



A Review on Hydroponics engineering and vertical gardening and It's performance of medicinal plants cultivation at terrace of kitchen garden

¹ D.Vijayakumar.D,² S. Balasubramanian, ³C.Selvakumar, ⁴B. Prasanna and

⁵B.Prathish Raaja

¹ Assistant Professor, Department of Biomedical Engineering, Mahendra Institute of Technology, Namakkal, Tamilnadu

² Assistant Professor, Department of Biomedical Engineering, Mahendra college of Engineering, Salem, Tamilnadu

³ Assistant Professor, Department of physiology, Vinayaka Mission institute of medical science, salem, Tamilnadu

⁴ Assistant Professor, Department of Biotechnology, muthayammal engineering college, Tamilnadu

⁵CEO & Scientist, Swamy Nursery Garden, Sirkazhi, Tamilnadu-690102.

Abstract: --In this paper a review on hydroponics engineering and its performance has presented. Hydroponics is that branch of bio gardening in which the plants are growing without the use of soil by applying from recycle aquaculture pond water to grow the plants. Undeveloped actions in the vein of making of herbals, medicinal plants and vegetables exclusive of soil less cultivation are totally a innovative revolution of agriculture. This paper essentially focuses on advancement of hydroponics system for growing plants. The similar grown condition, the identified growth rate of a hydroponic plant is 30-50 percent faster than a soil plant. As per the national report, 5554 tons of top soil layers are getting washed every year due to various reasons and the level of eutrophication is also growing day by day, the entire such issue can be easily controlled by hydroponics to a greater extent. This method is also extremely successful in culturing various rare medicinal plants at kitchen garden. The vital reason of this paper has been to plant promote the theory of hydroponics for its better use.

Keywords:-- Hydroponics Engineering , Aqua phonics and Agriculture.

Introduction

The term hydroponics is derived from greek word 'hydro' meaning water and 'ponos' meaning to culture [1]. It is a method in which plants are cultured without soil. In this technique the plants are grown in nutrient medium. In hydroponics the roots are emerged in nutrient solution.[1]. Hydroponics was introduced by Dr. W.F. Gericke in United States [2].In India hydroponics was first brought by Dr. W.J.Shalto Duglus. A laboratory in kalimpong area of Westbengal was established by Dr. Duglus. In 1990 this technique became famous and play a effective role in providing food to famine effected people in West Bengal.

Journey of Hydroponics from 17th Century to 20th Century

INFORMAL STUDIES DONE UNDER HYDROPONICS.

- Jan Baptista van helmont in 1600 conducted a random experiment on willow shoot. The willow shoot was kept on same soil for five years. At last the conclusion drawn from this experiment was that 73kg of water was taken up by the tree and only 57g of soil weight got reduced [2]. His experiment signified that water is main source of plant, thus the concept of hydroponics got started.
- In 1699, an english naturalist Jhon woodland conducted an experiment on spearmint. he concluded that spearmint grows better in water nutrient medium. Thus supported soilless culture [4].
- Juilius von sachs was a German scientist, who conducted an experiment in 1860 and concluded that plant can be easily grown in water nutrient solution. He said that proper nutrient supply in water medium can easily result to excellent development of plants. He coined this as nutriculture [1,4].

FORMAL STUDIES DONE ON HYDROPONICS

- Dr.W.F.Gericke a scientist of califonia university was the first person to term these senerio formally as 'hydroponics'. The term was coined as hydroponics in 1937 [4]. He performed an experiment by growing tomato plant in totally water dependent medium in which nutrient are suspended as per requirement. He observed the plant with 25 tomatoes.
- In 1938 a new discover a Dennis Robert hoagland in 1938 and the solution was further revised by Aron in 1950. The main constituent of this solution is nitrogen and potassium as essential nutrient.
- The concept of 'hydroponics' was than commercially used by the American troops in 1940s. They cultivated vegetables by using the tecnique of hydroponics in rocky shore of pacific ocean.
- In 1970, Dr.J.Shloto Douglas worked on Bengal hydroponics system. It was the first time introduced in India, as a labrotary was introduced in kalimpong, westbengal to work on the hydroponics [2,3].

Prototype of hydroponics System



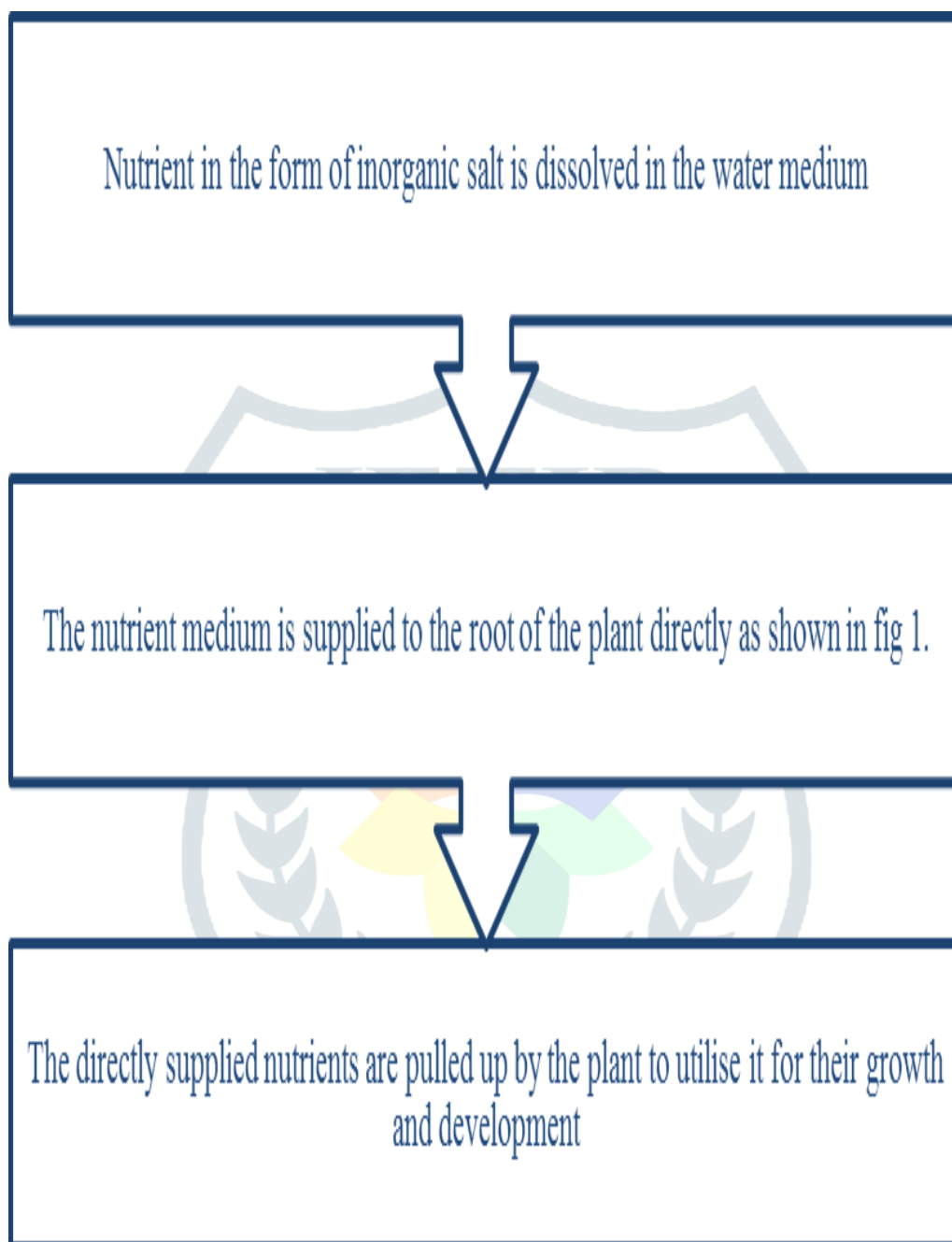
Fig:1 setup of hydroponics system at Swamy Nursery Garden sirkazhi -609102



Fig:2 setup of hydroponics system with hanging pots at Swamy Nursery Garden sirkazhi -609102



Fig:3 setup of vertical garden system at Swamy Nursery Garden sirkazhi -609102

Nutrition Up taking Mechanism of Plants in Hydroponics [10]

Advantages of hydroponics

There are many advantages of hydroponics. This system is easily manageable as the system is self mechanized. The adequate amount of nutrient could be supplied and there is no wastage of nutrient medium as in field cropping [5, 6]. It requires less space for culturing plants. The plants grown by using hydroponics is not affected by external climatic conditions [6]. The comparative analysis of crop grown in soil and hydroponics clarify that the yield is more incase of hydroponics. Example: The yield of tomato in one hectare soil field is 5-10 tonnes while the yield of tomato by hydroponics in one hectare is 180 tones [5]. The time period of crop maturation is also reduced by using hydroponics. [7]. Eutrophication, i.e., excessive richness of nutrient intake. It occurs due to frequent run off of nutrient medium and fertilizers from agricultural field. These runoff induces excessive plant growth i.e.; mainly aquatic weeds and algae. These processes usually cause depletion of oxygen level in water causing death to fishes and also cause aging of lakes and other stagnant water bodies. The use of hydroponics is highly effective to control the phenomenon of eutrophication [10].

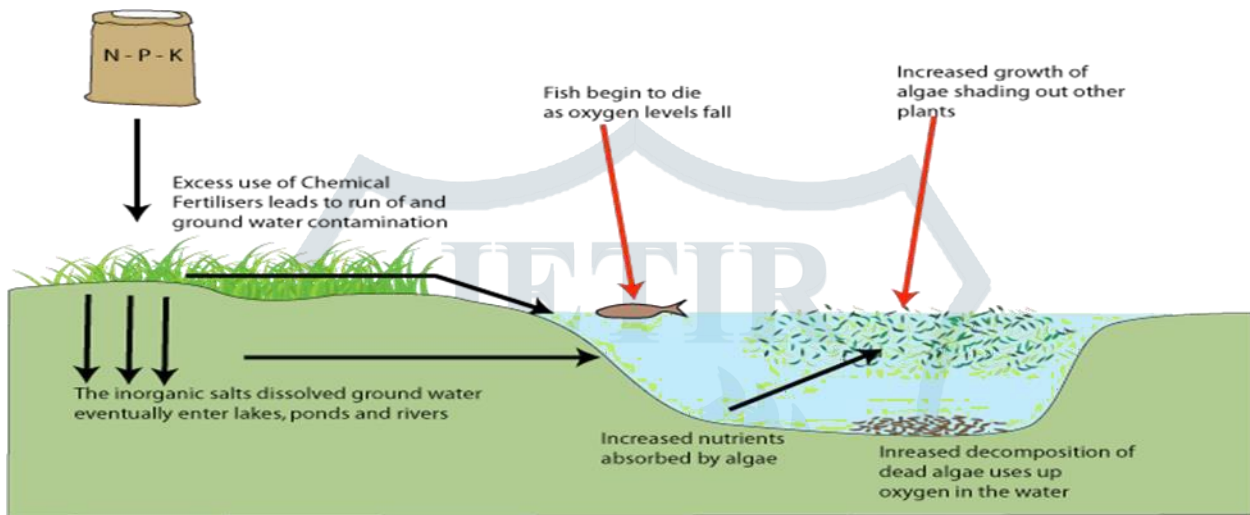


Fig:2 Eutrophication leading to ageing of lake thus reducing lake’s age [7].

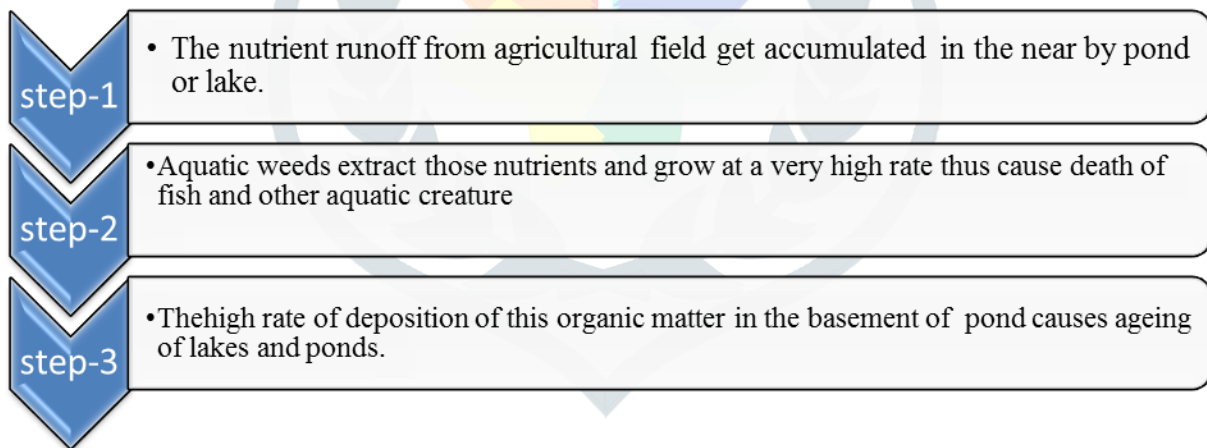


Fig:3 Flow chart of ageing of stagnant water bodies [10]

Use of Hydroponics in Present Day

The scientists of NASA have planned to grow crops using hydroponics in space [9]. As the length of mission on space is very long so the scientists have decided to find an alternative source by culturing crops in space.

Recently the Indian governments have launched the union budget of 2018-19 as Rs.500 crore for green operation. Under green operation the hydroponics can be effectively used to grow to mato and onion. Hydroponics is an effective technique in cultivation

of medicinal plants. In university of pisa an experiment was conducted on cultivation of Echinacea and basil (Ocimumbasilicum).The experiment proved that the biomass yield is good and even contamination is also less [10].

Conclusion

Hydroponics is a performance of culturing medicinal plants cultivation in terrace garden. Though the method of medicinal plant production is expensive still the yield is very high compare with vertical garden setup. It is advantageous to grow medicinal plant and other rare plant species. this performance is ecofriendly, better to use switch over to hydroponics as one of the major method of culturing crops.

References

- [1] Mamata D.sardare.etal assistant professor MIT academy of engineering AI and ipune. Are view on plant with out soil-hydroponics.
- [2] Dictionary of American History
- [3] KAEI-kazzazetal.-soil agriculture a new and advanced method for agriculture development an introduction
- [4] www.hydroponicsgardening.com
- [5] <https://in.image.seara.yahoo.com>
- [6] KeithRobert-How to hydroponics
- [7] <https://bigpictureeducation.com/hydroponics>
- [8] www.gov.nasa/mission
- [9] Maggini.etal.-Growing of medicinal plant in hydroponic culture.
- [10] Debjani Pandit and NeelamTyagi, A Review on Hydroponics and It's Utilisation in Present Day

