

Increasing the Variety of Vegetable Products Using Hydroponic Formulation Technology

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Abstract

Demand for horticultural commodities, especially vegetables, continues to increase along with population and prosperity. As science and technology develop, society becomes aware of the importance of providing healthy, pesticide-free food, and hydroponic vegetable cultivation is starting to attract the public. The method used in service activities is technology transfer/socialization regarding the need for product variations. The transfer of material will illustrate that the more types of products provided, the more attractive consumers will be. After the outreach activities, there was an increase in understanding of the hydroponic cultivation of cherry tomatoes. The product that will be developed in this activity is cherry tomatoes. Cultivating cherry tomatoes, making installations, and making nutritional formulas. Furthermore, after socialization, assistance was provided in the cultivation process, making installations, and making nutritional formulas. This community service activity does not only involve staff CV. Pesona21 also involves street vendors and apprentice students. Expansion of cherry tomato products begins with the installation and preparation of planting media. Next, care is carried out until the hydroponic cherry tomatoes are harvested.

Keywords: Empowerment, cherry tomatoes, hydroponics

INTRODUCTION

Demand for horticultural commodities, especially vegetables, increases along with population and prosperity. According to data from the Statistics Indonesia gross domestic product (GDP) grew by 2.59% annually in the fourth quarter of 2020. This positive growth was influenced by increased demand for vegetable commodities during the COVID-19 pandemic (Kementerian Pertanian Republik Indonesia, 2021). Along with science and technology development, people tend to be more aware of the importance of providing healthy, pesticide-free food. Simultaneously, hydroponic vegetable cultivation starts to attract the public.

One of the horticultural commodities which is currently developed in the agriculture sector is hydroponic vegetables. Hydroponic vegetables is known as fresher, cleaner, and healthier quality vegetables than conventional ones (Rosliani & Sumarni, 2005). It is caused by the cultivation process is relatively hygiene, using sterile media, and tends to avoid plant pests and diseases, which is free of synthetic pesticide residues. These advantages attract consumers who practice a healthy lifestyle by converting conventional vegetables into hydroponic vegetables. CV. Pesona21 Purwokerto is one of the agriculture companies in Banyumas District which focus on developing hydroponic systems, especially in vegetables. However, the variety of vegetables still lack. Cherry tomatoes have high economic value and hydroponic system could has known could produce good

quality harvest. (Wulansari et al., 2021). Therefore, we are interested in widening the cherry tomatoes as the variety of horticultural vegetable products in CV. Pesona21 Purwokerto.

METHOD

The community service used technology transfer method by socializing the needs of product variations. The socialization materials focus on illustrating the types of vegetables including the development process which is more attractive to the consumers. The targeted type of vegetables in this activity is cherry tomatoes. The socialization also included the topic of cultivating cherry tomatoes, installations processes, and procedure of nutritional formulas making. Furthermore, after socialization, we provided assistances during the cultivation process, installation process, and making nutritional formulas for cherry tomatoes. This community service activity participated all staff of CV. Pesona21, intern college students in company and street vendors near company.

RESULTS

The hydroponic vegetables developed by CV Pesona21 include leaf vegetables such as lettuce, choy, kale, and pagoda (figure 1), while have develop fruit vegetables yet, such as cherry tomatoes. By increasing the variety of products, CV Pesona21 can increase income and increase the knowledge of intern students. This activity is carried out in 2 directions to make the transfer of material more optimal (figure 2).

Hydroponic vegetables are a horticultural commodity currently being widely developed in the agricultural sector. Hydroponic vegetables produce fresher, cleaner, healthier quality vegetables than conventional vegetables (Rosliani & Sumarni, 2005). That is because the cultivation process is relatively clean, uses sterile media, and tends to avoid plant pests and diseases, so it is free of synthetic pesticide residues. These advantages attract consumers who have changed and implemented a healthy lifestyle by converting consuming conventional vegetables into hydroponic vegetables.

Demand for horticultural commodities continues to increase along with increasing prosperity and population. The survey results show that the higher the income, the higher the expenses incurred to meet monthly vegetable needs. That opens up market opportunities to increase vegetable production both in quality and quantity. One thing that can be done to improve quality and quantity is hydroponic technology. CV Pesona21 has been carrying out hydroponic vegetable cultivation since 2018. The vegetables developed to date are leaf vegetables.

As people's needs for healthy living grow, it is necessary to develop a variety of products, not only leaf vegetables but fruit vegetables also need to be developed to meet needs. Fruit vegetables that can be developed include cherry tomatoes. Cherry tomatoes are a type of tomato that people like. Besides their sweet taste, cherry tomatoes are suitable for pairing with hydroponic green vegetables as a salad or garnish. The price of cherry tomatoes reaches IDR 30,000, so cherry tomato farming is more profitable than regular tomatoes.

Before socialization, participants filled out a questionnaire. The questionnaire explains hydroponic cherry tomato cultivation, starting from sowing, formula making, care, and harvest (table 1). The questionnaire shows that the general understanding of hydroponic vegetable cultivation is already known with a score of 90; however, for hydroponic cherry tomatoes, the level of knowledge is 25. After socialization, knowledge about hydroponic cherry tomatoes increased to 95.

Community service activities are carried out in 2 stages. The first stage is socialization/transfer of material. Transfer material regarding the need for product variations. The transfer of material will illustrate that the more types of products provided, the more attractive consumers will be. The product that will be developed in this activity is cherry tomatoes. Cultivating cherry tomatoes, making installations, and making nutritional formulas. The cherry tomatoes selected and the media used are based on the results published by (Wulansari et al., 2022), namely the Rojita variety and cocopeat media. Combining the Rojita cherry tomato variety and cocopeat media can survive and produce high production in the lowlands. Cocopeat has micropores that can inhibit water movement to provide water for plants (Triana et al., 2017). Applying a nutrition formula helps increase growth and yield because it contains organic and biological ingredients necessary for the growth of cherry tomatoes. Proper nutrition will support the growth and production of cherry tomatoes (Manalu & Rahmawati, 2019).

From the results of the outreach, it is known that there is an increase in knowledge regarding hydroponic cherry tomato production. Staff and interns previously only had 25% understanding, but after socialization, the level of understanding became 90%. Staff and students initially only knew the hydroponics of leaf vegetables using the NFT system and fertilizer with synthetic fertilizers. Currently, staff and students know hydroponics with other types of plants, namely cherry tomatoes, with different techniques. The installation technology used is drip irrigation model technology, where the nutrient formula will flow slowly so that the plants optimally absorb it.

Expansion of cherry tomato products begins with installation and preparation of planting media (figure 3). At this stage, it was attended by staff, intern students, and PKL students. Next, care is carried out until the hydroponic cherry tomatoes are harvested (figure 4).

The advantage of the drip irrigation system is that it can save nutrient use because it can minimize water loss that will occur through percolation, evaporation, and surface runoff (Widiastuti & Susilo Wijayanto, 2018). Optimum nutrient absorption can stimulate plant growth and yield. Apart from that, using drip irrigation can save costs because the electricity is not always on. Drip irrigation is made permanent on a production scale so that it can be used for several growing seasons.

The nutritional formula is made by combining reduced doses of AB mix according to plant age, organic fertilizer available on the market, and biological fertilizer derived from the bacteria *Pseudomonas fluorescens*. These three ingredients have their respective roles: AB mix provides nutrition and concentration, biological fertilizer provides organic nutrients sustainably needed by plants, and biological fertilizer can stimulate plant growth and trigger plant resistance to disease during cultivation. By reducing the AB mix and adding organic fertilizer and biological fertilizer, the organic material content in cherry tomatoes will increase, thereby improving quality.

CONCLUSIONS AND RECOMMENDATIONS

Based on the service activities that have been carried out, there has been an increase in the knowledge and abilities of staff CV. Pesona21 and student interns related to expanding product variations with hydroponic cherry tomatoes. Increasing the knowledge and abilities of staff CV. Pesona21 and student interns were shown during the cultivation process through to maintenance.

No plants died due to pests or lack of nutrition. Hydroponic cherry tomatoes grow optimally, flower profusely, and already show fruit. With the successful expansion of product variations, it is hoped to have opportunities. CV Pesona21 can further develop both on a local and national scale.

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APPENDIX

Table 1. Assessment Aspects

No.	Rated aspect	Performance Achievement Level				
		1	2	3	4	5
1	Understanding hydroponic cultivation of cherry tomatoes					√
2	Ability to create installations					√
3	Understanding nutritional formulas				√	
4	Understanding of production management					√
5	Understanding marketing management					√
Total score :						90



Source: Personal documentation

Figure 1. Lettuce produced by CV. Pesona21 Purwokerto



Source: Personal documentation

Figure 2. Socialization/transfer of material with employees and interns



Source: Personal documentation

Figure 3. Process of Installation Making and Preparation of The Plant Media



Source: Personal documentation

Figure 4. Hydroponic cherry tomato care