

# A Review on Comparison between Hydroponics & Conventional Method of Growing for Conservation of Water & Land

Vandana B R<sup>1</sup> Asst. Prof. Rohan S Gurav<sup>2</sup> Asst. Prof. Sagar Waghmare<sup>3</sup>

<sup>2,3</sup>Assistant Professor

<sup>1,2</sup>Department of Studies in Water and Land Management

<sup>1,2</sup>VTU, Belagavi, India <sup>3</sup>S.G.Balekundri Institute Of Technology, Belagavi, India

**Abstract**— Because of approach of human progress there has been a ton of negative results developing step by step alongside the positive outcomes. The negative results is not influencing our day by day life but rather is going stride towards future likewise .Due to quick urbanization, industrialization the accessibility of land for agribusiness is diminishing ,not just this, it is additionally influencing the water in parts of pollution and making it unfit for drinking and different purposes. In addition, poor soil richness in a portion of the cultivable zones, less shot of normal soil ripeness develop by microorganisms because of constant development, visit dry season conditions and eccentricities of atmosphere and climate designs, ascend in temperature, stream contamination, poor water administration and wastage of enormous measure of water, decrease in water level, and so on are the threatening elements for the dirt based horticulture. Under such conditions, in future it winds up plainly difficult to get prolific land for horticulture other than the arrangement for the adequate measure of water. Normally, soil-less culture is ending up noticeably more important and dependable in the present situation, to adapt up these difficulties. In soil-less culture plants are raised without soil and with water preserving strategies. It has indicated promising outcomes all through the world.

**Key words:** Hydroponics, Conventional Method, Soil-Less Culture

## I. INTRODUCTION

Soil is the most broadly utilized medium for developing plants as it guarantees legitimate port, supplements, air, water and so forth for a fruitful and promising development of the plants. Moreover, it is a similar soil that makes the plants to confront issues, for example, consistency in development, sickness causing creatures and nematodes, unacceptable soil response, horrible soil compaction, poor waste, corruption because of disintegration and so on. Use of composts, pesticides, bug sprays and so on are likewise transforming the dirt into a non-ripeness condition and when the running off is progressive ,these manures, bug sprays, pesticides and so on get washed off and in the end blends with the water ,making it dirtied and the unfit for the vital needs, which thusly causes genuine natural issues. Furthermore, Conventional yield developing in soil is a troublesome procedure as it needs vast space, parcel of work and extensive volume of water. As the age we are living in is urbanized and a cultivated place, the urban communities are ending up being metropolitan urban communities and in such cases the accessibility of the land winds up plainly troublesome for plant developing and in a few spots we discover shortage of fruitful land and water because of their negative conditions. This customary strategy does not give finish control over environmental conditions, thus bringing

forth issues Because of every one of these issues said, it winds up plainly fundamental and of significance to look for a substitution strategy in a part to go about as a solution for every one of the results .To defeat these issues one needs to adjust such a substitution procedure which can help in taking care of the issues of current situation and even be useful for the up and coming days. In a place where an unnatural weather change has been all the rage it ends up plainly essential to eliminate the substantial volume of utilization of water for the traditional development

Before peeping into the substitution procedure a reality to be comprehended and to get cleared is that plants can be raised without soil gave a decent furthermore, effective, strong medium for their development, from which they can get important, compulsory supplements in appropriate prerequisites. A medium that can hold the supplements for the development of the plants and can without much of a stretch do the whole employment of whole development of the plants. In this manner such development of the plants without the contribution of the dirt can be called as soil-less culture. Soil-less culture alludes to the methods of Hydroponics and Aeroponic. The term Hydroponics was gotten from Greek words hydro implies water and ponos implies work. . It for the most part alludes to the strategy of developing plants in a dirt less condition with the roots drenched in a supplement game plan. Earthbound plants might be developed with their foundations in the mineral supplement course of action or in a dormant medium ,the mediums utilized for the holding the supplement game plan that is utilized as a part of the hydroponics are perlite, shake fleece, cocopeat, rock and so forth. Hydroponic developing of plants comes in various procedures .One can pick a particular hydroponic method which is most appropriate for their plant development. The primary favourable position of the hydroponics is that there is use of the composts, pesticides and bug sprays amid any phase of the development .The other strategy of soil-less culture is the Aeroponics.The principle distinction amongst hydroponic and aeroponic framework is that ,in the hydroponic framework the supplement course of action is given in a mixed shape with the water provided to the framework yet in the aeroponic framework the supplement game plan is given in a type of fine drops for the development of the plants. The parts of hydroponics to aeroponic likewise varies from each other .Aeroponic framework is more perplexing among all the hydroponic frameworks and includes fundamental segments and sub units. In India the word hydroponics was acquired into light the year 1946 by an English researcher W.J Shalto Duglar by building up a lab in Kalimpong range, West Bengal.

## II. PROGRAMMED FRAMEWORKS

The ordinary strategy for developing of the products requires standard observing and general supply of new water ,so far there is no computerized path discovered according to the investigations made to manage an open field development of the yields and when the climate conditions in an open documented development changes, it is difficult to set a similar climate or the natural variables as indicated by harvest's necessities and the producer's terms and standards for the fruitful development of the harvests, so it is acknowledged actuality that the developing of harvests depend on their seasons due to these restrictions and consequently a specific yield can be developed amid its reasonable season due to the ecological conditions that holds useful for the its development amid the time of development. In this way one can't get a coveted harvest development consistently. Though, the hydroponic framework returns the issue of normal observing i.e. one doesn't need to a constant eye on the working stream of the hydroponic framework and the fluctuating climate conditions that influences the plants development. This can be accomplished by the mechanization procedure i.e. by utilizing machines that naturally completes the work.

Sorts of robotized frameworks enjoyed the mechanization of the hydroponic frameworks are as per the following

- 1) Helped or semi-robotized framework
- 2) Completely robotized or clever frameworks

Helped or semi-robotized frameworks are those frameworks where in the hydroponic framework utilizes a portion of the help of electronic division for reminding the working conditions, that are set by the occasional technique, for example, disturbing engine pump for pumping supplement arrangement, pumping according to client's necessities or disturbing at certain set focuses and so on.

Completely robotized or smart frameworks are the most exceptional frameworks that have extra components that makes the framework to run ceaselessly with no help from the human source. These frameworks have worked in data of a hydroponic master and has the capacity to settle on self-choices relying on the data modified into the framework.

## III. PROSPECTS OF SETTING UP DEVELOPMENT LANDS

With regards to the ordinary technique for cultivating, it requires a vast territory, whose dirt is rich in minerals and enough fit for the development .The land chose ought to be to such an extent that, there ought to be adequate ground water to keep the land from drying. Consequently it is a dull procedure to choose a reasonable land for development, keep up the water content in the dirt all through the development. After dealing with every one of these components, here and there the yield turns out to be influenced from illness and non-consistency in the last yield.

In any case, while for the dirt less cultivating, the framework does not request any such of the variables said above for the ordinary technique. Hydroponics can be done in the ranges that are not appropriate for regular strategy, inside urban communities for making the sustenance locally accessible, proficient water utilize. Liberal of hydroponics diminishes farming overflow and soil-borne ailments, over

comes the issues confronted from trim pivot, control over climate conditions.

In this manner this correlation of hydroponics with traditional technique suggests that any sort of land works absolutely fine for the hydroponic framework for the effective development of plants.

## IV. SUPPLEMENT AVAILABILITY

It is the regular factor confronted as an issue in the customary technique is the accessibility of the best possible supplements to the plants amid development. The dirt which will go about as a stage for the development of the plants in some cases does not appropriately have every one of the supplements required for the effective development of the plants. At times the land contains the supplements required for the development of the plants in a higher range. On the off chance that the land decided for the development of the harvests has both of the conditions i.e., having low scope of supplements or having high scope of supplements, both of the condition can radically influence the developing length of the products other than influencing their dietary esteem. The arrangement found to beat the situation of low scope of supplements in the dirt was to execute the utilization of the composts which are substance based. This condition where in there is absence of supplements required for the development emerges to be a noteworthy issue.

In the Hydroponic framework, the supplements to the plants is provided in a fluid shape, which incorporates the best possible range or the best possible rate of the supplements required for specific sort of plant. The supplement arrangement is mixed with the water and is pumped to the developing framework are showered as drops. Supply of supplements relies on the framework executed for the development In the Hydroponic system, the nutrients to the plants is supplied in a liquid form, which includes the proper range or the proper percentage of the nutrients required for particular type of plant.

Almost all types of crops can be grown by adopting hydroponic method. The following table shows the types of crops and their yields compared with conventional system. The yield of different crops per acre being compared with conventional method.

Type of crops	Name of the crops
Cereals	<i>Oryza sativa</i> (Rice), <i>Zea mays</i> (Maize)
Fruits	<i>Fragaria ananassa</i> (Strawberry)
Vegetables	<i>Lycopersicon esculentum</i> (Tomato), <i>Capsicum frutescens</i> (Chilli), <i>Solanum melongena</i> (Brinjal), <i>Phaseolus vulgaris</i> (Green bean), <i>Beta vulgaris</i> (Beet), <i>Psophocarpus tetragonolobus</i> (Winged bean), <i>Capsicum annum</i> (Bell pepper), <i>Brassica oleracea var. capitata</i> (Cabbage), <i>Brassica oleracea var. botrytis</i> (Cauliflower), <i>Cucumis sativus</i> (Cucumbers), <i>Cucumis melo</i> (Melons), <i>Raphanus sativus</i> (Radish), <i>Allium cepa</i> (Onion)
Leafy vegetables	<i>Lactuca sativa</i> (Lettuce), <i>Ipomoea aquatica</i> (Kang Kong)

Condiments	<i>Petroselinum crispum</i> (Parsley), <i>Mentha spicata</i> (Mint), <i>Ocimum basilicum</i> (Sweet basil), <i>Origanum vulgare</i> (Oregano)
Flower / Ornamental crops	<i>Tagetes patula</i> (Marigold), <i>Rosa berberifolia</i> (Roses), <i>Dianthus caryophyllus</i> (Carnations), <i>Chrysanthemum indicum</i> (Chrysanthemum)
Medicinal crops	<i>Aloe vera</i> (Indian Aloe), <i>Solenostemon scutellarioides</i> (Coleus)
Fodder crops	<i>Sorghum bicolor</i> (Sorghum), <i>Medicago sativa</i> (Alphalfa), <i>Hordeum vulgare</i> (Barley), <i>Cynodon dactylon</i> (Bermuda grass), <i>Axonopus compressus</i> (Carpet grass)

Table 1: Types of crops that can be grown in hydroponics

Name of crop	Hydroponic equivalent per acre	Agricultural average per acre
Wheat	5,000 lb.	600 lb.
Oats	3,000 lb.	850 lb.
Rice	12,000 lb.	750-900 lb.
Maize	8,000 lb.	1,500 lb.
Soybean	1,500 lb.	600 lb.
Potato	70 tons	8 tons lb.
Beet root	20,000 lb.	9,000 lb.
Cabbage	18,000 lb.	13,000 lb.
Peas	14,000 lb.	2,000 lb.
Tomato	180 tonnes	5-10 tonnes
Cauliflower	30,000 lb.	10-15,000 lb.
French bean	42,000 lb. of pods for eating	-
Lettuce	21,000 lb.	9,000 lb.
Lady's finger	19,000 lb.	5-8,000 lb.
Cucumber	28,000 lb.	7,000 lb.

Table 2: Comparison of yield

Vegetables	Production (g/m <sup>2</sup> /day)
Carrot	56.5
Cucumber	226
Garlic	57
Ginger	57
Leek	57
Green Bean	113
Lettuce	226
Onion	56.5
Peapod	113
Potato	56.5
Salad greens	226
Tomato	113
Greens	113

Table 3: Production in hydroponic

#### V. EXTENSION FOR FUTURE INVESTIGATION

Hydroponics is at present the quickest developing innovation in the field of horticulture and it could effectively win later on, ruling the traditional strategy for developing at the spots where there is absence of land and water. Individuals staying in the condos could take up this

hydroponic frameworks for the achievement of their day by day needs in the area food. A correlation consider demonstrates that the development of the plants was seen speedier than that of the ordinary method. The last yield was gotten preceding the separate plant's harvest period, with less utilization of water and no utilization of soil. The most vital thing that stands in the hydroponic technique when contrasted and the traditional is that the hydroponic framework can be mechanized. If the hydroponic arrangement of developing could be encouraged for the normal individual, at that point it could be generally actualized all through the word. Upon being idealized the advantages acquired by the general population around the globe would be greater. Hydroponics could function admirably for those countries that don't have appropriate access to solid and supplement soil. With the fundamental learning about the setting up of hydroponics anybody could take up the execution of hydroponic framework and it would bring about a phenomenal decision for the gardeners. Though the underlying usage cost is high for the hydroponic system, upon being utilizing it by many individuals and for a long time, the cost in the up and coming days would clearly observe a decay level.

#### VI. CONCLUSION

The part of soil-less developing is relied upon to create and develop in both potential and exponential savvy in future, as the conditions supporting the customary technique for developing are being ominous the vast majority of the times. Especially with regards to nation like India, which is creating country, where the urbanization is at its own particular pace, and bringing about shortage of land and water, it would end up noticeably vital to receive to soil-less cultivating to save land and water for guaranteeing better future other than Government intrigue could catalyse this innovation in India

#### REFERENCES

- [1] S.Douglas , "Soilless cultivation of crops", Nature, 1995 Vol.175 pp.884-885
- [2] Protected cultivation to meet future challenges with special reference to soilless cultivation, Hydroponics and Aeroponics, by University of Agricultural sciences, Dharwad, Karnataka
- [3] Maeva Makendi S.G, A comparative Analysis of two plant growth mediums: Hydroponics vs. sol, The academy of science, research and medicine.
- [4] Mamta D.Sardare, Shraddha V.Admane, A review on plant without soil-Hydroponics, vol 2, IJRET, ISSN:2319-1163
- [5] Hydroponics, soilless and vertical farming, G.L.Bansal, Protected cultivation to meet future challenges
- [6] Matthew T.Murphy, Fannie Zhnag, Stanlry T.Omaye (2010) Comparison between hydroponically, conventionally and organically grown lettuces for taste, odor, visual quality and texture: A pilot study, Food and Nutrition science, 2011, 2, 124-127