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INTRODUCTION OF SOIL CULTIVATION (HYDROPONIC SYSTEM) TO IMPROVE QUALITY AND QUANTITY OF VEGETABLE HORTICULTURE RESULTS

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ABSTRACT

Hydroponic techniques are horticultural plants of leafy vegetables, fruit, ornamental plants, landscaping, and medicines. The key to successful hydroponic farming lies in choosing the right system and intensive care, from nursery to harvest. In general, not many people, especially housewives, know and understand hydroponic farming techniques, so a deeper introduction is needed so that housewives can find out the real benefits. Many benefits can be taken from hydroponic cultivation. Communities need knowledge in order to know and understand these methods in-depth. Besides that, it can find out the benefits obtained if planting in hydroponics when compared to planting using soil media. The byproducts of hydroponic farming can get more additional income if managed properly because planting a hydroponic system does not require large tracts of land so as to maximize yields.

Keywords: Plant Cultivation, Hydroponic Systems, Vegetable Horticulture

1. INTRODUCTION

The hydroponic planting system is a method of cultivation without soil media but instead uses water media. Plants that can be cultivated with hydroponic techniques are horticultural plants of leafy vegetables, fruit, ornamental plants, landscaping, and medicines. In hydroponic techniques the treatment is given from the nursery to harvest, using the only nutrient solution as a planting medium. The hydroponics that is carried out indoors require special lighting to replace the sun's rays, so that the humidity will remain controlled and the problem of the emergence of bacteria does not occur.

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Commercially, hydroponics provides many advantages including saving water use up to 90%, suitable to be applied in areas that are difficult to water, can use narrow land and do not know the season. Profits Plants that are produced will be better, cleaner, healthier, safer and more practical because vegetables that are harvested are free of pesticides, so vegetables that are harvested and then washed can be eaten immediately. Easier maintenance of vegetables, faster harvest time and save labor.

The key to successful hydroponic farming lies in choosing the right system and intensive care, from nursery to harvest. By routinely monitoring the need for nutrient water discharge in storage tanks and measuring the suitability of the concentration of nutrient solutions (ppm levels) that will be given to the type and age of plants planted to remain stable. Furthermore, maintaining and maintaining the plant environment is always clean to support its growth.

While the tool used is Total Diluted Solid (TDS) meters, producing units of ppm (parts per million). TDS is used to measure the number of dissolved solids in a liquid (water), both organic and inorganic (mineral). With a TDS meter, it can measure water temperature and estimate the amount of nutrient adequacy/concentration of the solution needed by plants.

In general, not many people, especially housewives, know and understand hydroponic farming techniques, so a deeper introduction is needed so that housewives can find out the real benefits, namely by providing counseling and training. By inviting housewives to grow hydroponically, it is hoped that in the neighborhood, the residents can meet their food needs, especially vegetable horticulture and fruits that can be planted using hydroponic techniques.

How to grow hydroponics to use land that is not too broad, not much done. Seeing the number of narrow land such as the plots of land in the surrounding neighborhoods that have not been utilized maximally, it is very necessary to provide guidance so that the surrounding communities can utilize their plots to grow hydroponics while at the same time as entrepreneurs. This hydroponic system can increase the benefits of housewives in increasing the quality and quantity of vegetable and fruit horticultural crops in urban areas while maximizing the existing plots of land. Based on the background above, it will be possible to study several objectives which are the subject of this paper: (1) Provide an overview of the hydroponic system, (2) Explain and apply methods of growing hydroponically (3) Provide an overview of the benefits and hydroponic cultivation deficiencies (4) Describe and introduce the best way of hydroponic systems to housewives in order to provide maximum benefits and benefits.

2. HYDROPONIC SYSTEMS

2.1. Definition of Hydroponics

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Hydroponics (hydroponics) comes from the Latin language, hydro means water, and phonos means workmanship so that hydroponics is water that works. "Hydroponics is a farming activity carried out using water as a medium to replace soil. This water contains nutrients needed for plant growth and roots to develop in nutrient solutions (Lingga, P., 2011). This nutrient solution contains mineral nutrients needed by plants. Besides hydroponic planting can also use husk charcoal, gravel, coarse sand, or coconut fiber.

2.2. Hydroponic Systems Engineering

There are two main hydroponic system techniques in its development: the Hydroponic Substrate System (open system) is the way to plant it almost the same as conventional farming, using pots and solid media that can absorb or provide nutrients for water, oxygen and a little organic material, planting media used are made from artificial planting media such as husk charcoal, Rockwool, cocopeat, hydroton and sawdust, the nutrition provided by this technique is done by drip irrigation which is wetting some areas around the plant. Non-Substrate Hydroponic System (closed system), in non-substrate hydroponics, is cultivation by putting plant roots on circulating nutrients and containing nutrients according to the needs of vegetables and roots will develop in nutrient solutions.

2.3. Based on the Hydroponic System Nutrition Movement

Based on the nutritional movement, there are two hydroponic systems, namely: Active / Dynamic Hydroponics is a mobile solution circulating using a sample pump: NFT (Nutrient Film Technique) and Aeroponic, a circulating solution rich in dissolved oxygen, the initial investment are relatively expensive, installation is more complicated. Passive / Static Hydroponics, this system depends on the capillary force of the growing media. Example: Wick System (axis system) and Floating Hydroponic System (floating raft system). The excess is a nutrient-rich solution, absorbed by the medium and passed on to plant roots. Good for leafy vegetables, but not recommended for large fruit plants. Inability to provide sufficient oxygen through the roots to support plant growth. For optimal results, it can be helped by aerating air bubbles using Aerator / Bubbler like in an aquarium. Based on nutritional movements, there are two types of hydroponic planting methods:

1. Hydroponic Substrate (open system)

The hydroponic substrate is a way of planting almost the same as conventional farming.

a. Using pots and solid media that can absorb/provide water nutrition, oxygen, and a little organic matter.

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b. The planting media used are made from artificial planting media such as husk charcoal, rock wool, cocopeat, hydro towns and sawdust.

c. Nutrition in this technique is done by drip irrigation which is wetting a part of the area around the plant.

2. Non-Substrate Hydroponic System (closed system)

a. Passive / Static Hydroponics

Example: Wick System (axis system) and Floating Hydroponic System (floating raft system).

b. Active / Dynamic Hydroponics

Example: Hydroponic NFT (Nutrient Film Technique) and Aeroponics

Hydroponic Wick System (Wick System) is the simplest hydroponic method because it only utilizes the principle of water capillarity. The nutrient solution has flowed from the reservoir to the root of the plant above with the intermediate axis, "Similar to the Way of the Oil Stove".

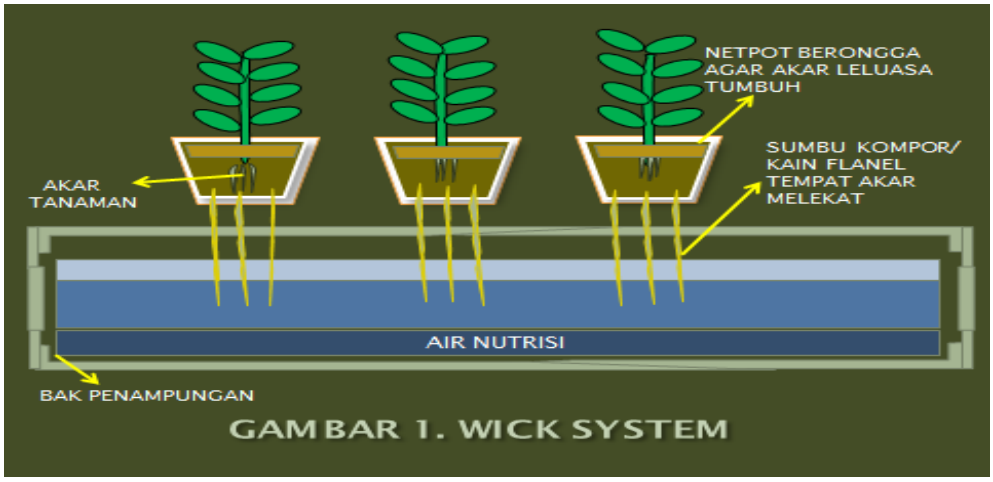

Figure 1: Hydroponics of the Wick System (Wick System)

Hydroponics NFT (Nutrient Film Technique) is a model of cropping cultivation by placing plant roots on circulating nutrients and containing nutrients according to vegetable requirements of 3mm so that the water (nutrition) and oxygen needs can be fulfilled. Good and balanced nutrition will help get maximum yields. This underlies the existence of a simple or automatic control system in a nutrient solution.

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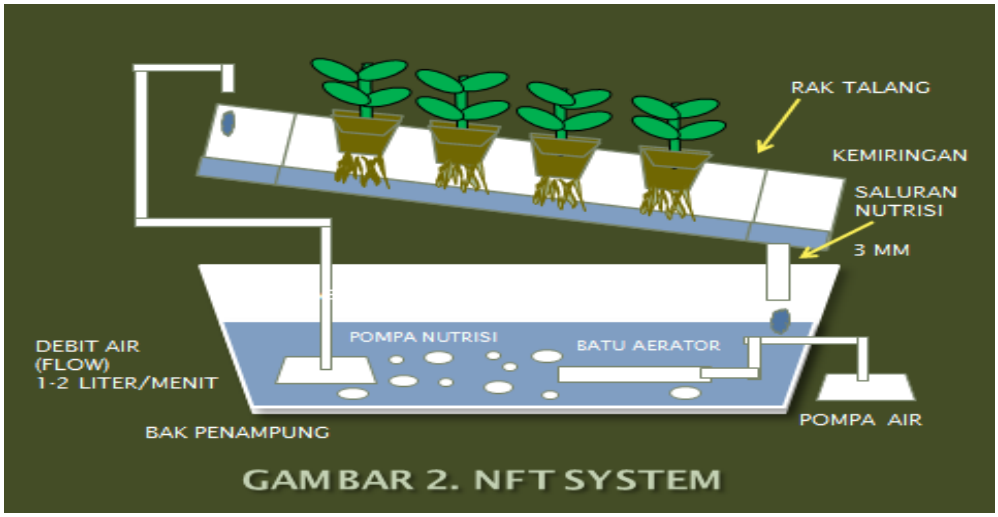

Figure 2: Hydroponic NFT (Nutrient Film Technique)

2.4. Hydroponic Media Requirements

The media used in growing hydroponic systems should meet the following requirements:

a. It contains lime or calcium and must be mild,

b. Has acidity from neutral to alkaline pH 6-7,

c. Free from pest and disease organisms,

d. Can store enough water for plant growth,

e. Easy to dispose of excessive and porous water,

f. It contains low salinity levels.

2.5. Nutrient and Oxygen Solution

Nutrient solutions that must be considered are the appropriate amount and element of pH. The pH element ranges from 5.5 -7.5. Nutrient solutions contain large concentrations of N, P, K, Ca, Mg and S, while the elements Fe, Mn, Zn, Cu, B, Mo and Cl in small amounts. The nutrient solution is made by dissolving fertilizer salts in water.

Oxygen plays an important role in growing hydroponic systems, lack of oxygen will make it difficult to penetrate cell walls, so plants will lack water and wither quickly because the solution does not contain oxygen. Giving oxygen into the solution can be through air bubbles like bubble water pumps used for aquariums.

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3. EXCESS AND LACK OF HYDROPONIC SYSTEMS

3.1. Hydroponic Advantages or Strengths

In choosing a hydroponic farming system, the advantages/disadvantages and disadvantages need to be considered so that the results can be in accordance with the desired needs.

a. Flexible Can be applied in various conditions, in urban areas with narrow land, hydroponics can be done on the porch of the house, garden in space, home yard.

b. Nutrition control is easy to do. The nutrient solution used is guaranteed to be balanced, because it is easier to add or reduce nutrients so that it is easy to control.

c. Higher production. Hydroponics produces two to four times higher production than conventional systems because essential nutrients are always available.

d. The resulting crop products are uniform because the plant media used are more stable and the irrigation system and nutrient circulation are standard.

e. Product quality is guaranteed in terms of product cleanliness and safety. Hydroponics uses sterile media and complete nutrient solutions so that the product is clean.

f. Save labor, because there is no-tillage and weeding.

g. While the hydroponic, fertilizing and irrigation systems are carried out with an electric pump, which is equipped with a timer.

h. It is easy to start a new planting because there is no-tillage, so you just need to replant it.

i. Saving water and fertilizer, the use of water and fertilizer in a hydroponic system is very efficient, because the amount of water and nutrient concentrations are given according to plant needs.

j. There are almost no weeds because the media used is not soil and sterile conditions, so as to reduce the growth of weeds.

k. Transplanting is easy to do

l. Replacing dead or damaged plants is easy.

m. Continuity of production maintained.

3.2. Hydroponic Weakness or Weakness

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a. The operation of a hydroponic system needs continuous monitoring, especially electricity and control of nutrient solutions.

b. If the planting area is attacked by disease, it will easily spread.

c. Requires workers who have special skills to run the hydroponic system.

d. If a failure occurs, it will cause a substantial loss.

e. Not all plants can be planted with the hydroponic method.

f. The initial investment is expensive.

g. Requires special skills to weigh and mix chemicals.

4. HYDROPONIC SYSTEMS HAVE NOT DEVELOPED IN THE COMMUNITY

4.1. Introduction Stage

The introduction of hydroponic farming systems in the community is needed, the first stage can be done by finding information from anywhere. Counseling and training can also be carried out to the expert level and advanced level, so as to obtain maximum results. It is hoped that after finishing receiving training, the community can utilize their skills well so that they can be applied to improve their standard of living. The main community is farmers, usually doing farming activities using land media. The introduction of planting with a hydroponic system needs to be introduced so that the community can provide an assessment of the hydroponic farming system compared to the method of planting using land so as to maximize yields.

A. Information from the Book Reference

Reference books on hydroponic planting and ways of making installations on hydroponics have been widely circulated in bookstores, even on social media, but the public is still not moved to learn them and practice them. This is due to the fact that planting hydroponic techniques is still difficult to do, so the community still needs assistance in doing so.

B. Counseling

Counseling methods are generally associated with a device or system to be used. The explanation will be explained briefly about various counseling methods that will be carried out. A good extension method really needs to be applied to provide an introduction and in-depth understanding of landless cultivation (hydroponic systems), how it works, the benefits and

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benefits obtained when using a hydroponic system, weaknesses of the hydroponic system, which method should be used, adjusted with plants to be planted.

C. Hydroponic Systems Training

Hydroponic technical training for the community should be carried out, to provide skills to an advanced level, to the community, in order to be able to create a joint entrepreneurial business in their environment. For this reason, cooperation from government agencies and private parties is expected to provide training as well as assistance, so that the hydroponic system cultivation technique is more developed and popular. With an instructor who has sufficient expertise, will minimize the risk of mistakes and failures in the implementation of planting.

4.2. The Development of Hydroponics in Indonesia

The development of hydroponic cultivation system cultivation in Indonesia is still not much in demand by the community, so it is necessary to conduct counseling and training so that the hydroponic farming system is growing. Hydroponic techniques require a fairly high investment and require special expertise. It is this factor that inhibits hydroponic plantations that have not been widely carried out in Indonesia. But now there are already Indonesian hydroponic entrepreneurs who have succeeded in exporting produce harvest the garden. Regions in Indonesia that have planted hydroponic techniques are in Jabodetabek. Currently, in West Java, simple hydroponic cultivation can be witnessed in Lembang, Purwakarta, and Garut while in East Java can be found in Nangkojajar (Pasuruan), Bedali Lawang and Batu (Malang).

4.3. Introducing Hydroponic Farming in Rumha Ladders

In hydroponic cultivation techniques require expertise to an advanced level in the field. Starting from the introduction and understanding of planting a true hydroponic system, to conducting training and assistance, so that the community can apply and utilize it for their own environment. The community, especially housewives, needs to know the hydroponic system deeply because there are many benefits and benefits that can be derived from growing a hydroponic system. In general, housewives (who do not work) only depend on the salaries of their husbands. The work of a mother in the household itself is very dense, so with entrepreneurial business at home, the mothers do not need to find a side job outside the home. By attending counseling, training in hydroponic system farming to an advanced level, mothers are expected to apply it in their own plots. Besides the beginning as a hobby, a farming hydroponics system can be maximized to get profit, so it can be used to increase family income. Thus this hydroponic system can be cultivated commercially, with good and maximum management and maintenance that will produce quality crops, which in the long run will have an impact on improving their welfare.

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5. CONCLUSION

Hydroponic cultivation is planting without soil media, can use nutritious solutions, husk charcoal, sand, coal, coconut coir, gravel and so on. Many benefits can be taken from hydroponic cultivation. Communities need knowledge in order to know and understand these methods in-depth. Besides that, it can find out the benefits obtained if planting in hydroponics when compared to planting using soil media. The byproduct of hydroponic farming can get more additional income if managed properly because planting a hydroponic system does not require large tracts of land so that it can maximize yields. Hydroponics is a farming system without soil media that can produce good quality crops. The government should provide counseling and training to the community, then provide capital loans, so that the community can try to plant with hydroponic techniques. If counseling, training and pilot planting provided during the training goes well, then the community (PKK mothers) can apply the knowledge they have to grow medium-scale hydroponics in their environment.

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