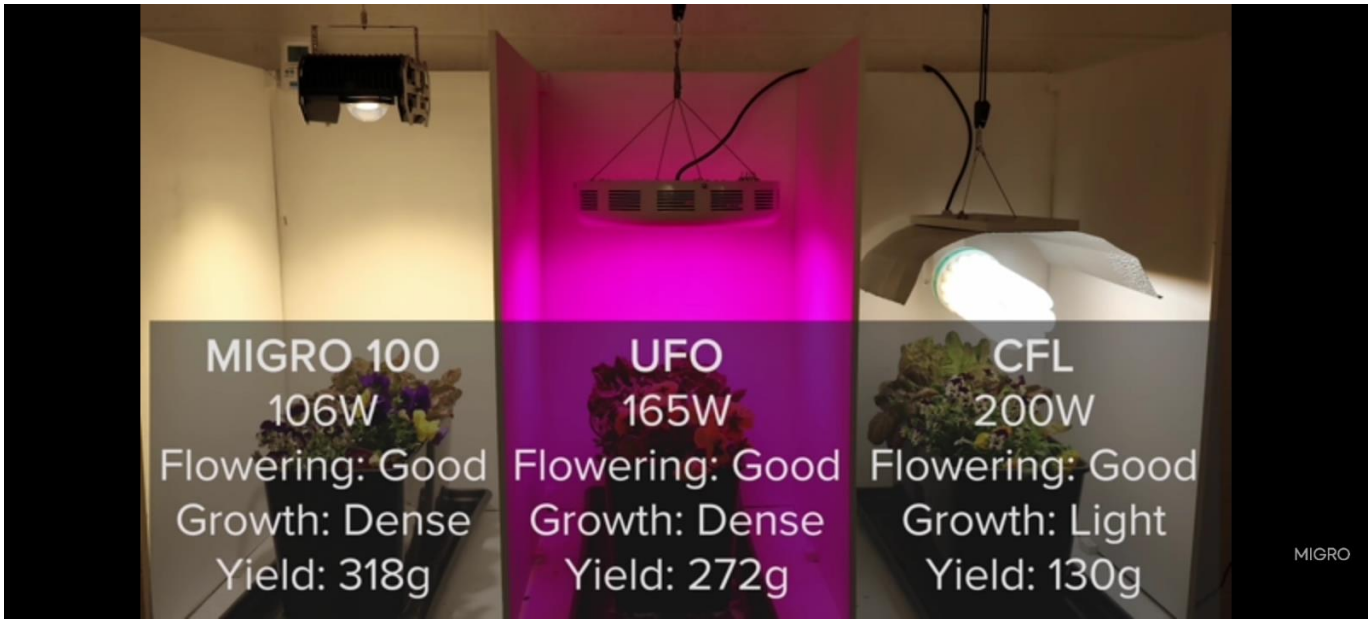

Fig. 2- types of grow lights for plants

Algae are essential to any ecosystem [7]. It shows the state of the ornamental ecosystem. Different types of algae can adapt to different environments. Such as Java Moss, Fern Moss, Christmas Moss, etc. Java moss is good for aquatic ecosystems, and fern moss is good for terrestrial ecosystems. Christmas moss is sensitive but does well in the winter.

PLANT	PLANT TYPE	ENVIRONMENT AND HUMIDITY	Best LUX	LIGHTING HOUR	FERTILIZER and Nutrients
Moss and Covering Plants	Low light	Very Cloudy and 70%+ relative humidity	400-800	7-11h	Nitrogen and Phosphorus

Aquatic Plant	Medium Light	Overcast 60-75% humidity	2000-4000	8-10h	Phosphorus, Magnesium, Calcium, Chlorine and Nickel
Bog Plant	High Light	Very Cloudy and 40%+ relative humidity	4500-6000	8-10h	Zinc, Molybdenum, Copper, and compost
Flower	Direct Sun	Sun Light and 10-30% humidity	7000+	12h	Micronutrient fertilizers, Zinc and Organic fertilizers
Aggressive Vegetative	Medium Light	Daylight and 50-60% humidity	2000-3000	12-15h	Organic fertilizers
Floating Plant	Medium Light	Overcast and 60-70 % humidity	1500-2000	10-15h	Organic fertilizers and Calcium, Sulfur

All requirements for plants

RESULTS AND DISCUSSIONS:

For making vivariums, some style is followed, and certain plants are used that are again brought from other countries. Therefore, it is difficult to save the artificial ecosystem. As a result, newcomers are not interested. But we can collect plants from the ecosystem of our country. Which is relatively easy to control. However, there are some deep-rooted ideas in society. But that is completely wrong.

In Asian countries like Bangladesh, India, and Pakistan, where the climate changes rapidly, it is really difficult to save the artificial ecosystem. However, the demand for artificial ecosystems is increasing in these countries. This proves that people are encouraged to do critical thinking.

The best way to know nature is to make and observe a vivarium. Every student should make one, even on a small scale. As a result, they will know how beautiful and complex nature is, and seeing this complexity, they will believe in the Creator.

CONCLUSIONS:

Many virtues are created by controlling artificial ecosystems, but humans are indifferent to them. They think it is just beauty. There is no point in buying a vivarium. It is known after years of research. The most important point of this paper is that if one wants to experience the beauty of nature, he should build a vivarium himself.

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