Abdimas Umtas: Jurnal Pengabdian Kepada Masyarakat
LPPM-Universitas Muhammadiyah Tasikmalaya
Volume: 5 Nomor: 1
E-ISSN: 2614 - 8544

Training on Cow Manure Liquid Organic Fertilizer Processing and Application on Green Spinach Plants in Alue Ambang Village

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ABSTRACT

Alue Ambang is a village in Mukim Teunom, Teunom District, Aceh Jaya Regency, Aceh Province, Indonesia. Based on the results of a field survey, the soil condition in the village garden is sandy loam soil. Sandy loam soil is able to quickly absorb water but cannot receive nutrients for plants. So that this type of soil requires additional fertilization. One of the types of fertilizer offered is organic fertilizer in the form of liquid. Liquid organic fertilizer (POC) is produced from the decomposition of organic matter such as leaves and animal waste. The purpose of this service activity is to provide knowledge and innovation about the importance of converting livestock waste into liquid organic fertilizer and fertilization methods with correct and appropriate concentrations. This activity was carried out for 3 months, attended by 8 farmer cadres and 13 village development students. The method used is direct training and practice. The several stages in this activity are: (1) survey stage, (2) training, (3) POC manufacture, (4) POC application, (5) harvesting and (6) processing. The result of this service activity is that the cow dung POC and farmer cadres get an understanding of the importance of utilizing cow dung waste as a liquid organic fertilizer and how to use house yard land as an effort to fulfill family food in Alue Ambang Village.
Key words : Training, Organic fertilizer, Liquid organic fertilizer application, Cow dung.

PRELIMINARY

Alue Ambang is a village in Mukim Teunom, Teunom District, Aceh Jaya Regency, Aceh Province, Indonesia. Located in the west of the Gampong Panton area, formerly Ulee Lhee, about 50 meters from Teunom City, the capital city of Teunom District (BPS, 2021)

Based on the results of the field survey, Alue Ambang Village is a village prone to flooding because geographically it is located along the coast and surrounded by rivers. The average profession of the villagers is farmer and fisherman . The condition of agricultural land in Alue Ambang Village is still not good because of its limited area and less than optimal land use. Thus the use of the yard around the house can be optimized to create economic value to meet the food needs of families with limited agricultural land, such as food crops, medicinal plants, ornamental plants and other plants (Dewi & Bachelor, 2015) .

Consumption of balanced household food can better meet nutritional needs, therefore people must consume a variety of foods to live a quality and healthy life. One component of a balanced menu in the framework of a family diet is green vegetables. Leafy greens are one of the most popular crops. Spinach is one type of vegetable that is very popular in the community.

Green spinach (*Amaranthus hybridus L.*) is one of the green leafy vegetables with high nutritional value that is favored by many people. Spinach was initially known as an ornamental plant, but in subsequent developments, spinach was widely promoted as a food ingredient which is a source of protein, vitamins A, B and C, and contains other nutrients (Gunawan, 2017)

Green spinach is used as a food source of protein which is very important to meet the food needs of families in Alue Ambang Village. Therefore, it is necessary to increase the growth and yield of green spinach. One way to increase spinach production is by giving liquid organic fertilizer (Rukmana, 2010) .

Liquid organic fertilizer (POC) is produced from the decomposition of organic matter such as leaves and animal waste. Liquid organic fertilizer has the advantage that it contains various kinds of nutrients needed for plant growth, improves soil structure, increases the life of microorganisms in the soil, is more evenly distributed and easy to use . One of the main ingredients in making POC is cow dung. Cow dung has the advantage of high fiber content such

as cellulose, cow dung can be beneficial for plants and soil by providing macro and micro nutrients for plants (Indawati *et al* ., 2016) .

In addition, cow dung is easy to find in Alue Ambang village. Because most of the residents of Alue Ambang also have side activities in raising livestock. One of the main obstacles that need to be overcome is the lack of public understanding on how to use cow dung as liquid organic fertilizer.

From the description above, it is necessary to conduct training and provide liquid organic fertilizer (POC) cow dung for green spinach (*Amaranthushybridus* l.) as an effort to fulfill family food. This is done by inviting the community, especially farmer cadres, to use cow dung as one of the main ingredients for making liquid organic fertilizer. In addition, the liquid organic fertilizer produced can also be used for household farming, such as growing vegetables in the yard, so that they can know in advance the use of pesticides and fertilizers, chemical fertilizers. Liquid organic fertilizers containing carbon and nitrogen elements are important for increasing soil fertility (Roidah, 2013) .

The purpose of this service activity is to provide knowledge and innovation about the importance of converting livestock waste into liquid organic fertilizer and fertilization methods with correct and appropriate concentrations.

IMPLEMENTATION METHOD

This activity was carried out in the village of Alue Ambang, Teunom District, Aceh Jaya Regency, starting from October 12 - December 09, 2021. The method used in this service activity was direct training and practice for farmer cadres. The different stages of this activity are as follows:

1. **Survey Stage**

The first survey was conducted to observe the potential of the village and the knowledge of the farmer cadres about organic farming. Then determine the right location to conduct training and provide liquid organic fertilizer (POC) of cow dung from the fermentation that has been carried out. The location of the manufacturing training (POC) is at the residence of a member of the farmer cadre, while the location for the cultivation of green spinach is in the village garden.

2. **Training**

This stage is the training stage for making cow dung liquid organic fertilizer (POC) for farmer cadres in Alue Ambang village, Teunom District, Aceh Jaya Regency which includes the following implementation matters:

a. Material presentation

The material presented was related to the use of cow dung into POC which can be used as an organic fertilizer for the growth of green spinach plants. In addition, some of the benefits of POC, the advantages of POC, and how to apply POC correctly are also presented. And explain the side effects of excessive use of chemical fertilizers.

b. Practice of Making Liquid Organic Fertilizer (POC) Cow Manure

After the cadres got the theory, the cadres were invited to do the direct practice of making POC from cow dung. The tools and materials used in this activity are: 15 liter bucket, container, knife, wooden stirrer, hoe, water, cow dung, brown sugar, granulated sugar, shrimp paste, *Effective microorganism 4* (EM4) and a camera. Then in this stage the cadres are taught the stages of making POC properly and correctly so that POC can be produced with good quality. The stages of making POC cow dung are: 1). prepare tools and materials, 2). then dissolve the ingredients (brown sugar, granulated sugar and shrimp paste) into enough water, but separate the container for the ingredients, 3). Enter 10 liters of water / 5 kg of cow dung into the bucket, 4). Stir until smooth, 5). then put all the ingredients into the bucket, 6). add liter of EM4, 7). then stir until smooth and close the bucket tightly, 8). Fermentation for 1 week (every 1 day the lid is opened for stirring).

3. POC Application

The POC application that has been produced is carried out at the time of land preparation before the spinach plants are sown. POC was given 3 days before planting with a concentration of 150 ml/1 liter of water (Rahma & Damayanti, 2021) . Furthermore, green spinach seeds were seeded on land that had been applied to POC, then plant maintenance was carried out with the second stage of POC fertilization given at the age of 14 DAP in order to get better (maximum) yields.

4. Harvest

Spinach plants are ready to harvest when they are 30 days after planting. The way to harvest spinach plants is to pull out the spinach, then clean the roots from the soil and the spinach is ready to be processed.

5. Processing

After harvesting, spinach plants are processed into vegetables that are ready to be consumed into a balanced menu and some are used as snacks, for example chips or spinach chips which are very crunchy and tasty. The characteristics of spinach leaves that are suitable for chips are broad leaves and are not attacked by pests and diseases. Fried spinach is also very suitable to be used as a dry snack at home or anywhere. The purpose of this activity is to provide knowledge to farmer cadres that spinach can be processed into a delicious snack as well as an effort to fulfill family food.

RESULTS AND DISCUSSION

The soil condition in the village garden or the yard of the farmer cadre's house in Alue Ambang village is a sandy loam soil type. Soil is an important factor that determines the growth and yield of cultivated plants because soil is a growing medium for plants. Sandy loam soil is one of the soils that has sand particles, which contain clay and sediment. Sandy loam soils are able to quickly absorb water but cannot hold large amounts of water or nutrients for plants (Fitriansyah, nd) . So that the type of soil in the village of Alue Ambang requires additional fertilization. so that it can be used to improve agricultural activities.

Usually the community or farmer cadres in Alue Ambang village still use inorganic fertilizers (chemical fertilizers) as a solution. However, these solutions have a negative impact on the environment if used incorrectly and for a long time, and are also very difficult to find on the market. The use of inorganic fertilizers in the long term reduces the organic matter content in the soil, damages soil structure, and pollutes the environment (Simanjuntak et al., 2013)

Therefore, the solution offered from this community service activity is the use of cow dung into liquid organic fertilizer as a good alternative to fertilization without chemicals. With this training activity, it is hoped that it can raise public awareness, especially farmer cadres, of the importance of healthy and creative living so that it can be transmitted to other residents.

Creative means creative processing of cow dung into materials that are more useful and have high economic value. In addition, the use of cow dung POC is expected to motivate people to live healthy lives by reducing the use of pesticides and chemical fertilizers. This is certainly able to motivate the community, especially farmer cadres not to use chemical fertilizers as the main alternative used for fertilizing plants, as well as provide information on the dangers of using excessive chemical fertilizers for plants and the health of the local community and can also add creativity to the cadres. in the use of home yard land for the cultivation of various plants. Some of the steps that have been taken in this service activity are as follows:

1. Preparation

The first stage of this community service is the investigative stage. This activity was attended by 8 farmer cadres and 13 village development students. With the intensity of the meeting time from 04.30 to 05.40 WIB. From the survey results, obtained data in accordance with Table 1.

Table 1 . Biodata of farmer cadres

No	Cadre Name	Age range	Gender	Profession
1	Abdus Samad	71 Years	Man	Farmer
2	Augustine	51 years old	Woman	civil servant
3	Sawiyah	53 years old	Woman	IRT
4	Rosdaniar	44 years old	Woman	IRT
5	Rosnilawati	46 years old	Woman	IRT
6	Wardah	41 years old	Woman	IRT
7	line	30 years	Woman	IRT
8	Nurhayati	56 years old	Woman	IRT

From the table above, it can be seen that the farmer cadres were very enthusiastic in participating in this activity, and were able to capture the knowledge that was given well. Of the 8 farmer cadres, 87.5% are women and 12.5% are men, who on average work as housewives, with an age range of over 40 years.

2. Training on Making Cow Manure POC

Training is an activity or various introduction efforts to develop workforce performance on the work of farmer cadres in an effort to utilize cow dung into organic fertilizer in the form of liquid and also explain the importance of using house yard land to fulfill family food.

Figure 1 . Training on Liquid Organic Fertilizer (POC)

At this stage the executor also conveys information about one of the fulfillment of family food by utilizing cow dung as the main ingredient in the manufacture of liquid organic fertilizer, as well as explaining the importance of using house yard land, because village gardens or gardens have been in the community, especially on the land of cadres. The farm is only used as a parking lot or even a place to beautify the appearance of the house.

The yard will become potential land if it is managed and used as land for farming. The benefits that can be obtained from yard management include being able to plant various types of productive plants that can meet the food and nutritional needs of family members, reduce household spending on food purchases and increase family household income (Ashari *et al.* , 2012).

This activity aims to increase innovation or develop innovation of farmer cadres about organic farming.

3. Manufacture of Liquid Organic Fertilizer for Cow Manure

Figure 2. Ingredients for Making Cow Manure POC

The result of the fermentation process is liter of EM4, kg of brown sugar, 3 bobon shrimp paste and 5 spoons of granulated sugar and 5 kg of cow dung as the main ingredient, 10 liters of POC are produced. Liquid organic fertilizer is the result of fermentation. The fermentation process is an anaerobic enzymatic change from an organic compound to a simpler organic product (Putra & Ratnawati, 2019) .

Figure 3. POC results that are ready to use

Organic fertilizers are fertilizers made from organic materials such as plant residues, animal waste, or from living things that have died. Decomposition of organic matter and dead organisms can change the physical properties of the previous form. Based on the shape, organic fertilizers are divided into two, namely: liquid fertilizer and solid fertilizer (Putra & Ratnawati, 2019) .

Liquid organic fertilizer is a fertilizer with chemical content that can provide nutrients according to the needs of plants in the soil. Liquid organic fertilizer is produced from the decomposition of organic matter such as leaves and animal waste (Taufika, 2011) .

Liquid organic fertilizer has advantages such as containing and being able to provide various kinds of nutrients needed for plant growth, improving soil structure, increasing the life of microorganisms in the soil, more uniform distribution and easy to use. The advantages of liquid organic fertilizer are that it can benefit the environment, restore soil productivity, reduce costs and improve product quality. (Putra & Ratnawati, 2019) .

4. Application of Cow Manure POC on Green Spinach Plants

The application of POC is carried out in village gardens by implementers and farmer cadres. POC is also given at the time of land preparation or 3 days before planting. Liquid organic fertilizer application must pay attention to the concentration or dose of fertilizer given to plants. The dose of cow dung POC fertilization is 150 ml/1 liter of water. Measurement of POC dose using a measuring cup in order to get an accurate concentration.

Figure 4. POC measurement at the time of application

Liquid organic fertilizer, especially foliar application, is known as a liquid foliar fertilizer which contains essential macro and micro nutrients. By giving cow dung POC, it can change village land which previously had a sandy loam structure to dawn. Due to the content of liquid organic fertilizer in cow dung, it includes 16 nutrients needed by plants and soil, such as primary macro nutrients (carbon (C), oxygen (O), hydrogen (H), nitrogen (N), phosphorus (P) and potassium (K)).

Figure 5. Application of POC in Green Spinach Cultivation.

After 3 days of application of cow dung POC, the spinach seeds were sown in polybags. Seedling is done in the morning at 08:00 WIB - finished. Followed by plant maintenance such as watering, weeding and second fertilization is carried out when the spinach is 14 days old after planting and the spinach has shown its vegetative growth but has not been maximized so it is necessary to give liquid organic cow dung fertilizer. So that the results of fertile spinach plants are obtained.

Figure 6. Spinach yield

Harvesting is the last step in the growing phase, but also the beginning of post-harvest work, namely preparation for storage and marketing. Spinach plants are ready to be harvested at the age of 30 days after planting, by pulling the spinach, then cleaning the roots from the soil and the spinach is ready to be processed.

Figure 7. Harvesting of Green Spinach *(Amaranthus Hybridus L)*

5. Processing

One way to increase the added value of spinach is to diversify the use of spinach leaves, which so far have only been used as vegetables in spinach products. In this service activity, the implementing team provides information or how to process spinach into spinach dents.

Figure 8. Process of Spinach Cracker Processing at Farmer Cadre's House

The ingredients used in the processing of spinach dents are spinach leaves, 1 kg of rice flour, 1.5 ounces of starch, 3 eggs, 5 cloves of onion, 1 bruntul garlic, lime leaves, coriander, 5 seeds of candlenut, Cook 1 fruit, salt and cooking oil.

The way of making it starts from blender all the ingredients (shallots, garlic, coriander to taste and candlenut) until smooth, then the lime leaves are chopped until smooth, then prepare the dough like (rice flour, starch, eggs, cooking water and salt), after The oil is heated until evenly distributed and put the spinach leaves into the mixture, fry the spinach leaves until they are golden brown and drain. After frying, let it cool. If you want to sell it, put it in the sales plastic.

Figure 9. Spinach

This processing aims to add economic value to home-based families, as well as efforts to fulfill family food in Alue Ambang Village, Teunom District, Aceh Jaya Regency.

CONCLUSIONS AND SUGGESTIONS

The implementation of community service that has been carried out is training on processing cow dung liquid organic fertilizer and its application to green spinach plants in Alue Ambang Village is running well and smoothly. This activity has been completed for 3 months, followed by 8 farmer cadres and 13 village development students. The stages of this service activity are the stages of surveying, training, making POC, application of POC, harvesting and processing. After this community service activity was carried out, the community understood more about the importance of utilizing cow dung waste as a liquid organic fertilizer and how to use house yard land as an effort to fulfill family food in Alue Ambang Village, Teunom District, Aceh Jaya Regency.

The suggestion from this activity is that it is necessary to provide longer assistance for the utilization of cow dung waste and more optimal utilization of the yard.

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