

# COMPARATIVE STUDY ON HYDROPONICS AND GEOPONICS

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## ABSTRACT:

Currently hydroponic cultivation is gaining reputation all over the world due to the fact of efficient resources management and great food production. Soil primarily based agriculture is now going through a number of challenges such as urbanization, natural disaster , local weather change indiscriminate use of chemical substances and pesticides which is depleting the land fertility. This causes food crisis. To increase food production, we have to change our traditional system of cultivation. So this paper focuses on growing plants in water which means growing plant hydroponically. Hydroponic gives the solution for the problems like water scarcity ,land shortage ,food crisis , etc., The results are finished through viewing quite number experiments.

**key : hydroponic, food production, water conservation.**

## INTRODUCTION

World Population projected to attain 9.7 billion by 2050 .On that time 50% of land will be useful for farmers. Consequently the food manufacturing has to be increased by 110% to meet the excessive demand. According to United Nation Organization (UNO), nowadays many countries are going through food crisis. Our traditional method will not cure the food crisis . Hence there is a need to change and improve our present day forming systems. Many researchers have been carried out in creating food production techniques. One of them is the soil less forming system. Soil less systems trends can minimize the farmer's consumption of resources such as aquaponics and hydroponics. Hydroponic food production or developing food without soil is growing global and appear to have a superb overturn as shoppers are turning into greater conscious of environmental benefits. Plants in hydroponic system can attain 20-25 % higher yields than a soil based system. There is rising attraction in hydroponics because it can be used in any place and it is independent of cropping seasons. The development of hydroponics sheds system requires hardwork and initial investments. It is recommended that this device can be chosen as a step to produce the food crops to meet the exhaustive needs and to manage the water shortage particularly in desirable areas for hydroponic farming.

## GEOPONICS

The process of growing plants in soil is called geponics.It is the traditional system of cultivating crops. Geponics is also known as soil based system of planting. In soil, plant's roots must go in search for nutrient. This is why typically as soil based plant has a much larger root system can hydroponics. In soil, plant's roots need to go in search for nutrients .This is why usually a soil based plant has a much larger root system than hydroponics.

## HYDROPONICS

The process of growing plants with water and without soil is call hydroponics. Hydroponics is a method of developing plants and nutrient filled water with or without the use of an inert medium such as gravel, coconut fibre, straw, jute bags, waste clothes etc., The word "Hydroponic" used to be invented by Dr.W.F.Gericke in1936 to narrate the growing of vegetation with the water solution along nutrients. The word 'hydro' means water whereas'ponos' means labor. The objective of hydroponic farming is to cultivate greens and vegetables with minimal use of water. In hydroponics , it takes an average of 45 days to harvest crop. The same plant would take 90 days to harvest crop.The time period of harvesting crops in geponics is double time taken by the hydroponics .Water fed on to develop these vegetation is 90 less in hydroponics when compared to geponics.



### Types of Hydroponics Systems

- ❖ Wick Systems.
- ❖ Deep.
- ❖ Water Culture (DWC).
- ❖ Nutrient Film Technique (NFT).
- ❖ Ebb and Flow (Flood and Drain).
- ❖ Drip Systems.



### NUTRIENTS:

The plants must need nutrients to grow. The major nutrients are Nitrogen, Phosphorus, Potassium (NPK). In hydroponics, others use chemical nutrients in water to grow plants. But in this experiment we use organic liquid fertilizers into water to grow plants. Some of the organic liquid fertilizers and the nutrients in them are listed below:

- ❖ Banana peel water  
Phosphorus, calcium , magnesium, sodium, potassium
- ❖ Tea powder water  
Nitrogen, magnesium
- ❖ Egg shell powder water  
Nitrogen, phosphoric acid.
- ❖ Ash powder water

Calcium carbonate, potassium.

❖ Aloe Vera soaking water

Magnesium, copper, zinc, potassium, iron, calcium, vitamin A, vitamin B12.

❖ lemon peel soaking water

Vitamin C , Calcium, potassium

❖ Onion peel water

Vitamin A,vitamin C,vitamin E

#### **NPK:**

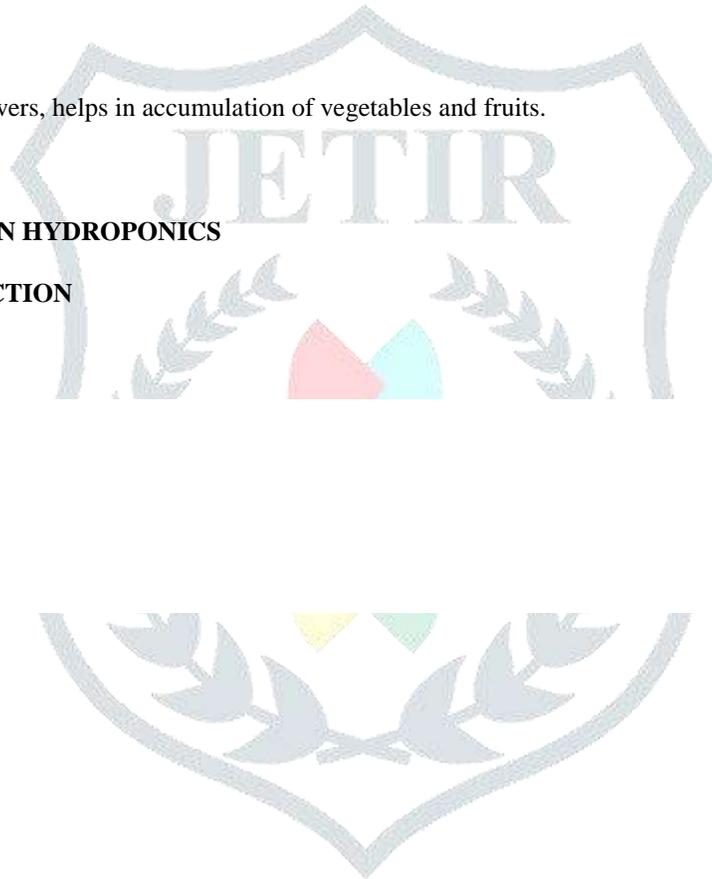
- Nitrogen- helps to get fresh greeny leaves, it reduces the yellowish leaves.
- Phosphorus- helps to get high yield.
- Potassium- helps to bloom lot of flowers, helps in accumulation of vegetables and fruits.

#### **VEGETABLES GROWN WELL IN HYDROPONICS**

#### **VEGETABLES - PRODUCTION**

(g/sq.m/day)

- ❖ Cucumber - 226
- ❖ Garlic - 57
- ❖ Ginger - 57
- ❖ Onion - 56.5
- ❖ Potato - 56.5
- ❖ Tomato - 113
- ❖ Greens - 113



**METHODOLOGY**

2 Bowl : Bowl A-with hole ,  
Bowl B – without holes



Bowl B is filled with nutritional water & Bowl A has inert medium like jute bags, coconut fiber, sponges, etc.,



Bowl A is placed in Bowl B



The medium in the bowl A absorbs water in bowl B and the seed started to grow.

## DIFFERENCE BETWEEN HYDROPHONICS AND GEOPHONICS

HYDROPHONICS	GEOPHONICS
1) Minerals release fast and faster growth.	Minerals release slow and slow growth.
Roots get nutrients easily. So plants have small root system.	Plants must go in search for nutrients. Plants have much larger root system.
Plants consume less water. Hydroponic plants consume 90% less water to grow crops.	Plants consume more water.
4) Pest didn't attack hydroponic plants.	Pest attack is more.
Increasing crop yield. 20 times more production than usual.	Usual yield.
Fruits and vegetables have high nutritional value and tastier than geophonics.	Fruits and vegetables have less nutritional value.
7) No weed attack. So plants grow without pesticides.	More weeds, pesticides have to be used
8) off season production. Any crop can grow in any season.	Crops depend on season. Only few crops can grow in one season.
9) Produce with less space and least time.	Produce with large space and more time.

### BENEFITS OF HYDROPHONICS

- No Soil Needed for Hydroponics.
- Hydroponics Saves Water.
- Climate Control.
- Plants Grow Faster and Larger With Hydroponics.
- No Weeds, Pests, or Disease.

### LIMITATIONS ON HYDROPHONICS

- Great care is required with respect to plant health control.
- Initial investment is high.
- A hydroponic garden requires your time and commitment.
- Experiences and technical knowledge is required.

### FUTURE SCOPE ON HYDROPHONICS

Hydroponics is the quickest developing sector of agriculture, and it ought to very well dominate food manufacturing in the future. As populace will increase and arable land declines due to poor land management, people will turn to new applied sciences like hydroponics and aeroponics to create extra channels of crop production. NASA has significant hydroponics research plans in place, which will advantage present day exploration, as well as future, long-term colonization of Mars or the moon. As we haven't yet observed soil that can support life in space, and the logistics of transporting soil through the house shuttle seems impractical, hydroponics could be the key to the future of space exploration.

**RESULT (IN CHILLI):**

First two setup is by hydroponics and next two setup is by geoponics

**WEEK 1**



IN HYDROPONIC - 2 big leaves and 2 small leaves.

IN GEOPONICS - 2 big leaves and the next set of leaves started to grow.

**WEEK 2**



HYDROPONIC – 6 big leaves and fresh and tall

GEOPONIC – 4 big leaves and short

**WEEK3**

HYDROPONIC – 10 big leaves

GEOPONICS – 6 big leaves

**WEEK 4**

HYDROPONICS – plant started to bloom and very tall.

GEOPONICS – short and slow growth

**RESULT**

By taking the result, the seed germination is fast in hydroponic when compared to geponic system . The water consumed in hydroponic is also less when compared to geponic system. The water consumed by hydroponic system is 1/10 th of water consumed by geponic system. The plant is healthier and taller in hydroponic and the growth rate is high.

**CONCLUSION**

The industry is expected to grow exponentially also in future, as conditions of soil growing is becoming difficult. Specially, in a country like India , where urban concrete conglomerate is growing each day , there is no option but adopting soil-less culture to help improve the yield and quality of the produce so thatwe can ensure food security of our country. High

demand for food production is increasing as the world population is growing. Meanwhile, the traditional farming using soil system will not cover the world's growing demand for food. Thus, developing a new farming and planting system techniques is required to avoid food crisis issue in the future. This study aimed to examine an efficient technique for alternative planting system which is the hydroponic system. The statistical experimental design approach was used to analyze and compare between traditional soil system and hydroponic system.

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