

**2019**

# **HYDROPONIC FARMING SYSTEM**

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***Turn Potential Into Profit***



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## Introduction to Hydroponic Farming



Hydroponic farming is a method of growing plants using mineral nutrient solutions, in water, without soil. In this technique, the composition of nutrients in the liquid solution used to water the plants is regulated. Also the rate of supplying the nutrients to the plants is adjusted / controlled.

It uses the irrigation system whereby crop roots receive a balanced nutrient solution dissolved in water with all the chemical elements needed for plant growth, which can grow directly on the mineral solution, otherwise in an inert medium or substrate.

Primarily, the hydroponic farmer controls the growing environment of the plants. Although this system is highly automated but appropriate management is required to get optimal production.

### The benefits of Hydroponic Farming:

A well designed hydroponic system is characterized by less wastage of water and nutrients than soil-based farms. Both water and nutrients are fed directly to the root structure of the plants and recycled through the hydroponic system. This also eliminates the typical land and water pollution possibilities due to overland flow and runoff, respectively.

Both of the stated aspects provide great economic benefits by reducing the cost of cultivation, generating more profits and

paving the way for sustainable agricultural practices. This is of key importance in regions ranked as having extreme scarcity of water.

Likewise, the absence of the soil medium reduces the likelihood of disease which is another plus factor. Traditional farming involves the tilling and cultivation of the soil. Both of these activities are time consuming and labor-intensive prior to the actually growing season whereas in hydroponic farming, neither tilling is carried out nor soil is required which makes it quite less labor intensive and less time consuming.

Other advantages of hydroponics are the management of the density of plants and the humidity of the growing environment.

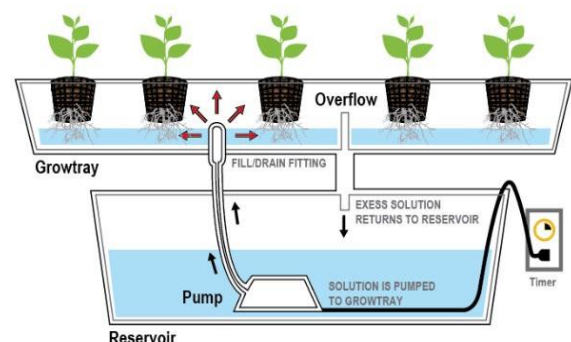
### Types of Hydroponic System:

There are different types of hydroponic systems, classified as follows:

#### 1. Hydroponic System in Liquid Medium:

These systems do not have substrates for crop development, which are produced directly on the water-bearing systems by various plants as:

- Deep Flow Hydroponics: New Growing System (NGS)
- Floating systems: Floating shelves
- Systems for water depth: Nutrient Film Technique (NFT)



## 2. Hydroponic Substrate System:

In this system, the produce is grown using inert substrates irrigated by drip irrigation, sub irrigation, or exudation. The most common substrates are Perlite, Rockwool, Coconut Fiber and Peat.

These substrates can be used in different ways and with use of following materials depending upon the availability of space and design of the farm:

- Crops benches or grooves.
- Growing up in a bag.
- Growing in individual containers or channels.
- Growing surface (sanded).



## 3. Aeroponic System:

This type of system involves growing of fruits and vegetables where the roots stay outdoors, in a container that is kept in the dark, where the nutrient solution is applied as an aerosol mist.



The use of hydroponic systems is justified in cash crops that require high control of the production process, such as greenhouse cultivation of Cucurbits, Tomatoes, Pepper and Strawberry etc.

## What to Grow in Hydroponic Farming?

Most vegetables and a number of fruits can be grown in this system.

### Leafy Vegetables

Lettuce grows well in hydroponic greenhouses, as do many other leafy greens such as chard, spinach and cabbage. In fact, any leafy vegetable can be grown in hydroponic system. Hydroponic substrate system is used for growing these vegetables.

### Vining Plants

Vining plants such as tomatoes, cucumbers and peas grow well in hydroponic conditions, as long as they have ample support. To provide support, they are wrapped around a vertically-tied string as they grow. Peppers will also grow well in a hydroponic farm. Aeroponic and Hydroponic Substrate System is widely used for production of these plants.

### Root Crops

Root crops can grow well in a hydroponic greenhouse, and they tend to grow best in a large container crossed by deep channels that allow the roots room to grow. For larger crops such as potatoes, channels must be 8 inches deep, while for smaller carrots, 3 inches depth is sufficient. Aeroponic system is widely used for production of these crops.

## Fruits

Smaller, lighter weight fruiting plants often do well in a hydroponic system. A tree can be started hydroponically, then transplanted to the soil once it outgrows its container. A particularly small fruit tree, such as a small papaya, may do well in a hydroponic greenhouse. Strawberries and raspberries make excellent hydroponic plants. Growing strawberries in an A-frame container, which essentially takes the shape of the letter "A," maximizes available space. Aeroponic system is widely used for production of fruits.

## Herbs

Basil grows exceptionally well hydroponically, and this system may dramatically increase its flavor. Chives also grow especially well hydroponically and can be planted quite densely.

Mint will grow well in a hydroponic greenhouse as well. Numerous other herbs can also be grown hydroponically, including Oregano, Rosemary, Watercress, Dill, Parsley and Sweet Marjoram. Hydroponic system based on liquid is mostly used for the growth of these herbs.

## Nutrient Requirements for Optimum Growth:

These are nutrients that plants need to absorb in large quantities. They are the most vital nutrient minerals you must take care of first. Following tables state the requirements of Nutrients, required for optimum growth of fruits, vegetables and herbs. The concentration level of Nitrogen (N), Phosphorus (P), Potassium (K), Calcium (Ca) and Magnesium (Mg) in mg/l or in (ppm) is prescribed.

### Crop

### N

### P

<i>Leafy Vegetables</i>	190	40
<i>Vining Plants</i>	200	40
<i>Root Plants</i>	190	45
<i>Fruits</i>	50	25
<i>Herbs</i>	170	45

### Crop

### K

### Ca

### Mg

<i>Leafy Vegetables</i>	310	150	45
<i>Vining Plants</i>	280	140	140
<i>Root Plants</i>	285	130	40
<i>Fruits</i>	150	65	20
<i>Herbs</i>	285	120	40

## Useful Links:

[www.smeda.org.pk](http://www.smeda.org.pk)

[www.pfa.gop.pk](http://www.pfa.gop.pk)

[www.punjab.gov.pk](http://www.punjab.gov.pk)

[www.icid.punjab.gov.pk](http://www.icid.punjab.gov.pk)

<https://agrinfobank.com.pk/hydroponic-farming-pakistan-future/>

[www.parc.gov.pk](http://www.parc.gov.pk)

[www.companylist.org](http://www.companylist.org)

[www.pakistanhydroponics.com](http://www.pakistanhydroponics.com)

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