

## Understanding Hydroponics and Its Scope in India

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### **Abstract:**

Every plant needs different type of soil for its growth. Some heavy water requiring plants need clay soil, some need sandy soil where standing water can get easily drained out. This demand automatically restricts the diversification of cultivation i.e. only limited amount and limited type of crop can be produced in an area. So, the situation where this varietal need of soil type can be eliminated even without compromising on the crop's need of nutrients, minerals water etc. can be described as Hydroponics. There are 6 basic types of hydroponic systems; Wick, Water Culture, Ebb and Flow (Flood & Drain), Drip (recovery or non-recovery), N.F.T. (Nutrient Film Technique) and Aeroponic. Hydroponics farming in India is in its rising stage. Now-a-days, in India, the progressively thinking farmers are adopting this innovative and inventive farming technique. Here the plants are totally depended upon the artificially created system. Some success stories of hydroponics farming can be considered as the confidence booster of any grower who is willing to set up this innovative hydroponic system.

### **Introduction:**

From the ancient time plants are been grown in soil where the plants happen to get all the necessary nutrients, minerals and water from the soil. Every plat needs different type of soil for its growth. Some heavy water requiring plants need clay soil, some need sandy soil where standing water can get easily drained out. Even some plants want loamy soil which is neither water holding nor water draining. Therefore, this demand automatically restricts the diversification of cultivation i.e. only limited amount and limited type of crop can be produced in an area. So, the situation where this varietal need of soil type can be eliminated

even without compromising on the crop's need of nutrients, minerals water etc. can be described as Hydroponics.

Hydroponics is a type of Horticulture and a part of hydroculture, which implies growing plants without soil where mineral nutrient solutions in a water solvent are used. Hydroponics is a Greek term, made from two words - *Hydro* means water and *Ponos* means labor. Thus "working water" is the true meaning.



Hydroponics operates on the premise that if you can provide with what they need; plants will grow well. In this sense, Hydroponics is invented to rule out the influence of Mother Nature - It can be placed in a controlled growing environment. Hydroponics replaces the soil with water and the growing media

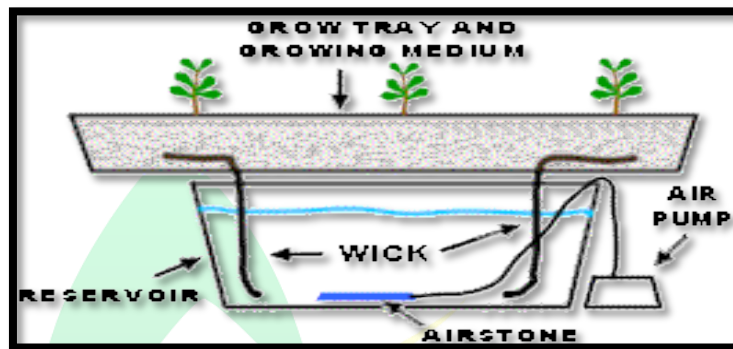
Hydroponics operates on the premise that if you can provide with what they need; plants will grow well. In this sense, Hydroponics is invented to rule out the influence of Mother Nature - It can be placed in a controlled growing environment. Hydroponics replaces the soil with water and the growing media. The growing media can be Perlite, sand, Rockwool, etc. Their main role is to transfer the nutrients in the water and keep the roots oxygenated. Nutrients are added to the water and are moved to the growing media and through the plant roots usually by a water pump. The interval of each action is often set by a timer.

Hydroponics is usually grown indoors or in a greenhouse. This means growers will take full management of the environment - climate, temperature, lights, ventilation, and so on.

### **Types of Hydroponic Systems:**

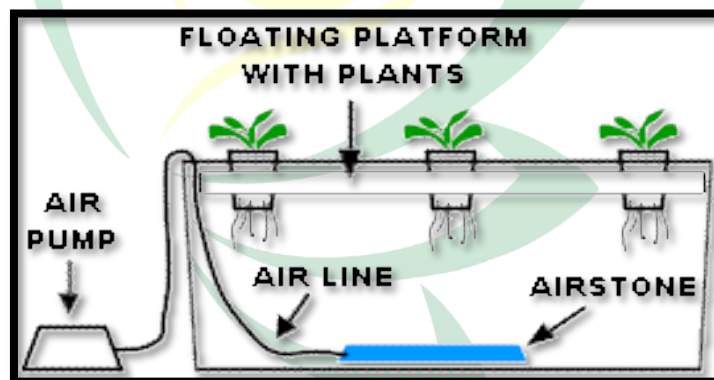
#### **WICK SYSTEM:**

The Wick system is a simple type of system. There are no moving parts in this passive system. The wick is used to draw the nutrient from the reservoir solution into the growing medium. Perlite, Vermiculite, Pro-Mix and Coconut Fiber are the most popular growing mediums which are used in this system.



### **WATER CULTURE:**

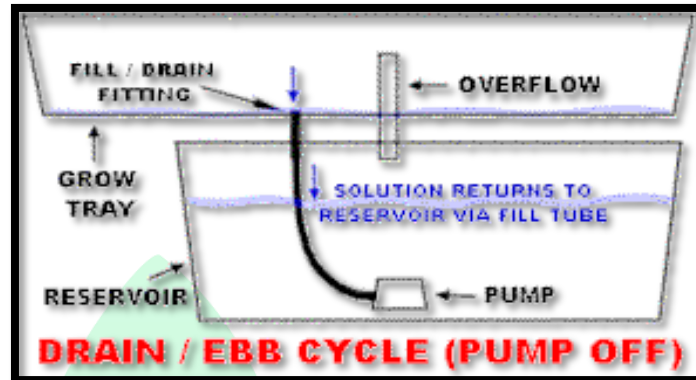
The water culture system is the simplest of all active systems. A floating platform is used to hold the plants directly on the nutrient solution. This platform is usually made of Styrofoam. Oxygen is supplied to the roots of the plants. Here an air pump is used to pump air to the air stone so that bubbles are formed in the nutrient solution. This system is used for fast growing water loving plants like lettuce.



### **EBB & FLOW – (FLOOD AND DRAIN):**

In this system the growing tray is flooded with the nutrient solution and then drained back into the reservoir. A submerged pump with timer is used for this action. The timer is used to turn the pump on so that the nutrient solution reaches to the grow tray. When the timer shuts the pump down, the solution comes back into the reservoir. It depends on the type and size of

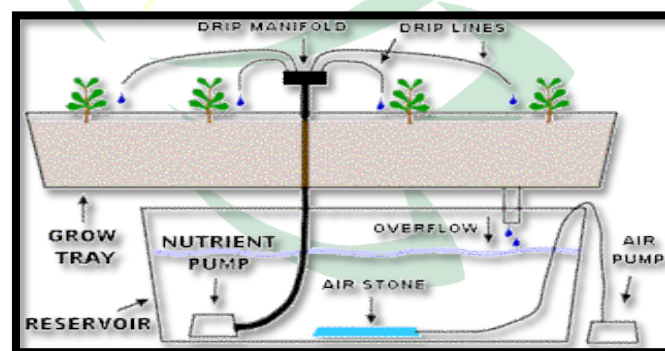
plants that how many times the timer will come in a day. Temperature and humidity and the type of growing medium are other factors too.



### DRIP SYSTEMS - RECOVERY / NON-RECOVERY:

Drip system is widely used system in the world. A submersed pump is controlled by a timer. The nutrient solution is dripped onto the base of each plant by a small drip line when the timer puts the pump on. In a Recovery Drip System, if there is excess solution then the runoff comes back in the reservoir for using again.

As excess solution is reused, a more inexpensive timer can be used because a recovery system can avoid precise control of the watering cycles. But the non-recovery system needs proper timer because watering cycles should be adjusted to give the plants enough nutrient solution and the runoff is minimum.

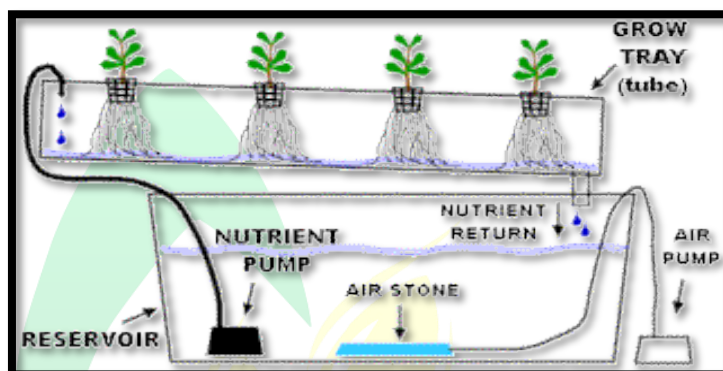


### N.F.T.(NUTRIENT FILM TECHNIQUE):

N.F.T. systems ensure constant flow of nutrient solution, so the submersible pump is not connected with any timer. The growing tray (usually a tube) is filled with the nutrient

solution through the pump and the solution flows over the plant roots. Then collected back into the reservoir.

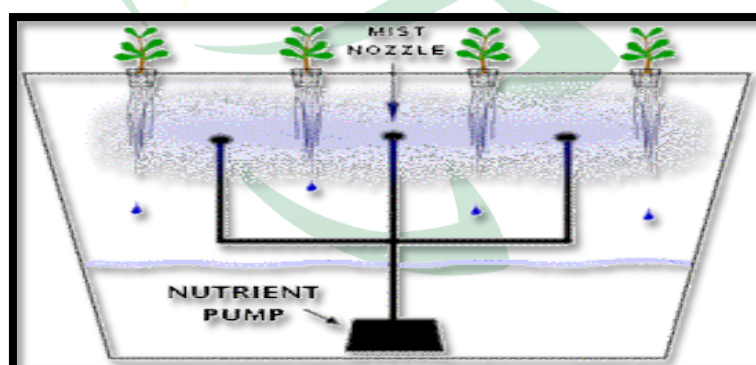
Air is normally used as growing medium to save the extra cost of replacing the medium after every crop. Normally a small plastic basket is used to support where the roots dangle into the nutrient solution.



### **AEROPONIC:**

The aeroponic system is a high-tech type hydroponic system. Air is used as growing medium primarily like N.F.T. The plant roots hang in the air and are misted with nutrient solution. If the misting cycles are interrupted the roots would dry up because they are exposed in the air.

The nutrient pump is controlled by a timer here like other systems, but in this system a short cycle timer is required where the pump is run every couple of minutes for few seconds.



### **Advantage:**

- Plants do not have to search for food in the soil rather they directly get all nutrient from the solution. All these energies will be instead consumed in its growth, and in producing fruits and flowers.

- Hydroponics saves water. This soilless growing method uses only 10% water in comparison to soil agriculture because of its efficient recirculated system.
- There is no need for soil here. The main benefits are:
  - a. Crops can be grown anywhere even in arable or heavily contaminated places. Crops are grown in all convenient locations like large scale green houses, apartments, terraces etc. So, a large portion of land can be saved.
  - b. In this system all kinds of soil related pests and diseases can be avoided.No need to worry about weed problems here.
- Effective use of nutrients. All nutrients are added to the solution, and you are 100% controlling giving the specific amounts of foods (nutrients) that plants need.



#### **Potential Downsides of Hydroponics:**

- The initial expenses are little too high because whole set up of a hydroponics system requires a greenhouse or any place like that, hydroponic air pump, timer, lights, air filters, fans, containers, growing media, nutrients etc.
- The grower needs to have enough knowledge and experience to run the system successfully depending upon the size of the system. Specific knowledge helps the grower to set up the system, maintain and monitor.
- Sometimes whole set up gets destroyed due to power outage. Here the plants are totally depended upon the artificially created system.

#### **Scope of Hydroponics in India:**

Hydroponics farming in India is in its rising stage. Farming system of India is largely traditional. So, the current market for this type of farming is narrow in metropolitan and cosmopolitan towns. Now-a-days, in India, the progressively thinking farmers are adopting this innovative and inventive farming technique.

- In India, the scope of hydroponics is very high because population size is increasing indiscriminately, so the size of the arable land reducing in availability. For this reason, it is difficult to produce staple crops for the growing population. By using hydroponics methods, the farmers can solve the problem of arable land availability in near future. This may be a start of new green revolution.
- Besides this, another significant benefit of this farming system evolution in India will mitigate the heavy load on farmers. As hydroponics farms needs less space and water and the growth rate of the crops is very quick than the traditional one. With excess food availability, there will be no struggle for hunger by farming in hydroponics system.
- The hydroponics farming will reduce pest and disease attack and the weed production. So, the use of pesticide, herbicide will be reduced. As a result, the environmental pollution and the cost of cultivation will be low.
- In Indian weather condition, agriculture is being affected by climate change like unseasonal rain, hailstorm. But in hydroponics farming system, plants can grow under controlled condition by creating the artificial atmosphere.

#### **Which type of plants we can grow?**

- Vining plants- Tomatoes, Cucumbers, Peas etc.
- Root plants- Potatoes, Carrots, Radish etc.
- Fruits- Raspberries, Strawberries, Small papaya, Pepper, Blue berries etc.
- Greens- Spinach, Cabbage, Lettuce, Celery, Mint etc.
- Herbs- Basil, Rosemary, Parsley, Watercress etc.

#### **Some success stories of hydroponics farming:**

1. Aqua Farms, Chennai: Rahul Dhoka, the founder of Green Rusk Organics and Hydroponics Farming Consultancy Aqua Farms grows everything like Italian basil, mint, spinach, lettuce by using planter made of PVC pipes.
2. Letcetra Agritech, Goa: Ajay Naik, software engineer-turned- hydroponics farmer, grows chemical-free vegetables like lettuce, salad greens, cherry tomato, bell peppers etc.

3. Urban Kissan, Hyderabad: Vihari Kanukollu, Dr. Sairam and Srinivas Chaganti establish Urban Kissan jointly, where they produce lettuce, herbs, greens, exotic vegetables throughout the year.
4. Future Farms, Chennai: Sriram Gopal, who earlier ran an IT firm, establishes the Future Farm to develop hydroponics farming, which spread over 10 states growing leafy vegetables.

**Conclusion:**

The main concern of any crop cultivation practice should include not only the profit point of view but also the environmental safety. The grower should consider that if he wants to increase the production and productivity, there would always be some consequences to compensate. Thus, he has to maintain the balance. Hydroponics is one of those underrated techniques where all these concerns can be maintained if the farmer is willing to take some initial risks and investment. So, it is clear that this is the time when our farming community should switch to modern terms and techniques from the conventional without thinking that the new is always unacceptable. It is time that the farmers should be encouraged to adopt Hydroponic system in every part of our country so that they get the exposure to explore.

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