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EMPOWERING COMMUNITIES THROUGH LIQUID ORGANIC FERTILIZER FOR COST AND NUTRITION GAINS IN CIBANTENG, BOGOR

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Abstract

The main goal expected by the administrators of the Raharja Farmer Group is to achieve food security in Cibanteng Village. However, the skills related to organic vegetable cultivation and the availability of essential farming materials and tools such as seeds, organic fertilizer, pots, plastic containers, and others are still suboptimal. The community service method involved a series of discussions with representatives of the farmer group, including local residents, retired civil servants, and housewives. These discussions focused on the importance of organic vegetable cultivation techniques, the production of liquid organic fertilizer enriched with phytohormones, and the practical application of planting organic vegetables. Active participation from community members and intensive mentoring, both in person and via online platforms such as WhatsApp, significantly contributed to the success of the program. Residents successfully cultivated and harvested vegetables such as kangkung and pakcoy in their home gardens. This not only increased their organic vegetable consumption but also had a direct impact on reducing household expenses. The harvest enabled savings on vegetable purchases for up to one week and promoted household-level food independence. Evaluation results indicate that the program met the needs of the community partners and effectively reduced their reliance on local markets. Additionally, the use of shallot waste as liquid fertilizer improved soil fertility and ensured the quality of the organic crops. This success demonstrates the potential for long-term sustainability if managed properly through the institutional support of the farmer group.

Keyword: Cibanteng Village, Food Self-Sufficiency, Liquid Organic Fertilizer, Organic Vegetables

INTRODUCTION

According to data from the Central Statistics Agency (BPS) of Bogor Regency, the population of Cibanteng Village, Ciampea District, in 2012 was recorded at 6,110 people, with a total area of approximately 426.9 hectares. However, recent data from 2024 indicates a

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significant population increase, reaching around 12,579 people, with a population density of approximately 18,689 individuals. The majority of residents in Cibanteng Village are employed in the public sector as civil servants, as well as in industries such as agriculture, livestock, and household-based small enterprises. The dominant agricultural activities include rice cultivation, vegetables, and other horticultural crops. In addition, some residents are engaged in trade, services, and small-scale industries. Given its supportive geographic conditions and abundant natural resources, Cibanteng Village holds substantial potential for the development of sustainable agriculture, particularly organic farming. The use of simple technologies such as liquid organic fertilizer (LOF) offers a viable solution for enhancing household cost efficiency while strengthening food security and nutritional intake for village residents (Rusdiyanto et al., 2023; Munawir et al., 2024b).

A group of residents in Cibanteng Village has established a farmer group named the Raharja Farmer Group. Two of the seven administrators are retired civil servants with an interest in vegetable cultivation. However, farming activities by this group have not been sustained due to limited access to necessary materials and tools. An area previously used as a swamp and garbage dump has been transformed into a greenhouse. A greenhouse is a building structure that functions as a controlled environment suitable for plant growth (Rizkiani et al., 2020; Munawir et al., 2024a). Moreover, many residents possess sizable home gardens that have the potential to be used for growing vegetables. Typically, the harvests from the farmer group's activities are distributed to nearby residents for shared consumption. While the Raharja Farmer Group aspires to promote food security in Cibanteng Village, the availability of essential agricultural inputs such as seeds, organic fertilizers, pots, plastic containers, and other tools remains inadequate. Furthermore, there is a need to empower residents with knowledge and skills in producing self-made organic fertilizers using household waste, which can help minimize daily vegetable expenses (Diwanti, 2018; Munawir et al., 2024b).

Vegetables suitable for cultivation in the home gardens of Raharja residents include fast-growing, commonly consumed crops with economic value, such as spinach, kangkung (water spinach), pakcoy, mustard greens, and red chili. These plants are relatively easy to grow using pot and plastic planting media (Rusdiyanto & Munawir, 2023). This method allows for variation in the number of plants grown in a single container (Danfar, 2009). Fertilizer availability is another critical aspect of vegetable cultivation (Noviansyah & Chalimah, 2015). Fertilizers are chemical compounds containing essential nutrients that promote plant growth (Roidah, 2013). Typically, fertilizers are mixed with the planting media or applied directly to the plant to maximize nutrient uptake (Yolanda et al., 2019; Munawir et al., 2022a). Fertilizers serve to supply the essential nutrients required to overcome deficiencies in the planting medium. Plants generally require large quantities of macronutrients such as nitrogen, phosphorus, and potassium, while micronutrients like calcium, magnesium, iron, copper, boron, and zinc are needed in smaller amounts (Susetya, 2012).

To support food security, fertilizer production can utilize readily available household waste, such as shallot peels, which are often discarded as waste. Shallot skins (Allium cepa) contain various phytohormones beneficial for plant growth and development (Munawir et al., 2024b). These include auxins, gibberellins, cytokinins, abscisic acid, and ethylene. Liquid organic fertilizer (LOF) made from shallot peels contains growth hormones that benefit root

development. In addition to growth hormones, shallot peels contain compounds such as flavonoids, saponins, glycosides, and steroids (Manullang, 2010). According to Rezkiwati et al. (2013), utilizing shallot peel waste as LOF can serve as an alternative to chemical fertilizers such as urea and ammonium sulfate (ZA). Yolanda et al. (2019) also reported that LOF derived from shallot peels is effective for vegetable crops such as chili. Similarly, Yikwa et al. (2019) found that using shallot peel-based organic fertilizers on chili plants accelerated their growth. Several studies have demonstrated the significant positive effects of shallot extract on plant growth and productivity.

Based on the problems identified among the community partners, the Community Service (PkM) Team aims to provide knowledge and skills in organic vegetable cultivation using phytohormone-enriched liquid organic fertilizer made from shallot peels. This activity focuses on utilizing residents' home yards to help fulfill community nutritional needs in Cibanteng Village, Bogor Regency, while also improving family cost efficiency. In addition, the PkM team seeks to supply essential materials and tools and to conduct training sessions in collaboration with the Raharja Farmer Group to support organic vegetable cultivation, thereby enhancing the sustainability of food self-sufficiency in Cibanteng Village..

METHOD OF IMPLEMENTATION

The method used in this community service program is Active and Participatory Learning (Nursyamsu, 2018). This approach includes group discussions with the farmer group, represented by retired civil servants and housewives, focusing on the importance of organic vegetable cultivation techniques, the production of phytohormone-enriched liquid organic fertilizer, and organic vegetable gardening. The primary objective is to enhance community awareness and decision-making capacity regarding sustainable agriculture practices (Munawir et al., 2021).

The participants of this community service activity include members of the Raharja Farmer Group, retired civil servants, and housewives in Cibanteng Village, Ciampea District, Bogor Regency. The target number of participants is a minimum of 50 individuals.

In this program, the production of phytohormone-enriched liquid organic fertilizer is carried out through a fermentation process using Effective Microorganisms 4 (EM4) and water. The implementation of this community service program consists of the following stages:

a. Problem analysis and coordination with the Raharja Farmer Group

b. Implementation of the community service program

During the implementation phase, the PkM team conducted three on-site visits for coordination and survey, demonstration and short training on plant cultivation, as well as monitoring and evaluation. In addition, mentoring was also carried out via WhatsApp and through group meetings as needed. The meetings took place at Jl. Griya Raharja RT 001 RW 008, Cibanteng Village, Bogor, West Java, which is the designated partner location. The specific activities conducted during these visits are as follows:

1. Coordination and Location Survey
    - Introduction of the PkM team to the community partners
    - Presentation of the PkM implementation strategy

- Survey of the community service site
- Confirmation of the quantity and types of materials and tools required for organic vegetable cultivation

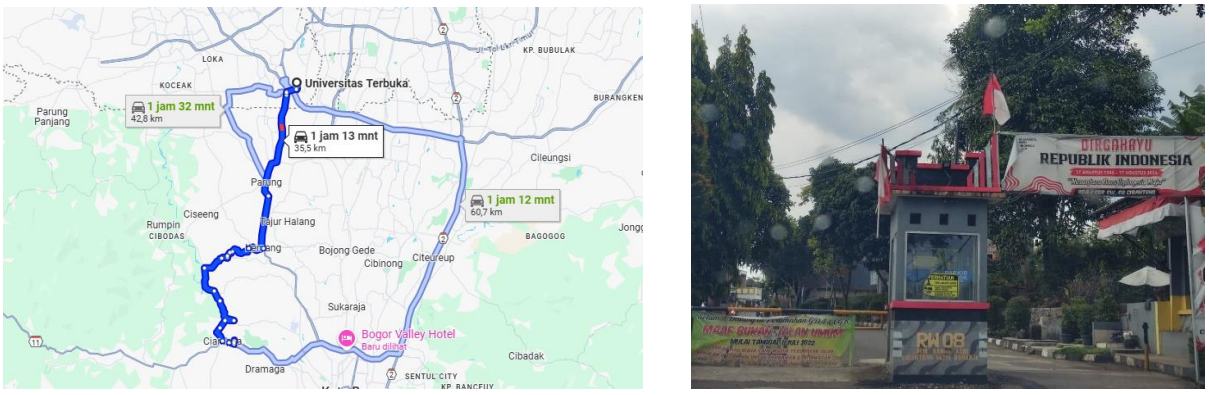
2. Vegetable Planting Demonstration and Brief Training on Cultivation
    - Delivery of a short session on organic vegetable cultivation using phytohormone-enriched liquid organic fertilizer made from onion peels
    - Distribution of materials and tools needed for organic vegetable gardening
    - Demonstration of the organic vegetable planting process
3. Monitoring and Evaluation

RESULTS AND DISCUSSION

Raharja Farmer Group is a community of residents in Cibanteng Village who share a passion for farming. This farming activity aims to build food resilience, especially in response to challenges such as the socioeconomic impacts of the COVID-19 pandemic. Based on the partner's problem analysis, one of the key issues faced by the group is the limited availability of farming materials and tools, as well as a lack of knowledge and skills in cultivating organic vegetables using phytohormone-enriched liquid organic fertilizer derived from onion peels. The community expressed their hope for a program that could help improve their household economy by enabling them to grow vegetables independently using their home yards, thereby supporting sustainable food security (Rifin et al., 2020). The community service initiative offered a solution by providing the necessary knowledge and skills for organic vegetable cultivation using onion peel-based phytohormone liquid fertilizer, along with the provision of essential materials and tools. The assistance to partners was carried out in several stages: coordination and survey, demonstration and short training on vegetable cultivation, and monitoring and evaluation. The results of each stage are detailed below:

Coordination and Survey

The coordination and survey activity took place on May 27, 2024, at Jl. Griya Raharja RT 001 RW 008, Cibanteng Village, Bogor, West Java, and was attended by five participants. To reach the location of the farmer group, the PkM team from Universitas Terbuka Central Office traveled approximately 35.5 km, taking around 1.5 to 2.5 hours. The journey passed through the traffic-congested areas of Parung and Dramaga, Bogor. The location map and illustration are provided in Figure 1.



(a) (b)

Figure 1. (a) Map of the location of the Raharja Farmers Group with the starting point at the Central Open University, dan (b) The Gate of Griya Raharja

Coordination and survey were the first activities conducted after the PkM proposal was approved. This initial activity aimed to establish mutual understanding and familiarity between the PkM team and the partner. Additionally, the coordination and survey stage provided the partner with information regarding the strategies and schedule for the implementation of the community service program at the Raharja Farmer Group location. The activity began with an introduction session between the PkM team and the partner representatives. The PkM team then outlined the strategic plan, emphasizing that the next phases would include a demonstration and short training on organic vegetable cultivation, followed by monitoring and evaluation. It was mutually agreed that the demonstration and training would be conducted on weekends in September (after Indonesia's Independence Day celebrations), considering that most residents work Monday through Friday.

Approximately 25 participants would be involved in the demonstration and training, divided into five groups. Each group would use their home yards or a group representative's yard for placing the planting media. The PkM team and partners agreed that the training materials would cover the benefits of vegetables, the preparation of onion peel-based phytohormone liquid organic fertilizer, seed propagation, transplanting seedlings into planting media, and organic plant care. The vegetables to be cultivated include spinach, water spinach (kangkung), pakcoy, mustard greens (caisim), and red chili peppers. It was also confirmed that the PkM activities would be conducted offline (in person). A WhatsApp group was created to facilitate ongoing communication and remote assistance between the PkM team and the partners throughout the program. In addition to the training content, the PkM team also discussed the necessary tools and materials for organic vegetable cultivation. Required tools include planting containers (such as pots and plastic bags), small shovels, and others. Necessary materials include manure, onion peel-based phytohormone liquid fertilizer, organic vegetable seeds, and other supporting inputs. Finally, the PkM team informed the partners that the last phase of the program would be monitoring and evaluation, which would include interviews and the distribution of questionnaires to gather feedback on partner satisfaction and suggestions for improvement. The activity concluded with a site tour to observe the facilities and infrastructure at the PkM location. Documentation of the coordination and survey activities is presented in Figure 2:

(a) (b)

Figure 2. (a) The PkM Team and the Raharja Farmers Group Management and the Greenhouse of the RT 04 chairman and (b) Samples of yards from residents of Cibanteng village, Bogor.

Demonstration and Training on Plant Cultivation

The demonstration and training session was conducted in the front yard of the farmer group's greenhouse. This activity took place on Saturday, September 21, 2024. The event was attended by five members of the PkM team and 31 residents of Griya Raharja, Cibanteng Village, Ciampea Subdistrict, Bogor Regency, West Java Province. The training session included a presentation and discussion on the benefits of vegetables, the production of phytohormone-enriched liquid organic fertilizer from onion peels, vegetable seed germination, transplanting seedlings into planting media, and the maintenance of organic vegetable crops. Siti Sopiah Sopiyan, a student from Universitas Terbuka, participated in the discussion with the partners regarding the presented materials. One of the participants asked, “What is meant by phytohormones?” The team responded, “Phytohormones are chemical substances produced by plants to regulate their growth, development, and physiological processes. They are also known as plant hormones.” Documentation of the opening remarks and the short training presentation is shown in Figure 3.

(a) (b) (c)

Figure 3. (a) Greetings from the PkM Team, (b) Brief presentation of material on organic vegetable cultivation, and (c) Discussion and Q&A regarding organic vegetable cultivation material

After the presentation, Siti Umamah Naili Muna handed over the tools and materials for organic vegetable cultivation to the Coordinator of the Griya Raharja Farmer Group in Cibanteng Village, Bogor Regency, West Java, who also represented the Raharja Farmer Group. Following this, a handover document was signed to formally record the transfer of items. The activity continued with a demonstration session, where residents and the management of the Raharja Farmer Group divided the participants into five groups. Each group then practiced organic vegetable cultivation using phytohormone-enriched liquid organic fertilizer made from onion peels. Documentation of planting media preparation and other activities is shown in Figure 4.

Figure 4. Preparation of planting media

Mentoring continues through the WhatsApp group to ask if there are any obstacles and to inform the progress of planting organic vegetables. Some documentation of online mentoring via the WhatsApp group is given in Figure 5.

Figure 5. Progress of organic vegetable cultivation with organic liquid fertilizer containing phytohormones from shallots in residents' yards

The demonstration activity and provision of brief material on organic vegetable cultivation was closed with a group lunch and group photo as in Figure 6.

Figure 6. Group photo of the closing of the demonstration activity and the provision of brief material on organic vegetable cultivation

Based on the results of the monitoring and evaluation, there has been an increase in the availability of materials and tools for organic vegetable cultivation in the yards of residents in collaboration with the Raharja Farmer Group. In the planting media at the residents' homes, several vegetable plants such as water spinach (kangkung) and pakcoy are still growing. According to interviews with several group members, the activities were conducted well and achieved 75% success. One of the challenges faced by the residents was the fear of making mistakes in practicing organic vegetable cultivation. However, this was addressed with the help and support of the Raharja Farmer Group, led by Syafei. According to Syafei, the planting period for organic vegetables is approximately 1.5 months, and the residents have successfully harvested their organic vegetables. The residents informed us that the taste of the water spinach they grew was sweeter compared to the ones bought at the market. Furthermore, the harvest can last for up to one week. This has led to a reduction in their daily living expenses for vegetable purchases over the week. There has been an improvement in the community's economy by producing vegetables in their own yards, ensuring a steady supply of organic vegetables and making household vegetable expenses more effective. Therefore, food security can be achieved if the organic vegetable planting activities in the residents' yards are sustainable.

Based on the questionnaire responses from each group representative, the community service planning carried out by the UT and ITB lecturers has been well-executed and in line with the needs of the community partners as well as the scientific methods for vegetable cultivation.

Additionally, the phytohormone-enriched liquid organic fertilizer made from onion peels has been beneficial for cultivating organic vegetables, and the practice of planting vegetables in the yards has begun to be carried out sustainably. The materials and tools used for vegetable cultivation are easily accessible. Moreover, the outcomes of this community service are in line with the initial plan and can be maximally utilized by the partner group for cultivating organic vegetables using phytohormone-enriched liquid organic fertilizer from onion peels. Therefore, based on the evaluation through interviews and questionnaires, the implementation of the community service (PkM) has been successful. The materials and tools provided by the PkM team have greatly assisted the residents and the Raharja Farmer Group in creating food security for at least a week after the harvest period. This has also led to family cost efficiency regarding vegetable purchases, providing nutritional intake for the residents. The partners hope that such community service activities for vegetable planting with phytohormone-enriched organic liquid fertilizer for food security can continue. In addition to improving food security, the easy access to fresh vegetables in the residents' yards has simplified vegetable consumption and alleviated difficulties in increasing family nutritional adequacy. According to Munawir et al. (2023), this program can reduce the habit of shopping at the market, which may not guarantee that the vegetables are organic. On the other hand, it reduces family expenses for transportation and vegetable purchases, enhancing food independence within the community. Another positive impact is the development of community group institutions to support food planting programs starting from the home yard (Munawir et al., 2022b). Furthermore, the utilization of onion peel waste to produce organic fertilizer can improve soil fertility, ensuring the quality of organic vegetables (Munawir et al., 2024; Rusdiyanto and Munawir, 2024).

CONCLUSION

The Community Service (PkM) activity carried out by the community service team, in collaboration with the Raharja Farmer Group in Cibanteng Village, Ciampea District, Bogor Regency, has successfully achieved the goal of improving the community's knowledge and skills in cultivating organic vegetables using phytohormone-enriched liquid organic fertilizer made from onion peel waste. This activity was conducted through three main stages: coordination and survey, demonstration and brief material presentation, seedling and planting of organic vegetables, followed by monitoring and evaluation. Active participation from the residents and intensive guidance, both directly and through online media such as WhatsApp, contributed to the success of the program. The residents successfully planted and harvested vegetables such as water spinach (kangkung) and pakcoy in their own yards, which not only increased organic vegetable consumption but also had a significant impact on household cost efficiency. The successful harvest resulted in savings on expenses for one week and encouraged food independence. The evaluation results show that this program meets the partners' needs and helps reduce dependency on the market. Moreover, using onion peel waste as fertilizer has been

proven to enrich the soil and ensure the quality of the plants. This success demonstrates the potential for the program's sustainability if managed well through farmer group institutions. Therefore, this PkM activity contributes to food security, household cost efficiency, and local and independent family nutrition improvements.

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