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Cultivation and Processing of Aloe Vera to Enhance Community Income

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ABSTRACT

Aloe vera is a versatile plant with numerous health and beauty benefits; however, its cultivation potential has not been fully optimised due to residents' limited knowledge and skills in both cultivation and processing. The cultivation and processing of aloe vera in RW 06, Gandasari Subdistrict, Jatiuwung District, Tangerang City, was carried out to increase community income. The methodology employed was Participatory Action Research (PAR), involving stages such as socialisation, training on cultivation and processing, provision of resources, technical assistance, and marketing strategies based on local needs. The results of the community service program indicated several stages of implementation. Land preparation for aloe vera cultivation involved weeding, loosening the soil to 30–50 cm depth, and allowing it to rest for 1–2 weeks. Soil was treated 2–3 times with the addition of fertilisers, followed by the construction of planting beds 100–120 cm wide and 20–25 cm high. Seedlings were planted at a 5–7 cm depth with spacing of either 50 x 75 cm or 50 x 100 cm. A survey of 10 respondents revealed that 60% successfully produced aloe vera gel and 50% attempted to make healthy beverages. The program received positive feedback, with 88% of participants understanding the benefits, 90% reporting that they were supported by providing seedlings and tools, and 70% understanding marketing strategies, indicating overall training success. Conclusion: The program had a positive impact, as the community successfully engaged in aloe vera cultivation, supported the local economy, and contributed to creating new job opportunities.

Keywords: *Cultivation, Aloe Vera, Income, Society.*

A. INTRODUCTION

Aloe vera, a plant from the Liliaceae family native to Africa, is widely known for its benefits in health and beauty (Raharjo, 2023). Since its introduction to Indonesia in the 17th century, more than 350 hybrid varieties have developed. "The Miracle Plant," Aloe vera is used in various countries such as China, the Congo, and the United States as a natural remedy for wounds, hair loss, tumours, haemorrhoids, and as a laxative (Marhaeni, 2020). Compounds such as aloin, emodin, resin gum, and essential oils enhance its value (Iskandar, 2021). Its cultivation potential remains underutilised in RW 06, Gandasari Subdistrict, Tangerang. This is despite the agricultural sector contributing 13% to the national GDP (Badan Pusat Statistik, 2022), and the global aloe vera extract market projected to reach USD 3.48 billion by 2029 (Han et al., 2023).

Aloe vera has advantages in terms of rapid growth and adaptability to various

environmental conditions (Savitri et al., 2022). The plant has significant potential to be developed in Indonesia as a promising agribusiness venture due to its rich nutritional content, including enzymes, amino acids, minerals, vitamins, polysaccharides, and proteins (Putra et al., 2023). According to research by Babalola et al. (2021), aloe vera grows well in areas with low rainfall and poor soil conditions, making it suitable for cultivation on marginal lands. Moreover, the economic value of aloe vera-based products is quite promising (Setiawan, 2022). Products such as aloe vera gel (Wariyah et al., 2024), health drinks (Dewi, 2022), and natural cosmetics (Iskandar, 2021) are increasingly popular. Additionally, aloe vera can be processed into jelly, an affordable and healthy snack alternative contributing to family income (Sebayang, 2022).

The cultivation potential of aloe vera in RW 06 presents new economic opportunities for the local community. The growing demand for aloe vera-based products could foster the development of micro, small, and medium enterprises (MSMEs), contributing to job creation and improved community welfare. However, many residents still lack the necessary knowledge and skills in aloe vera cultivation and processing. Therefore, an empowerment program through training and mentoring is needed to enhance community capacity in producing value-added products (Destiartono, 2025). A well-planned and systematic program implementation is crucial, especially as RW 06 already has an active Women Farmers Group (Kelompok Wanita Tani/KWT) that cultivates various vegetables. The presence of this group represents social capital that supports the successful development of aloe vera as a local superior commodity.

Aloe vera cultivation training is essential to increase production yields by applying proper irrigation and harvesting techniques. Optimal irrigation at 20% soil moisture significantly improves yields, with ridge planting methods outperforming flat and raised bed planting, especially when using 60-day-old suckers (Singh et al., 2021). Harvesting techniques also play a vital role, with harvest frequency affecting productivity by up to 38.76% (Setiawan et al., 2025). However, cultivation challenges include farmer exploitation by middlemen, a lack of processing units, inadequate storage and transportation facilities (Ponnarasi et al., 2020), high production costs, seed shortages, and limited technical knowledge. Enhanced extension services and technical education are needed to address these issues (Mittal, 2024).

The training program covers proper planting, maintaining, and harvesting techniques and skills for processing aloe vera into marketable products such as gel, beverages, and cosmetics. With adequate knowledge and skills, residents of RW 06 can maximise the potential of aloe vera to support local economic growth. The program aims to increase income, create new job opportunities, and reduce unemployment. Land use can be optimised through training and assistance to produce high-quality products. This community service initiative also seeks to explore the potential for aloe vera cultivation and processing in RW 06 and provide strategic, data-based recommendations. The program aligns with government efforts to improve community welfare, promote sustainable agriculture, and encourage responsible natural resource management.

B. METHOD

The community engagement approach employed in this program is Participatory Action Research (PAR), which involves the active participation of RW 06 residents throughout all stages of the initiative. From socialisation and training to mentoring in the cultivation and processing of aloe vera, the community members are not merely passive recipients but act as active agents

in the empowerment process. This method promotes collaboration, is grounded in local needs, and results in sustainable and applicable solutions. The implementation method for aloe vera cultivation and processing in RW 06 was carried out through six main stages:

1. Socialisation

   The socialisation phase occurred on July 26, 2025, at the Gemas Implan Women Farmers Group (KWT) Reading Garden. This session aimed to increase residents' awareness of aloe vera's health and economic potential. Tools used during this stage included an LCD projector, laptop, sound system, and various presentation media (slides, posters, or leaflets) to support visual and interactive information delivery.
2. Cultivation Training

   The July 27, 2025, training session featured speakers from the agricultural experts and aloe vera entrepreneurs. The material covered planting techniques, care, fertilisation, and harvesting. Equipment used included demonstration tools (such as seedling samples, planting media, and fertilisers), polybags, small shovels, sprayers, and plant labels. These tools were used in hands-on sessions, allowing participants to understand practical cultivation methods.
3. Provision of Assistance

   After the training, participants received support through aloe vera seedlings, polybags, small hoes, hand trowels, and buckets. These tools were provided to help residents begin cultivation at home and to reduce initial production costs.
4. Technical Assistance

   Technical mentoring was conducted regularly through site visits to residents' cultivation areas. Tools used included monitoring forms, cameras/phones for documentation, and basic measurement tools (such as soil pH or moisture meters, if needed). This ensured that knowledge was applied effectively and that any issues could be addressed promptly.
5. Processing Training

   Residents were trained to process aloe vera into gel, beverages, and soap products. Equipment used included blenders, strainers, electric stoves, pots, packaging bottles, and soap moulds. Hygiene tools such as gloves and masks were also emphasised to ensure the products met health standards.
6. Marketing Strategy

   Marketing training included using smartphones, cameras, internet access, and social media applications like Instagram and TikTok. Product design templates, packaging labels, and digital promotional materials were also introduced to support online branding and sales efforts.

C. RESULTS AND DISCUSSION

Based on the planned stages of implementation, the following results were obtained:

1. Land Preparation for Cultivation

The preparation of the planting area was carried out through several key steps. First, the land was cleared of weeds, stones, and plant residues. Initial soil tilling was performed using hoes to a 30–50 cm depth to loosen the soil. The soil was left open for 1–2 weeks to reduce acidity and moisture levels. This was followed by a second round of soil processing, repeated 2–3 times, while incorporating organic fertilisers such as manure or ash to enrich soil

fertility. Next, planting beds were constructed with a width of 100–120 cm and a height of 20–25 cm to facilitate planting and maintenance. The orientation of the beds was adjusted to follow the natural flow of water to ensure proper drainage. Finally, planting holes (tugal) were made at 20–30 cm depth to accommodate the aloe vera seedlings.

Figure 5. RW 06 Residents Preparing the Planting Area

2. Planting Aloe Vera

Once the land was prepared correctly, aloe vera seedlings were planted by placing them into 5–7 cm deep holes. The soil around the roots was then filled and compacted to ensure the plant remained firm and stable. Planting was carried out using a single-row spacing of 50 x 75 cm or 50 x 100 cm to allow sufficient space for optimal plant growth.

Figure 6. Aloe vera plants cultivated by RW 06 residents

Below is the Likert scale survey table based on responses from **10 residents**, with the percentage of agreement calculated from scores of 4 (Agree) and 5 (Strongly Agree):

Table 1. Haisl Survey Planting Aloe Vera

Statement	Score 1 (Strongly Disagree)	Score 2 (Disagree)	Score 3 (Neutral)	Score 4 (Agree)	Score 5 (Strongly Agree)	Total Respondents	% Agreement (4 & 5)
I successfully produced aloe vera gel after the training.	0	1	3	4	2	10	60%
I was interested and tried to make a healthy drink from Aloe Vera.	1	2	2	3	2	10	50%

Notes: STS stands for Strongly Disagree, TS for Disagree, S for Agree, and SS for Strongly Agree. Among the 10 participants, 9

expressed enthusiasm toward the training (scores 4 and 5). Additionally, 6 participants successfully produced aloe vera gel, 5 attempted to make aloe vera-based health drinks, and 7 reported that the training provided sufficient knowledge.

With these new skills, RW 06 residents are expected to be capable of processing aloe vera gel once their plants reach harvest maturity. The harvest period is a critical aspect of aloe vera cultivation that farmers and entrepreneurs overlook. Aloe vera plants typically reach harvestable maturity at approximately 1.5 to 2 years of age (Donat & Sucu, 2024). The plant is mature and has an optimal gel content at this stage. Aloe vera gel is the most valuable part of the plant due to its rich content of nutrients, vitamins, and minerals that are beneficial to health. During harvesting, selecting sufficiently large and mature leaves is important, as older leaves tend to contain more gel (Pawłowicz et al., 2021). Ideally, harvested leaves should be at least 10–15 cm in size (Talukdar et al., 2023). The harvesting process must be done carefully. Using a sharp and clean knife is the first crucial step. Leaves should be cut from the base, not the tip, to preserve the plant's health and allow it to grow after harvest. Once harvested, it is essential to process the leaves promptly, as aloe vera gel is highly sensitive to air exposure, which causes oxidation and a rapid loss of its beneficial properties.

3. Processing aloe vera gel

After the aloe vera leaves are harvested, the next step is to process the gel within them. This gel can be directly or further processed into creams, lotions, or health beverages. The harvested leaves must first be thoroughly washed to remove any dirt or pesticide residues to obtain high-quality gel. Subsequently, the leaf skin is carefully peeled off to extract the gel inside. This process requires precision to ensure the resulting gel is clean and free from the skin, which contains aloin, a laxative compound undesirable in health products. The aloe vera gel processing method involves selecting fresh leaves, washing, removing aloin by positioning the leaves upright, peeling and extracting the gel, mixing the gel until frothy, followed by filtering and storing the gel in airtight containers inside a refrigerator to maintain freshness and safety for use.

4. Making Healthy Aloe Vera Drinks

Aloe vera drink is beneficial for digestion, helps alleviate constipation, and reduces cholesterol and blood sugar levels. In addition, this beverage functions as a natural antioxidant that aids in enhancing the immune system and reducing inflammation, including in the stomach. To prepare this healthy drink, ingredients such as washed and soaked aloe vera leaves, salt, sugar or syrup according to taste, and lime are required. The preparation begins by peeling the aloe vera skin until the transparent flesh is visible, then cutting the aloe vera flesh into desired pieces. Boil water until it reaches a rolling boil, then add the aloe vera pieces and let them simmer for approximately 10 minutes. Next, prepare an acidic solution by mixing one litre of water with one tablespoon of lime juice. Soak the aloe vera pieces in this acidic solution, then rinse them with the cooled boiled water. Serve the aloe vera pieces in a glass with ice cubes and add syrup to taste for a more refreshing flavour.

5. Aloe vera as cosmetics

One example of using aloe vera gel is in the cosmetic industry. Aloe vera gel is frequently used as a base ingredient in the formulation of skincare products such as moisturisers and facial masks. The anti-inflammatory and antibacterial properties of aloe vera

gel make it highly effective in soothing skin irritation, reducing redness, and providing the necessary moisture for the skin. Due to its popularity and efficacy, many major cosmetic companies incorporate aloe vera as a key ingredient in their products. Aloe vera offers various benefits in cosmetic products, including moisturising the skin due to its high water content, brightening the skin by reducing melanin production and dark spots, and diminishing inflammation caused by acne and sunburn thanks to its anti-inflammatory and antioxidant properties. Additional benefits include combating premature ageing by stimulating collagen production and protecting against free radicals, accelerating the healing of burns, and naturally removing makeup. Methods of using aloe vera gel for cosmetic purposes include applying pure aloe vera gel as a mask directly onto a clean face, using mixed masks such as aloe vera gel combined with honey or with cornstarch/rice flour applied for 15–20 minutes, facial serums made by mixing aloe vera gel with rose water, and facial creams prepared by blending aloe vera gel, almond oil, and vitamin E capsules until the desired consistency is achieved for application.

6. Aloe vera as medicine

Furthermore, aloe vera has various applications in the health sector. Aloe vera gel can be a natural remedy for digestive issues like constipation. When consumed as a beverage, aloe vera gel can be mixed with juice or water to enhance its freshness while increasing its health benefits. Several studies indicate that consuming aloe vera gel may help improve the immune system and provide detoxification effects. Aloe vera gel can also be utilized to prepare various medicinal treatments, including alleviating stomach acid by mixing the gel with water, honey, ginger, or lemon juice and consuming it 20–30 minutes before meals; treating itching and burns by applying aloe vera gel directly to the affected skin areas; and relieving joint pain by applying cooled aloe vera gel to the painful joints to help reduce discomfort.

In agriculture, harvesting aloe vera also significantly impacts plant productivity and sustainability. Proper and timely harvesting can enhance future yields. Therefore, farmers must understand the growth cycle of aloe vera and appropriate maintenance methods to ensure that the plants remain healthy and productive. Good maintenance practices include adequate watering, appropriate fertilisation, and protection against pests and diseases.

Figure 7. Group photograph with residents of RW 06, Kelurahan Gandasari.

This table presents the survey results regarding implementing the community service program in aloe vera cultivation, including participants' responses and evaluations related to

the activities and the impacts gained from the program.

Table 2. Survey Results on the Implementation of the Community Service Program

No	Activity Step	Statement Indicator	Number of Respondents	Average Score	Percentage of "Agree/Strongly Agree" (%)
1	Socialization	I understand the benefits and economic potential of aloe vera cultivation.	10	4.6	88%
2	Cultivation Training	I feel more confident in carrying out aloe vera cultivation.	10	4.5	85%
3	Assistance Provision	Providing seedlings and agricultural tools makes it easier for me to start cultivation at home.	10	4.7	90%
4	Technical Assistance	Technical assistance helps me overcome obstacles in cultivation.	10	4.3	82%
5	Processing Training	I can process aloe vera into products after the training.	10	4.2	78%
6	Marketing Strategy	I understand how to market aloe vera processed products.	10	4.1	70%

Note: The Likert scale consists of 1 = Strongly Disagree (STS), 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. The average score is the total rating divided by the number of respondents. The percentage indicates the proportion of respondents who selected Agree (4) or Strongly Agree (5) out of 10 respondents.

Based on the survey results from 10 respondents, the majority of participants in the aloe vera cultivation community service program demonstrated positive responses at each stage of the activities. During the socialisation phase, 88% of participants understood aloe vera cultivation's benefits and economic potential, with an average score of 4.6. Cultivation training increased participants' confidence by 85%, with an average score of 4.5. The provision of seedlings and agricultural tools was highly supportive, with 90% agreement and an average score of 4.7. Technical assistance effectively supported 82% of participants (average score 4.3). Processing training enabled 78% of participants to produce aloe vera products (average score 4.2). However, understanding of marketing strategies was somewhat lower at 70%, with an average score of 4.1, indicating the need to improve the marketing aspect of processed products. Overall, the program successfully imparted significant knowledge and skills to the participants.

D. CONCLUSION

The aloe vera cultivation community service program successfully imparted significant knowledge and skills to the participants. The implementation stages began with land preparation, including weeding and stone removal, gradual soil processing, proper bed formation, and planting holes for aloe vera seedlings. After the land was prepared, planting was conducted with attention to planting depth and spacing to ensure optimal growth. Survey results indicated that most participants were highly enthusiastic and successfully applied the knowledge they gained, particularly in aloe vera gel production and making health beverages. The aloe vera gel processing was done using correct procedures, from washing the leaves to extracting clean gel to ensure a high-quality final product. The aloe vera drinks offered health benefits, including aiding digestion and boosting immunity. Moreover, aloe vera gel was also utilised in the cosmetic industry as a base ingredient in skincare products that effectively relieve irritation, moisturise, and brighten the skin. In the health sector, aloe vera gel was used as a natural remedy for various issues such as digestive disorders, burns, and joint pain. Proper plant maintenance, including watering, fertilisation, and pest protection, was also critical in achieving sustainable cultivation

and harvesting. Overall, the program received positive responses from participants at all stages, although marketing processed products still requires improvement to maximise and sustain cultivation results. The program has successfully empowered community members with practical knowledge applicable in their daily lives**.**

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AUTHORS' CONTRIBUTIONS

Author 1 : Designed the proposal, established collaboration with RW 06 residents, coordinated all stages of the activities, and prepared the implementation report while comprehensively evaluating the program's impact on the community.

Author 2 : Prepared cultivation materials, provided technical training to participants, supervised field practices, monitored plant growth, and offered solutions to cultivation challenges faced by RW 06 residents.

Author 3 : Developed training modules, trained residents in making aloe vera processed products, and ensured that processing adhered to cleanliness and food safety standards in accordance with applicable regulations.

Author 4 : Trained residents in digital marketing of products, assisted in creating content and packaging design, and guided using social media as an optimal promotional tool for aloe vera products.

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