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IMPORTANCE OF HYDROPONICS AND AEROPONICS

Shweta Soni[1], G. Pradeep Kumar[2] and Govind Vishwakarma[3*]

[1]Assistant professor, Department of Vegetable Science, BUAT, Banda (U.P.)-210001

[2] Assistant professor, Department of Agriculture, Bhagwant University, Ajmer, Rajasthan-305004

[3]Assistant professor, Department of Horticulture, DCAST, Selaqui, Dehradun (U.K.)-248011

***Corresponding:** govind0139@gmail.com

❖ Introduction

It is the subset of hydro culture in which plants are grown without soil, using substitutes like mineral nutrition solutions in water solvent. Or it is a type of gardening, in which plants are grown in water instead of soil. Mineral solutions are added to the water to help them survive. Many types of plants will grow in a hydroponic set-up.

The technology Hydroponics and Aeroponics plays very crucial role in 21st century in soilless culture in commercial food production. The main principle involving the use of sprayers, nebulizers, foggers to create a fine mist of solution of deliver nutrients to plant roots. Both hydroponics and Aeroponics are alternative forms of gardening that do not use soil as a medium for growth. The main difference between the two is that hydroponics uses water instead of soil as a growing medium, and aeroponics does not use either. Because aeroponics and hydroponics have a lot of similarities, the two terms are often used together and often mistaken for the same thing.

♣ Important Steps to be Consider

- Seedlings are usually started in a smaller version of soil, such as perlite or clay pebbles.
- Then, the developed seedlings are transferred to a hydroponic container with water.
- The containers are kept in a room or container where the lighting, temperature and humidity are controlled.

♣ Importance of Hydroponics

- They are space savers
- Effectively using of plant nutrients
- Hydroponics are water efficient
- There will be No weeds, fewer pests, and Plant diseases
- We can produce stable and high yields than normal once
- There will be a control on whole system
- Choosing of growing media is easy and fast sterilization
- Transplantation is easy process
- Through hydroponics crops are grown all around the year

♣ Advantages

- It’s a soilless culture
- Better using of space and location
- Controlled climatic conditions
- Hydroponics are water savers (only 10% of water used compared to field once)
- More effective use of nutrients

- Controlled pH solution
- Better growth rate
- There is no growing of weeds
- The pest and disease attack is very less in scale
- It savers both time and labour
    - Hydroponics is also believed as stress- relieving hobby

♣ **Challenges**

- It requires commitment and time
- Only skilled or technical people can handle it
- There is a risk in water and electricity maintaining
- There is threat in system failuring
- High investment in initial stages
- Quick spreading of Diseases and pests

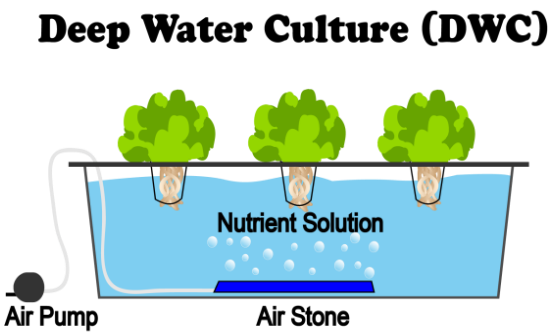
❖ **Types of Hydroponic Systems**

There are six main types of hydroponics systems:

1. Deep water culture system (DWC)
2. Nutrient film technique system (NFT)
3. Aeroponics
4. Wicking System
5. Edd and flow system
6. Drip system

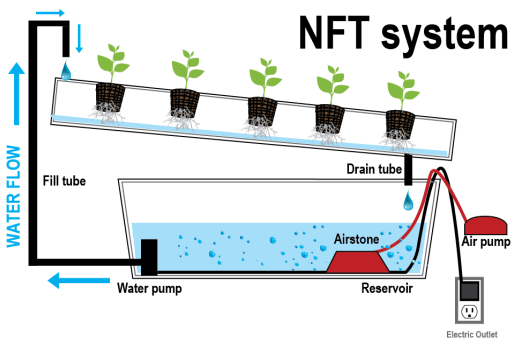
1. Deep Water Culture

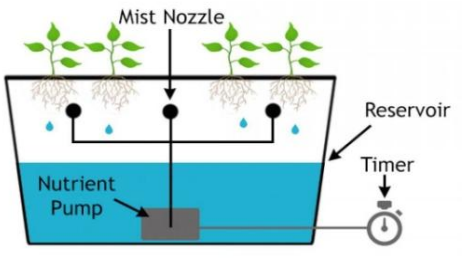
It is the easiest method of hydroponics. it is also known as reservoir method. Cause in this system we use a reservoir to hold a nutrient solution. The roots of plant are suspended in the solution so they get a constant supply of water, oxygen, and nutrients. Water is oxygenated by using air pump through air stone to pump as bubbles.



2. Nutrient Film Technique

In 1960s Dr. Allen cooper developed the NFT technique and it also became standard practice to hydroponic cultivation. It is type of system where a continuous flow of nutrient solution runs over the plant roots the nutrient solution flow by force of gravity. This NFT is also known as gutter NFT. The plant roots absorb more oxygen from air than from the nutrient solution itself the roots are in contact.





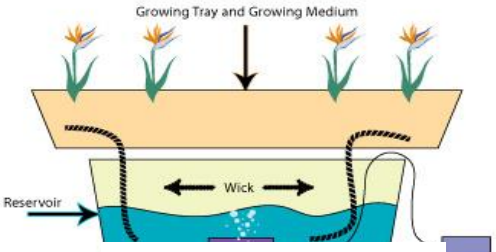
3. Aeroponics-

Aeroponics is a method of hydroponics by which the roots are misted with a nutrient solution while suspended in the air. There are two primary methods to get the solution to exposed roots:

1. High pressure system
2. Low pressure system

4. Wicking system

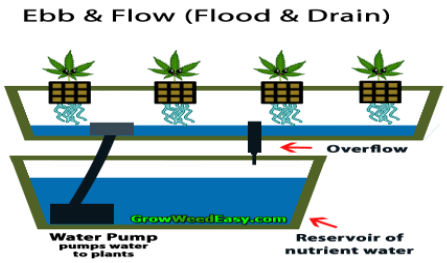
It is the most basic type of hydro system you can build. Wicking is one of the easiest and lowest costing methods of hydroponics. The concept in wickling is that using materials like as cotton that is surrounded by a growing medium with one of the wick material placed in the nutrient solution.



Wicking system

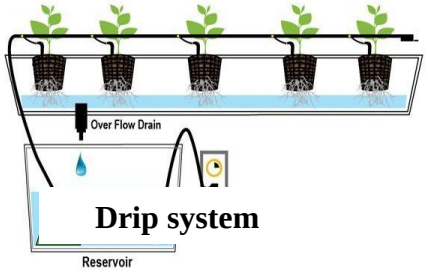
5. Ebb and Flow system

This Edd & Flow hydroponic system is ideal for plants that are accustomed to periods of dryness. This type of system functions by flooding the growing area with the nutrient solution at a specific interval. The nutrient solution then slowly drains back into the reservoir the pump hooked to a timer so the process repeats itself at a specific interval so that the plants get the desired amount of nutrients. It is also known as flood and drain system. In this system the roots of plants are not exposing to nutrient solution on a constant basis.



6.Drip system

Drip systems are extremely common in commercial operations but less common in recreational gardens. A hydroponic drip system is rather simple. It works by providing a slow feed of nutrients solutions to the hydroponics medium .it can also have fastened by draining medium, but have to use a faster dripping emitter.



Drip system

Aeroponics

The word "**Aeroponics**" is derived from the Greek meanings of aer "air" and ponos "labour". Aeroponics is an indoor gardening practice in which plants are grown and nourished by suspending their root structures in air and regularly spraying them with a nutrient and water solution. Soil is not used for aeroponics. It is the process of growing plants in an air or mist environment without the use of soil or an aggregate medium.

Aeroponics is a relatively new way of growing plants that is getting increasingly popular with many people because of the speed, cost, and novelty. Aeroponics only came about during the 1940s. It is one of the best ways to grow plants in a soil-free environment, with the exception of hydroponics. Compared to hydroponics, aeroponics have more control

over the root system than hydroponic, because in this don't even need to immerse the roots in any liquid. This makes your aeroponics nursery "mobile." Aeroponics uses a small internal micro jet spray that sprays the roots with fine, high pressure mist containing nutrient rich solutions. Because the roots are exposed to more oxygen, the plant tends to grow faster. It is also easier to administer all sorts of nutrients to the plant, via the root system.

Importance of Aeroponics

- Direct providing of nutrients to plant roots
- Aeroponics conserves water
- Moisture level is controlled in this method
- It can be combined with hydroponics
- Crops are easier to harvest in the absence of soil
- No labour requirement by making automation
- Production of high quality food in controlled environment
- The pest and disease infestation are reduced through controlled environment maintenance
- No need of immersing roots in water which helps in more control
- Production of more food with less effort

There are two types of Aeroponics Systems:

1. High pressure system
2. Low pressure system

1. High pressure Aeroponic Systems (True aeroponic systems)

While the low pressure systems are the most common, high pressure aeroponic systems are the "true aeroponic" systems. That's because it takes the higher pressure (60-90 psi) to properly atomize the water into a fine mist with a very small water droplet size. This fine mist allows the roots to get a lot more oxygen than in low pressure systems. However, it's more complicated and expensive to build a high pressure aeroponic system.

2. Low pressure Aeroponic Systems (Soakaponics)

Also termed "Soakaponics" low pressure Aeroponic systems are what most people are familiar with when they think of aeroponics. That's mainly because most all aeroponic systems sold at stores selling hydroponics supplies are low pressure systems. While the low pressure systems work very nicely, the large water droplet size is much different than in the high pressure systems. The main reason the low pressure aeroponic systems are so popular is that they don't require much more in the way of cost or special equipment than other types of hydroponic systems. The simplicity and low cost of low pressure systems makes this type of aeroponic system very attractive to many home growers.

Disadvantages

- Dependence totally on the system.
- Skilled persons and technical knowledge is required.
- Regular cleaning of the root chamber.
- High investments and maintenance.

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