

# Hydroponics: Soil- Less Farming, A Sustainable Agriculture System

Bindu,  
M. A. & NET in Geography  
Panjab University, Chandigarh

**ABSTRACT:** Have you ever wanted to grow your own vegetables or herbs at home but were unable to do so for lack of space? If so hydroponics gardening could be the answer you have been looking for. It basically involves growing healthy plants without the use of a traditional soil medium. Hydroponics allows plants to grow up to 50% faster than they would in soil. Also, fresh produce can be harvested from a hydroponic garden throughout the year, eliminates the need for herbicides and pesticides, reducing the constant need for a fresh water supply. The right nutrient mix combines primary nutrients (nitrogen, potassium, magnesium), secondary nutrients (calcium, sulphur, phosphorus) and micronutrients (iron, copper, manganese, zinc, molybdenum, boron). Hydroponics saves you 80 percent of irrigation water and gives you crops for 10 month of the year, more than ever, people across the world are becoming more conscious about what they are consuming and better sensitized to how the products they are consuming are being produced .In the case of soilless farming methods, it would appear that the next era of farming would be technological, in the hands of Urban residents instead of traditional Rural Farmers, and carried out in multi-storey towers of food and farming, not on soil but from soilless culture. This paper is going to underline the process of soil less farming and its need for sustainable development.

**KEYWORDS:** Soil Less Farming, Sustainable Development, Hydroponics.

**INTRODUCTION:** More than ever, people across the world are becoming more conscious about what they are consuming and better sensitised to how the products they are consuming are being produced. The demand for safe and healthy food forces food companies to devise new technologies and methods which produce healthy food for human consumption. Have you ever wanted to grow your own vegetables or herbs at home but were unable to do so for lack of space? If so, Hydroponic soil less farming could be the answer you have been looking for. HYDROPONICS technology is emerging as a revolution in the agricultural sector.

## What is Hydroponics?

The science of soil-less gardening is called hydroponics. It basically involves growing healthy plants without the use of a traditional soil medium by using a nutrient like a mineral rich water solution instead. A plant just needs select nutrients, some water, and sunlight to grow. Not only do plants grow without soil, they often grow a lot better with their roots in water instead.

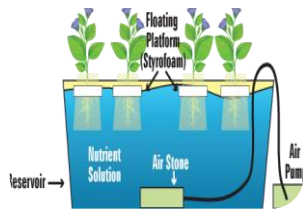


### **GROWTH MEDIUM IN HYDROPONICS:**

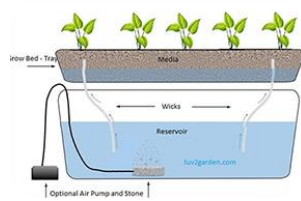
Plants with shallow roots, like leafy greens, do fine in solution cultures. On the other hand, plants with deep roots, such as beets, and heavy vegetables, such as cucumbers, do better with growth mediums such as foam, coconut husk, sponges, and peat moss.

### **THE NUTRIENT SOLUTION:**

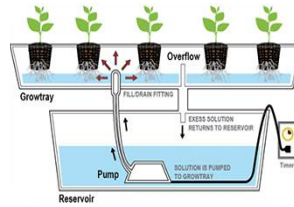
- The right nutrient mix combines primary nutrients (nitrogen, potassium, and magnesium), secondary nutrients (calcium, sulphur, phosphorus) and micronutrients (iron, copper, manganese, zinc, molybdenum, boron). Basic nutrient solution is- 25 ml of  $\text{CaNO}_3$  (calcium nitrate)
- 1.7 ml of  $\text{K}_2\text{SO}_4$  (potassium sulfate)
- 8.3 ml of  $\text{KNO}_3$  (potassium nitrate)
- 6.25 ml of  $\text{KH}_2\text{PO}_4$  (monopotassium phosphate)
- 17.5 ml of  $\text{MgSO}_4$  (magnesium sulfate)
- 2 ml of trace elements
- Store your solution in a food-grade container at room temperature and away from light. Make sure to shake it well before using. Also, your plants will inform you if they are receiving too few or too many nutrients – not enough and the leaves will turn yellow; too much and they will look brown, burnt or curled.

**HYDROPONICS SYSTEM:**

Hydroponic  
Raft



wick system



Ebb and Flow  
system

**HYDROPONICS AS A SUSTAINABLE AGRICULTURAL SYSTEM:** Studies showed that by the year 2050, our growing global population would require an estimate of 60 percent more food than we produce today. We are not producing enough food and much of what we are producing is unevenly distributed. All over the world there is a growing need for nutritious food rather than mere filling the stomach. Malnutrition is an increasing problem in both developed and developing countries. Globally, Food security is also a problem. Currently soaring food prices are buffeted by droughts, floods and the cost of energy required planting, fertilizing, harvesting and transporting it.

In this situation Hydroponic farming is a Sustainable solution to all these problems. Plants are among the few organisms that can synthesize all the required metabolites from inorganic ions, water and CO<sub>2</sub> using the energy captured from the sun. Hydroponics is a method of growing plants that takes advantage of this fact by providing all of the nutrients, in their inorganic form, in a liquid solution with or without solid media.

**CASE STUDIES:****□ Hydroponic Farm in Abu Dhabi:**

“Hydroponics saves you 80 per cent of irrigation water and gives you crops for 10 months of the year.” Nasser Al Zaabi, a successful farmer who has 33,000 square metres of farm in Al Khatem, the Eastern Region of Abu Dhabi emirate, was surprised to see his guests on Thursday. Al Zaabi’s vegetables farm is using the hydroponics technology, considered most suitable for our harsh agricultural conditions, poor in water, soil and climate. It was introduced to Abu Dhabi farmers in 2011 by the Abu Dhabi Farmers Services Centre (ADFSC). There are two main types of hydroponics, the solution culture and the medium culture. The first uses just water mixed with nutrients, while the second has a solid medium for the roots such as sand, gravel or peat. Al Zaabi has gone for the second type for his farm. At least half a dozen green houses are lined up in his farm, since hydroponics, which uses less pesticide, require growing plants in controlled temperature areas. In each of these greenhouses, which are protected from insects by several thick plastic curtains, there is a massive fan that keeps the temperature at optimum level. “The weather can be 50 degrees outside in the height of summer, but thanks to new greenhouse technology, the temperature will remain a steady 28 degrees, the optimal temperature for year-round growing of

crops such as tomatoes and cucumbers,” said Basem Al Khawaldeh, ADFSC’s Acting Farming Section Head. Al Zaabi grows, tomatoes, cucumbers, capsicum and eggplants in his farm. The taste of a sun ripen tomato growing in nutrient rich soil may never be quite the same as the greenhouse tomato growing with only basic nutrients but hydroponics makes sense environmentally and economically.

### ❑ Hydroponic Farm in Gurugram:

The project was set up in 2015 by three friends, Rupesh Singal, Avinash Garg and Vinay Jain, all IT professionals. It uses indoor farming techniques in a controlled environment. Some of the crops produced on-site include tomatoes, European cucumber, cherry tomatoes, bell peppers, basil, parsley and rosemary, which all come from locally sourced seeds. The capital investment made has been reported at Rs. 60 lakh with the annual operational cost totalling around Rs. 20 lakh. The crops are grown in cocopeat, a fibre made out of coconut husk, and water is pre-treated with essential nutrients

“We do not require fertilisers and pesticides as the vegetables are grown in a controlled environment. We use a polythene sheet to shield the vegetables from ultraviolet rays. The plants grow in a safe and healthy environment and produce vegetables and fruits free of chemicals,” Dhruv Kumar, a farmer engaged in the project, told Hindustan Times.

“We have installed two reverse osmosis (RO) water plants in our farm. The plant capacity is 2,000 litre/hour. We decided to use RO water for farming to have bountiful production and for that it is mandatory the plants must get the required nutrients and minerals in right proportion,” states Avinash.

**CONCLUSION :** Traditional agriculture is cultivation of crops/plants in soil. Industrial agriculture kept on innovating and creating new economic possibilities, with biological research leading to great discoveries in crop genetics. HYDROPONICS technology is emerging as a revolution in the agricultural sector. It helps us to overcome temporal (seasonal) and spatial (agroclimatic) problems of crops. It uses much less water, no percolation and runoff. It grows more number of plants in small area. Faster growth, early harvest/ fruiting and with extended duration or some crops can be grown round the year. Potential drawback is that not everyone will be able to handle the costs that come with hydroponic cultivation, which includes the initial capital cost and the cost to run and it can also be high maintenance as it requires constant supervision and management. It requires specialized knowledge and equipment. As such, in the case of soilless farming methods, it would appear that the next era of farming would be technological, in the hands of urban residents instead of traditional Rural Farmers, and carried out in multi-storey towers of food and farming, not on soil but from soilless culture.

### REFERENCES:

- <http://www.soilless.org/hydroponics/soilless-farming-hydroponic-crop-cultivation/>
- <https://www.blueplanetnutrients.com/hydroponic-growing-basics/42-types-of-hydroponic-sytsems>

- <http://www.hamarikrishi.com/about-hamarikrishi/>
- <https://www.thebetterindia.com/106387/gurugram-hydroponic-organic-soilless-urbanfarming-chemicalfree/>
- <http://www.agrifarming.in/hydroponics-farming/>
- <http://www.petbharoproject.co.in/>
- <http://www.radongrow.com/>
- <http://1.droppdf.com/files/uZzEM/hydroponics-for-the-home-grower-2015-.pdf>
- <https://www.khaleejtimes.com/nation/general/plants-grow-without-soil-in-this-abu-dhabi-farm>

