

Hydroponic Development Training in Bukit Sari Village, Padang Tualang District as an Efficient Land Use Effort

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ABSTRACT. *Training is an effort to develop skills through experiential learning. Hydroponic-making training is a work program that is implemented in field group activities. The training is aimed at the people of Bukit Sari Village so that the village community is educated and can use the land efficiently by planting vegetables using a hydroponic system, and hydroponic training uses the demonstration method. Our organization employs an action research design that aligns with the principles of hydroponics. Specifically, on August 5, 2022, we executed training activities in Bukit Sari Village, located within the Padang Tualang District. The implementation sequence begins with preparation, implementation, and closing stages. The training that was carried out showed an increase in the pre-test and post-test results regarding community knowledge about hydroponics. The average community pre-test result was 58.1, and the community post-test result was 85.4, with an average increase of 27.4. People who are enthusiastic and open to receiving hydroponic training support these findings, demonstrating increased public knowledge and understanding of hydroponics. Hydroponic training activities have been implemented and have provided numerous benefits to the community, including increased productivity, creativity, and innovation in land and time utilization. The community can consume healthier vegetables, and besides that, the community can also increase the economic value of their own family and the village where they live.*

Keywords: *Development, Hydroponics, Training, Vegetables*

INTRODUCTION

The word hydroponics comes from Latin, 'hydro' meaning water and 'phonos' meaning work; thus, hydroponics can be interpreted as water

working . Hydroponics is a growing activity that uses water as a plant nutrient source by dissolving minerals in the water (Istiqomah, 2007) ; (Hidayat, 2020). Hydroponics is an agricultural method that uses water as a substitute for soil for plant growth, reducing the need for extensive land. It is primarily feasible in areas like yards and rooftops and only requires a small area for its implementation (Putra, 2019); (Singgih, 2019).

The use of hydroponics in farming has many benefits and advantages. Farming with hydroponics can be done without using soil, thus saving land. Water circulation will be maintained by utilising a hydroponic system so that water can continue to be utilised. Simple hydroponics can be made by utilising used items at home so that they become useful items. Using a hydroponic system, the plants produced are more hygienic, the plants are protected from weeds, the plants get more nutrients, and the growth of plants is faster, thus providing promising harvests. In addition, by using a hydroponic system, plants can not only be planted horizontally but also vertically (Alviani, 2015) .

Crops grown using hydroponic systems are vegetables, ornamental plants, and seasonal fruit plants. These are plants that have high economic value. So, not all types of plants can be grown with a hydroponic system. Some vegetable crops that can be grown hydroponically are lettuce, pakcoy, mustard greens, kale, kailan, and peppers (Hendra, 2014).

Training is an effort to develop skills through experiential learning activities (Kusuma, 2019); (Fitriani, 2022). Hydroponic training is one of the work programmes implemented in field course groups. The training is aimed at the Bukit Sari Village community so that the village community is educated and can utilise land efficiently by planting vegetables using a hydroponic system.

Many people like to consume vegetables because they are rich in substances that nourish the body, as they are a source of vitamins, minerals, protein, vegetable matter, and fibre (Fatimah, 2020); (Asnah, 2016); (Yosandy, 2018). Hydronic planting offers benefits over traditional soil media, including potential pest and disease mitigation, higher product quality, increased market value, and lower selling prices (Rakhman, 2015).

Bukit Sari village is located on an oil palm plantation, which is far from the city. By utilising a hydroponic system to grow vegetables, it will be easier for the community to consume vegetables. In addition, the benefits of utilising hydroponics, in the long run, will improve the community's economy, as Sri Mukti Wirawati and Sri Ndaru Arthawati (2021) implemented a hydroponic training activity programme that was

able to increase community productivity during the pandemic. Therefore, implementing hydroponic manufacturing training aims to educate the community on how to make hydroponic vegetable plants by utilising existing land (Sri, 2021). Verticulture, also known as vertical plant cultivation, is a sustainable and visually appealing method that can be beneficial for urban and rural residents with limited land area, as it allows for the creation of an environmentally friendly landscape (Siregar, 2021).

METHODS

This service uses an action research design based on the concept of hydroponic implementation. The training activities were conducted on August 5, 2022, in Bukit Sari Village, Padang Tualang District. Hydroponic training was conducted using the demonstration method. The training activities were conducted on August 5, 2022, in Bukit Sari Village, Padang Tualang District. The sequence of implementation of training activities consists of three main stages, namely, starting with the preparation stage. At this stage, field course groups (KKN) students prepare hydroponic tools and materials and proceed with pre-test activities. The next stage is the implementation stage, namely the delivery of material about hydroponics and demonstrations of making hydroponics, starting with seeding plant seeds, making nutrients, moving seedlings, and educating people on how to harvest hydroponics properly and correctly. The last stage is the closing stage. At this stage, the community participating in the training was given a post-test to test the community's understanding of growing with a hydroponic system.

The selection of instruments and equipment should be tailored to the type of hydroponic system being built and the plant's needs. Regular monitoring and control using instruments will help to ensure optimal conditions for hydroponic plant growth. The community registered with the committee to become trainees, ensuring their high desire to participate in hydroponic training activities. Data collection for this service involved using a questionnaire focused on implementing hydroponic training and utilising the JASP application.

RESULTS AND DISCUSSION

The implementation of the hydroponic training was carried out in three main stages, namely the preparation stage, the implementation stage, and the final or closing stage. The preparation stage of the hydroponic training was characterised by preparing the tools and materials needed. The tools and materials used in making hydroponics are:

1. Styrofoam
2. Rockwall
3. Netpot

4. Knife
5. Pen
6. Container
7. Measuring cup
8. Water
9. Plant seeds.
10. AB Mix Nutrient

Before implementing the training, the community members who participated were given a pre-test first. Then, at the implementation stage, the community was educated and counselled about growing with a hydroponic system. After that, the community was guided to demonstrate how to sow seeds on rock wool, compound nutrients, transplant seedlings, hydroponic plant care, and harvesting.

1. Seed Sowing

Before sowing the seeds, it is necessary to prepare rock wool that has been measured in boxes and perforated first, then put the seeds according to the rock wool box. After that, wet the rockwool with water, ensuring that all parts of the rockwool are wetted with water. Sowing seeds should be done in the afternoon. The next day, place the seeds directly under the sun so that their growth is good. Seeds that have been sown will germinate and produce plant seeds, which will later be transferred to the hydronic net pot system. For seedling care, ensure the rock wool is always wet, and the seedlings are exposed to sufficient sunlight for at least 5-8 hours.

2. Nutrient Compounding

Nutrients are compounded once the seedlings have been transplanted into the net pot. The nutrients used are a mixture of nutrient A and nutrient B, or AB mix, with 5 ml each of A and B dissolved in 1 litre of water. Nutrients A and B mix are nutrients used as a substitute for nutrients in the soil because the hydroponic system does not use soil as a growing medium but water.

3. Transplanting Seedlings

Transplanting is done when the third leaf of the seedling has grown. Good seedlings are those whose stems are not too tall and whose leaves are wide. The seedlings are transferred into the net pot and placed in Styrofoam perforated according to the net pot. The Styrofoam must be filled with nutrient water first, and then the seedlings are placed inside. The size of the nutrient water in the Styrofoam is under the seedlings' rockwool, meaning that the water level in the Styrofoam should not exceed the rockwool, let alone reach the plant stems. If the plant stems are still easily submerged in nutrient water, the plants may die.

4. Hydroponic Plant Care

Taking care of hydroponic plants is not too difficult, but we must diligently check and pay attention to the growth and development of plants, starting from the roots, stem and leaf growth, and pests that may be attached to the plant. Pests that may be present on hydroponic plants are usually insect pests. Hydroponic plants cannot use non-organic pesticides that contain chemicals, so we must diligently check our hydroponic plants. To overcome pests, we can use organic pesticides such as chilli pepper solution, papaya leaf solution, or tobacco solution. In addition, the main thing to note is the availability of nutrient-rich water in Styrofoam. Hydroponic plants should not dry out, so make sure the plants' water needs are well maintained.

5. Harvesting

Harvesting can be done 30–35 days from the time of sowing. A good harvest is done in the morning or evening so that the freshness of the plants can be maintained. Harvesting hydroponic plants is done by taking all parts of the plant, which are lifted directly from the rock wall where the plant is attached.



Figure 1: Atmosphere of Hydroponic Training

Hydroponic vegetables are gaining popularity due to their superior quality, freshness, and cleanliness, leading to a consistent annual growth trend in the Indonesian market as customers transition from traditional to hydroponic vegetable consumption (Savira, 2019). Hydroponic farming is a versatile and cost-effective method for recreational and commercial purposes, especially in regions with limited land availability. It can be conducted in residential yards or on household terraces, making it an ideal choice for small-scale cultivation (Izzuddin, 2016). The community organisation want to enhance household income through hydroponic farming and encourages a shift towards using residential yards for economic purposes (Putra, 2019); (Misrah, 2020).

The hydroponic planting system consists of several main things, namely: (1) the nutrients used for plants to grow and develop are dissolved, sprinkled, or dripped into the water; (2) it does not require a wide planting space so that even though we have little land, we can still produce productive plants; and (3) it does not use harmful pesticides, and plants must be protected from pests (Syamsu R, 2014).

The primary use of hydroponics in the Bukit Sari Village community is to support and increase food security, according to research by Waluyo (2021), who found that with hydroponic training, the community's understanding of hydroponics has increased so that they can manage land for food security. With the hydroponic training, it is hoped that the people of Bukit Sari Village can practise the knowledge they gain and further develop hydroponics in the village (Waluyo, 2021).

After completing the implementation stage, the closing stage was concluded, where the community members who had participated in the hydroponic training were given a post-test. The following are the results of the pre-test and post-test of the hydroponic training, as illustrated in Table 1 below.

Table 1. Community Understanding of Hydroponic Training

No.	Kategori	Pre-Test	Post-Test t	Average Increase
1.	Definition of hydroponics	62,5	90	27,5
2.	Tools and materials used in the hydroponic planting system	10	25	15
3.	Types of plants that can be grown with a hydroponic system	90	100	10
4.	Nutrients needed by hydroponic plants	45,6	100	54,5
5.	How to care for hydroponic plants	84,5	93	8,5
6.	How to harvest hydroponics	22	90	68
7.	Advantages of hydroponics	92	100	8
Rata-rata		58,1	85,4	27,4

Based on Table 1, there is an increase in the pre-test and post-test results regarding community knowledge about hydroponics. It is known that the average community pre-test result is 58.1, and the community post-test result is 85.4, with an average increase of 27.4. This shows an increase in community knowledge and understanding of hydroponics. The community is very enthusiastic and open to receiving hydroponic training, which supports these findings. This is in line with Hardin et al. (2021), who states that in the

implementation of hydroponic training, the community is very enthusiastic and welcomes the training activities. (et al., 2021).

The community is expected to know about hydroponic growing plants, which can be a viable alternative to traditional methods for those lacking land resources (Singgih, 2019). The counselling had to improve villagers' understanding of hydroponics through lectures, interactive sessions, and practical demonstrations. An experiment was conducted using the wick system, focusing on plant management and its importance in evaluating hydroponic cultivation efficacy (Hidayat, 2020).

The village community is set to benefit from mentoring initiatives that will provide valuable knowledge about hydroponic cultivation, educating them about various plant species that can be grown using hydroponic techniques (Solikhah, 2018); (Dur, 2021). Hydroponic vegetable cultivation in communities has received positive feedback from residents, especially in domestic tasks involving stages such as seed preparation, planting, plant maintenance, and harvesting (Sutarni, 2018).

CONCLUSIONS

Based on the implementation of hydroponic training, hydroponic training activities provide many benefits to the community, including the community being productive, creative, and innovative in utilising land and time. The community can consume healthier vegetables; in addition, the community can increase the economic value of their own family and the village where they live. Thus, it can be suggested that the community understand hydroponic farming.

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