

## Hydroponics - Innovative Way of Future Farming

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### Introduction

“HYDROPONICS” is the growing of plants in a liquid nutrient solution with or without the use of artificial media. Commonly used mediums include expanded clay, coir, perlite, vermiculite, brick shards, polystyrene packing peanuts and wood fiber. Hydroponics has been recognized as a viable method of producing vegetables (tomatoes, lettuce, cucumbers and peppers) as well as ornamental crops such as herbs, roses, freesia and foliage plants. Due to the ban on methyl bromide in soil culture, the demand for hydroponically grown produce has rapidly increased in the last few years. (Butlar, 2006) Evidently, soils pose serious limitations for plant growth in general causing farmers to face difficulty due to the trade off between large space requirement or reduction in plant growth and thus productivity. (Maharana, 2011) Currently, it is difficult to hire manpower for open field agriculture. These problems are mitigated to a large extent due to the introduction of hydroponics and aeroponics, both of which are soilless cultures. (Singh, 2012)

### History

The word hydroponics comes from two Greek words ‘hydro’ meaning water and ‘ponos’ meaning labour. This word was first used in 1929 by Dr. Gericke, a California professor who began to develop what previously had been a laboratory technique into a commercial means of growing plants. The U.S. Army used hydroponic culture to grow fresh food for troops stationed on infertile Pacific islands during World War II. By the 1950s, there were viable commercial farms in America, Europe, Africa and Asia.

### Hydroponics in the Home Garden

For the hobbyist, hydroponics is a highly technical specialized form of agriculture that has an ever-expanding application to everyday use. At the same time, home hydroponic gardens have become so simple that people without a green thumb can be successful in growing flowers and vegetables in their homes. Many of the advantages of commercial



hydroponics also apply to the home and hobby gardeners. In many industries, small systems are developed, then expanded for large scale use. Conversely, in hydroponics, large scale commercial production is becoming more common, while it is more of a challenge to make smaller systems economically feasible.

### **Planning Commercial Hydroponics**

Hydroponic systems are only one of the options available when you are considering whether to grow a crop. Planning for a commercial business should, therefore, follow the normal sequence for considering any horticultural enterprise. Don't overlook soil growing. You need a worthwhile reason to use a hydroponic system instead of soil. If you do choose to go with hydroponics, you should evaluate the advantages and disadvantages of each type of production system for your crop of interest. For short term crops such as lettuce, the common choice is recirculating NFT or flood and drain gravel channels. For longer term crops or those very vulnerable to root disease, the common choice is non recirculating, media-based systems.

### **Future Scope of This Technology**

While it might not have a large market share, hydroponics does have incredible growth making it the fastest growing sector in agriculture. In the future it is projected to dominate all of the world's food production. Hydroponics is likely to thrive as more and more land is devastated by poor farmland management and overuse causing people to turn to newer innovative methods of farm production. Certain countries like Japan have already adopted a proactive approach to these technologies due to its lack of arable land and rising land prices being an island nation. Japan's hydroponics is for the most part done with NFT or sand/gravel techniques. Using bio-technical approaches such as posed by hydroponics, the Japanese have come up with newer and more productive plants for hydroponic rice production. Due to the environment control four harvest can be performed within a single year, compared to the traditional single harvest per year. As the global population becomes more urban, cities like Indianapolis are investing in more local food production systems that offer economic development opportunities and reduce a city's carbon footprint using 90 percent less water than traditional farming methods [Van *et.al.*, 2002]. Desert climates such as those in Israel have also been the subject of immense agricultural innovation. Due to arid climate and a general lack of water, the country has been using hydroponics to grow berries and bananas in



shipping containers. These fruits cannot actually be grown in that climate but still are capable of yielding 1,000 times greater produce. Even certain large businesses have realized the value of hydroponic systems. The large store chain Target began a series of trials in spring 2017 hydroponic gardens were installed at selected locations. These gardens can provide customers with very fresh vegetables and herbs with minimal water usage

### **Water Conservation in Hydroponics**

As water becomes more precious and valuable resource, the use of hydroponics is urgently needed and is expected to become more popular in future time. Compared to soil cultivation, Hydroponics saves between 70-90% more water as it gets recovered, filtered, replenished and recycled. In soil farming, the majority of the water provided to the plants is leached down to the soil and unavailable to the plant's roots, whereas in hydroponics, plant roots are either submerged in water or a film of nutrients mixed in water surrounds the root zone at all times, keeping it hydrated and nourished. Waste nutrient solution can be used as an alternate water resource for crop cultivation under hydroponic system (Choi and Lee, 2012). Under controlled hydroponic conditions, it is feasible to grow high-value, high-quality crops while consuming 70-90% less water than typical soil-based agriculture. Salinity, dissolved solids and pathogens are all common factors in groundwater and dam/river water that can affect plant yield and condition, but this type of problem is totally avoided in hydroponics.

### **Conclusion**

Hydroponics has emerged as a promising method for growing a wide range of crops in recent years to feed a large portion of the world's population. In country like India, where urban conglomeration is rising day by day, there is no alternative other than adopting a soil-less culture i.e., hydroponics, to ensure the country's food security and the quality of produce. However, to stimulate commercial hydroponic farms and low-cost hydroponic technologies, government intervention and research institute interest are required.

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