HYDROPONIC (SOILLESS) FARMING: THE TECHNOLOGY TOWARDS SUSTAINABILITY

Project Reference No.: *45S_* BE_*2123*

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Keywords:
Urbanization, Natural disaster, Water scarcity, Climatic changes, Soil based agriculture, Hydroponic or soilless farming, Nutrients directly to the crop roots, Quality agriculture, Productivity

Introduction:

Soil contains all the important components for the growth of plants. It provides nutrients, air, water etc for the successful growth of plant. All the important beneficial process such as nitrogen fixation, providing moisture and whole plants generation happen due to the presence of soil. In normal practice of growing crops, farmers face below mentioned issues in common with less yield, chance of soil borne insects and pests-hence increases attacks, weed growth, unhealthy crops etc. The world population projected to rice 9.7 billion by 2050. At the same time, it has been estimated that 50% of the arable land around the world will be unusable for farming. Consequently, the food production has to be increased by 110% to meet the high demand. According to United Nations Organization (UN), today many countries are facing food scarcity, especially in Asia and Africa. The food crisis is expected to last to 2050 if the demand will not be covered. The major reason for this crisis is the climatic change due to drought or floods s they became more frequently. To overcome these limitations, Hydroponics was developed by the scientists. Soilless culture mainly refers to the techniques of Hydroponics and Aeroponics. We are mainly concentrating on Hydroponics. The term hydroponics was derived from the Greek word ‘hydro’ means water and ‘ponos’ means labor. It is a method of growing plants using minerals nutrient solutions, without soil. This system helps to face the challenges of climate change and also helps in production system management for efficient utilization of natural resources and mitigating malnutrition. In India, Hydroponics was introduced in year 1946 by English scientist, W.J. Shalto Duglas and he established a laboratory in Kalimpong area, West Bengal. This type of agriculture will help in increase in yield, less weeds, more productivity, less usage of land, crops can be grown in any type of climatic condition.

Objective:

Aim:

Sustainable growth of crops without using soil.

Scope:

i) To overcome the increased growth of cities, the above method is adopted. The root cause for not implementing agriculture in cities are:

Land shortage
Water scarcity
Lifestyle
Climatic change

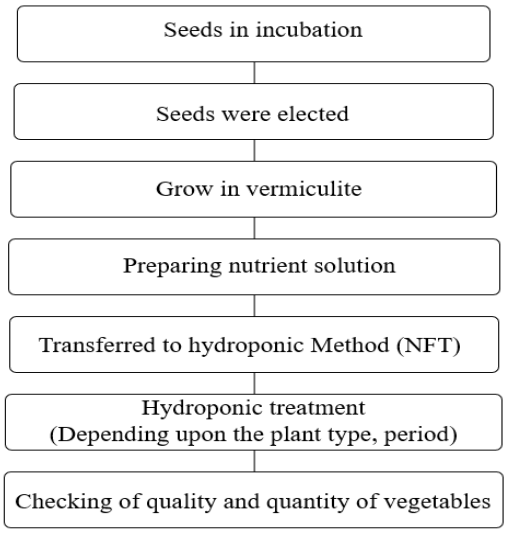
ii) To get rid of soil erosion in agriculture the hydroponic method is useful.

iii) Due to the decrease in practice of agriculture and increased population the vertical farming can be adopted.

iv) Less water with more yield.

v) More production in smaller space.

Methodology:



Selection of the method: There are 6 types of hydroponic followed earlier. To name them Deep water culture, Drip system, Ebb and flow, Nutrient film technique, Wick system and Aeroponics. We have adopted Nutrient film technique which was developed in the mid1960s in England by Dr. Alen Cooper. In this method, a nutrient solution is pumped constantly through channels in which plants are placed. When the nutrient solutions reach the end of the channel, they are sent back to the beginning of the system. This makes it a recirculating system, here the plants roots are not completely submerged, which is the main reason for naming this method NFT.

Growing of saplings: In general tomato, cucumber, strawberries, leafy lettuce and herbs are grown in common. We have chosen lettuce to grow in our project.

Experimental setup: PVC pipes of 2.5 inches dia are bought and drilled for about 2.3 inches of holes. L joints, end caps, reducers gate walls, 0.5 hp pump, water pump football, ring hose pipe are arranged. Then using all the materials final hydroponic setup was made.

For the water medium we have mixed the nutrients which contains both macro nutrients and micro nutrients. The water is made to flow 24 hours. Our project also concentrates on experimenting on different constraints like flowing water and stagnant water flow, normal nutrient and organic nutrients.

Saplings grown

Initial setup

Results:

After 40-45 days of planting completely grown plants can be expected. The yield is measured in terms of growth rate, height of the plant, quality of the crop, depth of root etc. The Ph, EC, humidity and temperature should be maintained constantly. In the beginning due to higher pH retardation of plants was observed and then it was detected and corrected. The nutrients added to the water also should be in a proper proportion, failing which leads to the increased or decreased value of Ph.

Conclusions:

To overcome the increased growth of cities, land shortage, climatic changes, water scarcity and lifestyle the hydroponic farming can be a good alternative to promote the agriculture with sustainable growth of crops. With less water and smaller space more production can be achieved.

Scope for future work:

1. The productivity of the crop can be compared with conventional forming with its different constraints like height of the plant, breadth of the leaf, depth of the root, size of the crop.
2. The experiment on normal NPK nutrients and the organic nutrient like gomutra and also with the stagnant water flow and the flowing water flow will give us a clear image on the best outcome or the quality output that can be applied in the further implementations.
3. The overall investment of the hydroponic farming can estimate.
4. Promotion of hydroponic farming to the farmers by highlighting productivity rate, less consumption of water, lessening the strain in agricultural work.
5. In a nutshell, this project can be an alternative to the conventional farming as the people are facing towards the easy way of earning money, hence rate of practice of agriculture is decreasing day by day.