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Evaluating the Impact of a Women's Empowerment Program on Environmental Sustainability through Eco-Friendly Fertilizer Production

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Abstract

Evaluating the Impact of a Women's Empowerment Program on Environmental Sustainability through Eco-Friendly Fertilizer Production. *The high potential in Grenden Village as a corn producer has the side effect of increasing corn plant waste. Most people do not utilize corn waste, especially corn cobs. Corn waste is rich in organic matter and can be reused for plant fertilization. Corn cobs can be used as an alternative fertilizer that can replace the role of chemical fertilizers. PPK Ormawa Team of HMPS S1 Science Education ASE held training for village residents through the Gayati Women's School to provide education and practical activities to residents to utilize corn waste as organic fertilizer. This research aims to evaluate the effectiveness of a training program in teaching local women to utilize corn cobs as organic fertilizer. This research was conducted using a descriptive qualitative method that focuses on describing the results obtained in real terms based on conditions in the field. Data were collected through observation, activity documentation, and interviews. The implementation of the activity was carried out in Grenden Village, Puger District in August 2024. The target of this activity was mothers who were members of the Gayatri Women's School, totaling around 20 people. The object of this activity is corn cobs which are one of the local wastes in Grenden Village. Evaluation of this activity through the results of the pretest and post-test shows that education and training in making fertilizer from Corn Cobs have a positive impact on the community such as waste reduction, economic improvement, soil health, and empowerment education.*

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INTRODUCTION

Grenden Village is located in the coastal area, one of the villages in Puger sub-district, Jember Regency, East Java Province. This village has an area of 11.12 $km2$ with the second largest population in Puger District. BPSIT Serealia stated that corn production in Indonesia for March 2024 reached 2.29 million tons. Corn plants mostly grow in tropical climates, and have a soil texture that is suitable for use as a food crop like corn (Tangngisalu et al., 2023). This is because of the environmental characteristics of Puger Village so the village area is widely used as a corn farming area.

Based on data from the Central Statistics Agency in 2023, the majority of people still depend on agricultural products. This is complemented by an explanation of data from the Central Statistics Agency for 2020 (updated 2021) which shows that corn production in Puger

Village is ranked fourth among all regions in Jember district. Puger Village has a corn farming area of 6,840 Ha with corn production of 60.25 kw/Ha and annual corn production reaching 41,211 tons. The conclusion from this data shows that many village residents work as corn farmers.

The high potential in Grenden Village as a corn producer has the side effect of increasing corn plant waste. This happens because the use of corn is only used as a staple food, which means that the cobs, hairs, and husks of corn are left to become waste in the environment. Most people only use corn waste to feed their livestock in the form of corn cobs by mixing it with animal feed grass. There is a lot of corn waste that can be used for other, more useful products, one of which is corn cobs. Corn waste from crops is a by-product of crop cultivation which is rich in organic material and can be reused to fertilize crops. Elvania et al (2024) added that corn cobs contain a lot of organic material, which can play a role in increasing plant production by supplying microbial elements and soil microelements to the soil pH. This fertilizer is very important in the plant growth cycle because it can improve soil structure, regulate soil pH, and increase the activity of microbes and microelements in the soil. Dahliana et al (2022) added that corn cobs contain several components that are useful for making organic fertilizer, including cellulose and hemicellulose fibers which support the decomposition process and improve the quality of compost. In addition, the lignin in corn cobs provides stability to the compost, although it is difficult to decompose. The carbohydrates contained provide energy for microorganisms during composting, while macronutrients such as potassium, calcium, magnesium, and phosphorus support plant growth and soil health. All this organic material will decompose into humus which improves soil fertility and structure.

Fertilizer is an important element in the farming process. A good fertilizer will produce fertile plants, where the content in the plants will be higher. Increasing the quantity of agriculture can be done by increasing soil fertility. Fertilization aims to produce better plant growth, apart from adding macro and micronutrients in the soil, the yield and quality of plants can be guaranteed well (Rohmaniya et al., 2023). Excessive use of chemical fertilizers can have bad effects in the long term. Using compost is one way to improve soil quality. Using chemical fertilizers over a long period will cause the soil to harden and lose its porosity because the acid levels in the soil will increase over time (Sahid et al., 2023). However, its use in society is quite difficult because prices continue to rise so many farmers make a profit with a small margin. This fact is supplemented based on SISKAPERBABO data as of August 25, 2024, per kilo ranges from Rp. 5,678.00 up to Rp. 11,271.00.

One effort that can be made to prevent a decrease in the fertility of agricultural land and reduce the costs of using fertilizers by farmers is to increase the use of non-organic fertilizers. The organic fertilizers in question include manure, solid compost, or liquid organic fertilizer (POC) (Paulus et al., 2020). From this explanation, it can be concluded that corn cobs are used as an alternative fertilizer material that can replace the role of chemical fertilizers.

Based on the results of the analysis of community needs and problems in Grenden Village, the PPK Ormawa HMPS S1 Science Education ASE team discussed and agreed with the village community and local leaders to establish a "Women's School" with the "Gayatri Women's School" program which utilizes natural potential, one of which is by cultivating corn agricultural waste which has been left unused and not utilized optimally. Gayatri Women's school is a non-formal institution formed to improve community life skills based on local potential in Grenden Village. Based on the results of the discussion, the PPK Ormawa HMPS S1 Science Education ASE Team held training for village residents through the Gayati Women's School with the aim of providing education and practical demonstration for residents to utilize corn waste as organic fertilizer as an educational training program. This is expected to significantly reduce waste from corn farming and also increase the selling value of processed corn waste products.

METHODS

This research was conducted using a descriptive qualitative method which focuses on describing the results obtained in real terms based on conditions in the field. Descriptive research is a strategy in qualitative research that is carried out by examining events or phenomena in real life through exposure obtained from a group of individuals or respondents (Rusandi and Rusli, 2021). This research was carried out to provide a solution to the problem of corn cob waste in Grenden Village, which also provided training on how to use corn cob waste in organic fertilizer.

The activity will be carried out in Grenden Village, Puger District in August 2024. The target of this activity is around 20 mothers who are members of the Gayatri Women's School. The object of this activity is corn cobs which are one of the local wastes in Grenden Village because they have many large expanses of corn rice fields. The activities were carried out at the Gayatri Women's School in Grenden Village. The stages of implementing the activities carried out are explained into three stages.

1. **Preparation**

The first stage is location survey activities which aimed to directly observe the condition of Grenden Village, especially its agricultural potential. The survey was also carried out by conducting interviews with the village head and the Grenden Village community. Activity planning is carried out after knowing the field conditions by holding planning discussions to overcome problems and benefits of local resources found in Grenden Village.

2. **Implementation**

The second stage was the implementation of educational activities and demonstration about the introduction of corn cob fertilizer which consists of three steps.

a. Provides education regarding the impact of the large amount of corn cob waste in Grenden Village.
b. Provides education and introduction regarding the benefits of corn cob waste in organic fertilizer.
c. Provides training on how to make organic fertilizer from corn cob waste.

3. **Evaluation**

The evaluation stage is carried out by analyzing the results that have been achieved by comparing the pretest and posttest results and making activity reports. This research uses two data collection techniques, primary and secondary data collection techniques. Primary data collection techniques were carried out using three main methods including direct observation, activity documentation, and interviews. Secondary data collection techniques were carried out by conducting literature studies from books, articles, and Grenden Village data. The data obtained will then be analyzed using the Miles and Hubberman interactive model (Sakina and Effendi, 2021) which is carried out by collecting data, reducing data, presenting data, and drawing conclusions or verification. The stages of implementing the activities carried out are as follows:

a. **Location Survey:** The first stage is a location survey which aims to directly observe the condition of Grenden Village, especially its agricultural potential. The survey data is also supported by interview data with the head of the village and the Grenden Village community.
b. **Planning:** The second stage is to describe the next planning about problems and benefits of local resources found in Grenden Village based on the environmental conditions.
c. **Implementation:** The third stage carried out was the implementation of educational activities and the introduction of corn cob fertilizer which was carried out by providing information regarding the benefits of corn cob fertilizer and a direct demonstration of making corn cob fertilizer. The activities were carried out at the Gayatri Women's School in Grenden Village.

Figure 1. The Stages of Implementing the Activities Women`s School Program

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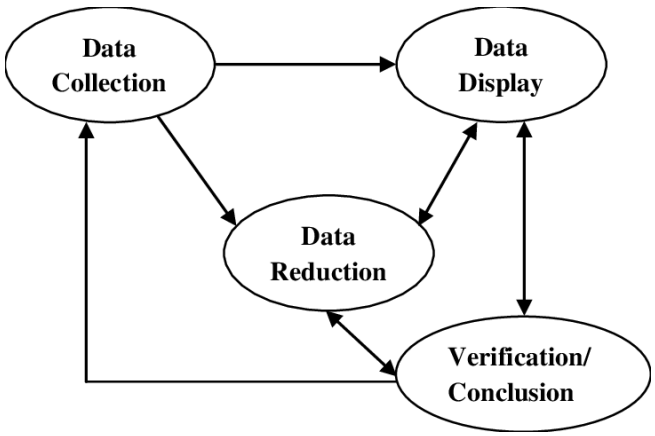

Figure 2. Interactive Models of Miles dan Hubberman
Sakina and Effendi (2021)

RESULTS AND DISCUSSION

This research uses a descriptive qualitative method by describing real phenomena based on community activities carried out directly by the Gayatri Women's School. Several stages are carried out starting from the stages: Village Survey, Activity Planning, and Activity Implementation. The implementation of the activity begins with an explanation of the fact that Grenden Village has abundant local resources for corn fields. Although the local resources provide a lot of corn cob waste. The next activity is to educate the community about the function and importance of organic fertilizer from corn cob waste. After that, all the participants do the practice activity to make organic fertilizer from corn cobs. During the process of making corn cob fertilizer.

The educational training to utilize corn waste as organic fertilizer was held for four months. The response of all participants is well during the training. The participants consist of the

village government, the community, and participants of the Gayatri Women's School. The results obtained at each stage of the activity are:

Figure 3. The Stages of Location Survey

1. The location survey obtained data that Grenden Village has a very large corn farming area. This location also significantly contributes to environmental waste such as corn cob waste, According to interviews with the village head and the community of Grenden Village, there has never been any training or education about the proper management of corn cob waste. So, the resident usually burns the corn cobs, mixes them with the animal feeds, or just throws them in the environment.

Figure 4. The Stages of Activity Planning

2. Activity planning was carried out by discussions activity with the implementation team and the results of the planning were obtained in the form of education and training for the Grenden Village residents regarding the utilization of corn cob waste into organic fertilizer.

Figure 5. The Stages of Implementation

3. The implementation of educational training to make corn cob fertilizer consists of two activities the presentation of information related to the benefits of corn cob organic fertilizer and direct demonstrations of making corn cob fertilizer. This implementation activity is measured before and after the activity using the pretest and posttest results.

Table 1. Community Life Skills Pretest Results

Criteria	Population (f)	Population (%)
Good 81-100	4	20
Enough 61-100	9	45
Less ≤60	7	35
Total	20	100

Based on Table 1, the results of the community life skills pretest showed that 4 people, or 20% of participants were in the category of having good skills, 9 people (45%) were in the category of sufficient skills and 7 people (35%) still had skills in the category of lacking. The pretest data showed that there were still many people who did not have skills in utilizing corn cob waste.

Table 2. Community Life Skills Posttest Results

Criteria	Population (f)	Population (%)
Good 81-100	12	60
Enough 61-100	6	30
Less ≤60	2	10
Total	20	100

Based on Table 2, the results of the community life skills posttest showed that 12 people or 60% were in the category of having good skills, 6 people, or 30% were in the category of sufficient skills and 2 people or 10% still had skills in the category of lacking. The posttest data results showed that there was an increase in the number of people who had good skills and there was a significant decrease in the number of people with lacking skills. It shows that there is an increase in skills to make corn cob fertilizer. It can be concluded that there is an increase in participants' knowledge and skills after the educational practice activities to make corn cob fertilizer. This shows that the women`s school program through the educational activity of making eco-friendly corn cob fertilizer to reduce local environmental waste in Grenden was effective.

Evaluation of this activity through pretest and posttest results showed that education and training on making fertilizer from corn cobs had a positive impact on the community, especially the participants of Gayatri Women's School. Through this activity, participants gained a good understanding of the importance of processing organic waste and the benefits of using organic fertilizer for agriculture. This shows that the women`s school program through the educational activity of making eco-friendly corn cob fertilizer to reduce local environmental waste in Grenden was effective. The evaluation results showed that most participants understood the steps for making corn cob fertilizer and its benefits for the environment. Based on the training results, this activity is expected to provide long-term positive impacts. Both in reducing environmental waste and improving the economy of residents. One of the challenges in this program is the difficulty in producing fertilizer in large quantities. This is due to the lack of access to supporting equipment and tools. In addition, due to limited tools and time, laboratory testing and the effectiveness of fertilizer use in the field cannot be carried out.

CONCLUSION

The research shows that the women`s school program through the educational activity of making eco-friendly corn cob fertilizer to reduce local environmental waste in Grenden was effective. This activity has a positive impact through education and the introduction of environmentally friendly corn cob fertilizers. The use of corn cobs as fertilizer contributes to

waste reduction, as well as supporting more efficient and economically sustainable agricultural practices. This activity has succeeded in inspiring village women to become agents of change in efforts to preserve the local environment. So this educational activity is important to continue to be developed and continued to support environmental conservation efforts and increase the sustainability of local agricultural production. Hopefully, further research related to this training activity can produce corn cob fertilizer on a large scale and be equipped with the implementation of laboratory tests so that it can be marketed to the wider community.

SUGGESTION

As a follow-up to the research that has been conducted, the researcher provides the following suggestion that is analyzing the effectiveness and influence of eco friendly corn cob fertilizer on plant growth.

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