



Hydroponics as an Advanced Technique for Vegetables

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Cultivation of plants in water or the cultivation of plants without using soil is possible. The science of growing plants in a medium other than soil, using essential plant nutrient elements dissolve in water is called Hydroponics. The word HYDROPONICS was derived from Greek words HYDRO meaning water and PONOS meaning LABOR, literally meaning “water working”. Hydroponics became popular in 1920s when a scientist named Dr. William F. Gericke of University of California demonstrated the laboratory experiments in plant nutrition on commercial scale. In doing so he termed these nutriculture systems as HYDROPONICS.

Component of Hydroponics Cultivation

- I. **Material** -Coco coir, Rockwool, Potassium rich- Blooming, Perlite
- II. **Nutrient Solutions**:- Nitrogen rich- **Growth**, Phosphorus and Other includes:- Macro and Micro elements.

Need of Hydroponics Cultivation

As per population growth is increasing it is difficult to feed the future because of not enough land and also due to increasing cost, harsh climate, decreasing fertility of soil and decreasing water. Plants grow 30-50% faster in hydroponic farms than in soil. Such process of growing plants without soil is due to the reduced environmental stress as they're typically grown indoors, and optimised delivery of water and nutrients to the plant. Hydroponics doesn't require much space and can be used in places where in-ground agriculture is not possible. It has potential to produce much higher crop yields.

Plants grown without soil typically use around 90 per cent less water than those grown in soil due to recycle and reusing of water and nutrient solutions. Due to use minimal amount of pesticides and fertilizers compared to that of soil based plants, which means no chemicals are being released in the environment. Due to direct access of water and nutrients plants grown in hydroponics system do not need to develop large roots system which offers the grower a shorter harvest time.

Soil and soil-borne pests and diseases are also eliminates, so there is no need to use large amounts of pesticides which reduces soil erosion as well as air and water pollution.Reducing pollution is vital to protecting plants and animals indigenous to areas near farms.They are able to manage nutrients and pH to make sure that plants are getting the exact nutrients they need. System can be closed and recycle the water which is not used by plants. Water can be used again and again. The ability to grow indoors allows farmers to control temperatures and lightning schedules to improve plant protection.

Types of Hydroponics System

There are six types of hydroponic systems under which all variations are situated.

1. Wick System, 2. Water Culture, 3. Ebb and Flow (Flood and Drain), 4. Drip System, 5. N. F. T. (Nutrient Film Technology) and 6. Aeroponics System

All hydroponics systems works in a different way, which means that all six hydroponic systems have their own distinct pros and cons for us to consider.

1. **Wicks System-** It is easy and simplest type of system that we can use to grow plants, which means that it can be used by practically anyone. It is the only hydroponic system that doesn't require the use of electricity. The plants are placed directly within an absorbent substance like perlite or vermiculite.
2. **Water Culture-** A water culture system is another highly simplistic type of hydroponic system that places the roots of the plant directly into the nutrient solution. The oxygen that the plants need to survive is sent into the water by a diffuser or air stone. When you use this system, keep in mind that the plants should be secured into their proper position with net pots.
3. **Ebb and Flow (Flood and Drain)-** This system is mainly used among home gardeners. With this type of system, plants are positioned in a spacious grow bed that's packed with a grown medium like rockwool or perlite. Once the plants are carefully planted, the grow bed will be flooded with a nutrient-rich solution until the water reaches a couple inches below the top layer of the grow medium, which ensures that the solution doesn't overflow.
4. **Drip System-** A drip system is an easy-to-use hydroponic system that can be quickly altered for different types of plants, which makes this a great system for any grower who plans to make regular changes. The nutrient solution that's used with a drip system is pumped into a tube that sends the solution straight to the plant base.
5. **N. F. T. (Nutrient Film Technology) -** The N.F.T. system has a simple design. When you use one of these systems, the nutrient solution is placed into a large reservoir. From here, the solution is pumped into sloped channels that allow the excess nutrients to flow back into the reservoir. When the nutrient solution is sent into the channel, it flows down the slope and over the roots of each plant to provide the right amount of nutrients.
6. **Aeroponics System-** Aeroponic systems are easy-to-understand but somewhat difficult to build. With this type of system, the plants that you wish to grow will be suspended in air. A couple of mist nozzles are positioned below the plants. These nozzles will spray the nutrient solution onto the roots of each plant, which has proven to be a very effective hydroponic method.

At this point, you might be wondering what plants and vegetables one can grow in their hydroponic garden. The commercial vegetables which are growing in hydroponic system *i.e.* Lettuce, Tomatoes, Hot Peppers, Cucumbers, Green Beans, Cucumber, Spinach, Bell Pepper, Celery etc.

Conclusion

Hydroponics is a technology. Vegetables can be grown with the help of different hydroponic systems. No Soil degradation and water depletion is there because no soil is used whereas 95% less water is used in Hydroponics. Vegetables produced hydroponically can be grown either for self-consumption. *i.e.* in kitchen garden or can be grown in large infrastructures for commerce. Minimum or no use of pesticide is done as crops are supplied with nutrient medium and high yield is obtained as compared to traditional farming. Plants grown on large scale provide green space in a populated area which adds aesthetic value, reduce runoff from precipitation and heat effects by fixing carbon through photosynthesis.