IJOCORE
Indonesian Journal of Community Research & Engagement
Available online at https://serambi.org/index.php/ijocore/index

Implementation of Smart Hydroponics in Binor Village

Abstract— *Hydroponics is cultivating plants without using soil but using water. Apart from using water, hydroponic plants need nutrients to maintain the quality of the plants. There are several methods for watering hydroponic nutrients, including DFT (Deep Flow Technique). DFT is a hydroponic system that uses a flat installation to create a pool of water and nutrients in the installation. The aim of using smart hydroponics is to design a Monitoring and Control System for Mixing Nutrients and Water pH in Hydroponic Plants. Smart hydroponics is also equipped with Internet of Things (IoT) for remote control and monitoring which is implemented in the Binor Village Harmony Earth Tourism. The control system used is an Arduino microcontroller and the Blynk application. The implementation of the Smart Hydroponic control system is a form of training for the young people of the Binor Village Youth Organization to care for plants in the Bumi Harmony tourism area in Binor Village, Paiton District, Probolinggo Regency.*

Keywords— *Hydroponics, Internet of Things, Smart Hydroponics.*

✉ Corresponding author
Indonesian Journal of Community Research & Engagement, 01 (01), 2022, 00-00
P-ISSN: 2962-9268, E-ISSN: 2962-925X | DOI: http://doi.org/10.15408/ijocore.vxix.xxxx

1 Introduction

Hydroponics is one of the hydroponic systems of the future, hydroponics can be used anywhere, including in villages, cities, open fields, apartment buildings and so on. Hydroponics is cultivating plants without using soil, caring for plants in hydroponics is easier to care for than using soil media, and makes it easier to control nutrition and protect plants from pests to maintain the quality of plants in hydroponics.

This hydroponic uses rockwool planting media for plant containers and absorbs nutrients in flowing water. Every hydropic plant requires certain nutrients, both in terms of pH and ppm. It is necessary to check regularly so that the nutrients obtained by the plants are in accordance with their needs. (Mufida et al., n.d.)

Nutrient A-B Mix or fertilizer for hydroponics, Nutrient A-B is a solution made from chemicals that are given through the planting medium, this nutrient functions for plants to develop well. Nutrients or herbal fertilizers have macro and micro factors that are combined to fertilize plants in hydroponics. Hydroponic nutrients or A-B Mix fertilizer are specially formulated for plant types such as leaf vegetables (spinach, lettuce, pokchoy), and fruit (peppers, melons, strawberries, tomatoes) and others.

The hydroponic system widely used is a DFT (Deep Flow Technique) system where the concept is that the base of the plant is placed in a water structure with a water height of 3-4 centimeters, the water circulates with the help of a pump and mixes nutrients that have been mixed by a smart control device to adjust with plant needs. Smart hydroponic devices have many benefits for residents who don't have much time to spend time with them because they can be controlled remotely. (Pohan & Oktoyournal, 2019)

The problem of unequal public knowledge in technological knowledge and insight in caring for hydroponic plants which causes hydroponic plants to not produce optimal growth and quality, so that hydroponics that use manual nutrition methods do not lack or excess nutrients which causes hydroponic plants to develop slowly, the leaves are not green and The worst risk is death in hydroponic plants.

To overcome this problem, it is necessary to have a tool to mix nutrients and balance nutrients according to the needs of hydroponic plants. It is important for the public to be aware of increasingly rapid technological developments in order to broaden their knowledge to make work easier and make time, place and work more efficient in the agricultural sector. Socialization on the application of smart hydroponic technology to Karangtaruna youth in the Bumi Harmony tourist area in Binor village, Paiton sub-district, Probolinggo district.

Research entitled Design and Development of a Nutrient Control System for hydroponic plants based on the Internet of Things which can monitor and control these parameters using a smartphone, making it easier for farmers or users to check even remotely. Where there are several tools that support the manufacture of this tool, namely a pH sensor as a detector of acids and bases in water and nutrient solutions, a TDS sensor as a detector of nutrient content solutions, an Ultrasonic HC-SR04 sensor as a detector for the level of nutrient water, an I2C LCD as a display, water pump which distributes nutritious water solutions to plants, BLYNK which controls hardware remotely and can display sensor data and store visual data. Arduino Uno to control all components, and Esp 8266 to connect to WiFi or the internet.

2 Method

Community service activities take the form of socialization by inviting youth youth from Binor village and Bumi Harmony tourism managers. The method used in this activity is qualitative. The implementation method for socializing smart hydroponic tools.

1. Observation / interview

The method for carrying out this activity is by visiting hydroponic plants in the Bumi Harmony tourist area. The officer who looks after the tourist village is a youth group from Binor village who was then interviewed with various questions about hydroponic plants. The questions asked are, seeding, planting, care, mixing nutrients, plant pests, risks of excess and lack of nutrients, daily maintenance.

2. Socialization and discussion

The method for carrying out this activity is to hold socialization by making a presentation using PPT and practicing directly how the tool works. In carrying out this socialization, the resource person provides an explanation of the material that has been prepared, then at the end of the socialization, the resource person can open a discussion session for participants who want to ask questions about material they don't understand or questions about problems often faced by business people. Resource persons can answer the questions given and provide future solutions so that business actors can solve problems properly and correctly.

3 Findings And Discussion

3.1 Finding

Monitoring the use of hydroponic plants is very important to determine plant growth. Mixing nutrients and nutrient dosages to plants in hydroponics will show the quality of the plant. If excess or lack of nutrients will cause the plant to grow abnormally and the worst consequence is that the plant can die. Smart Hydroponics is a solution for the community, especially in the Bumu Harmoni area, for caring for plants and controlling nutrition automatically to maintain or maintain plant quality and is also equipped with remote monitoring so that the owner can see it from his gadget.

Fig. 1. Controlling and monitoring Smart Hydroponics

Socialization on the use of Smart Hydroponic tools was carried out in the Bumi Harmony tourism area, precisely in Binor village, Paiton sub-district, Probolinggo district on Saturday, December 2 2023. The targets of this activity were workers at Bumi Harmony tourism, the Binor village youth group and local communities who use hydroponic planting systems.

This socialization has the theme of using smart hydroponic tools in Binor village. Initially, the resource person discussed the benefits of using hydroponic planting methods, types of plants that can be planted using hydroponic methods, manual care, mixing nutrients. Manual care will require time and energy to care for plants, mix nutrients and monitor nutrient levels every day. The benefits of the Smart Hydroponics tool make it easier to maintain nutrient mixing and can be monitored from the gadget.

3.2 Discussion

The next activity is to hold discussions with the management of the Bumi Harmony area, Karangtaruna and the community. Participants were very enthusiastic about asking questions and sharing their experiences of problems in treatment using the hydroponic method. The resource person answered and provided the right solution to solve the problems experienced by the participants. Questions from the participants included regarding the dosage for mixing nutrients and types of nutrients for hydroponic plants.

The socialization and discussion activities were completed, then continued with the handover of tools and placement of equipment in the Bumi Harmony tourist area by KKN students. This activity ended with a group photo with KKN students at the location where the smart hydroponic equipment was placed at the Bumu Harmony tourist spot.

4 Conclusion

More and more people are using the hydroponic planting method because it does not require soil and does not require large areas of land and can be moved. Smart hydroponics is an important tool used to make it easier to care for and control plant nutrition so that the quality of plants using the hydroponic planting method can be maintained properly. The disadvantage of this tool is that it needs to be close to a source of electrical energy because there is a pump, as well as equipment for control that requires an electricity supply. For those who will develop this tool to add an independent energy source so that its use can be placed in areas/locations far from PLN electricity.

5 References

[1] Aprillia, S., & Myori, D. E. (2020). Pengontrolan Electro Conductivity pada Larutan Nutrisi Hidroponik Berbasis Arduino. In *JTEIN: Jurnal Teknik Elektro Indonesia* (Vol. 1, Issue 2).

[2] Gozal, R. P., Setiawan, A., & Khoeswanto, H. (2020). Aplikasi SmartRoom Berbasis Blynk untuk Mengurangi Pemakaian Tenaga Listrik. *Teknologi Industri*, *8*, 1–7.

[3] Handoko, P. (2017). *Sistem Kendali Perangkat Elektronika Monolitik Berbasis Arduino Uno R3*. *November*, 1–2.

[4] Katu, U., Nurul Chumaerah, A. M., Hikma, N., Jurusan Teknik Elektro Politeknik Negeri Ujung Pandang, D., & Jurusan Teknik Elektro Politeknik Negeri Ujung Pandang, M. (2019). *SISTEM FERTIGASI BERBASIS INTERNET OF THINGS (IoT)*.

[5] Mubarok, S., Wisnu Dwi Wahyudi, D., & Octaviany, D. (2018). Pemanfaatan Modul RTC Berbasis Arduino Mega Sebagai Penentu Variabel Nutrisi Pada Sistem Kontrol Hidroponik. *Jurnal Transistor Elektro Dan Informatika (TRANSISTOR EI*, *3*(1), 5–8.

[6] Mufida, E., Septian Anwar, R., Khodir, R. A., Prihan, I., Program, R. 4, Komputer, S. T., Kmputer, I., Teknologi Dan Informasi, F., Bina, U., & Informatika, S. (n.d.). *Perancangan Alat Pengontrol pH Air Untuk Tanaman Hidroponik Berbasis Arduino Uno*. http://ejournal.bsi.ac.id/ejurnal/index.php/insantek

[7] Mustika Julyana, S., & Meidy Suhendar dan, R. (2018). Hal. 69-72 Sistem Pengendalian Nutrisi pada Tanaman Kangkung Hidroponik Menggunakan Mikrokontroler Arduino Mega 2560, Shinta Mustika Julyana. *Ronal Meidy Suhendar Dan Janizal*, *3*(2).

[8] Pohan, S. A., & Oktoyournal, O. (2019). Pengaruh Konsentrasi Nutrisi A-B Mix Terhadap Pertumbuhan Caisim Secara Hidroponik (Drip system). *LUMBUNG*, *18*(1), 20–32. https://doi.org/10.32530/lumbung.v18i1.179

6 Authors

1st Fuad Hasan is the head of the electrical engineering study program at Nurul Jadid Paiton University, Probolinggo(email: fuadhasan@unuja.ac.id)

2nd Abdus Salam Helmi is the head of the electrical engineering study program at Nurul Jadid Paiton University, Probolinggo(email: h2367213@gmail.com**)**

3rd Gilang Novaldi is the head of the electrical engineering study program at Nurul Jadid Paiton University, Probolinggo(email: gieva7631@gmail.com**)**

Article submitted xxx-xx-xx. Resubmitted xxx-xx-xx. Final acceptance xxx-xx-xx. Final version published as submitted by the authors.