

Organic waste processing education in Senuko Hamlet

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Abstract

Household organic waste is an environmental problem facing Senuko Hamlet. Students from the Community Service Program (KKN) at Aisyiyah University in Yogyakarta held a socialization session on organic waste processing to increase public knowledge and awareness. The activity included outreach, discussions, and a Q&A session with speakers from the waste recycling community. Topics covered maggot cultivation, the use of stacked bucket composters, and rice husk charcoal processing. Nineteen participants enthusiastically participated in the activity, although no hands-on practice was conducted. This education increased residents' understanding that organic waste can be processed into a resource that benefits the environment and the economy. Follow-up assistance is needed to ensure practical implementation.

Keywords: Organic waste; Education; Senuko Village

1. Introduction

According to the World Health Organization (WHO), waste is anything unused, unwanted, or discarded that originates from human activities and does not occur naturally. Waste is the residue of daily human activities or natural processes in solid or semi-solid form, consisting of organic or inorganic substances, biodegradable or non-biodegradable, deemed useless and discarded into the environment.

Organic waste is waste derived from the remains of living organisms, both plants and animals, that can decompose naturally through biological processes by microorganisms. Examples include food scraps, vegetables, fruits, leaves, twigs, and animal waste. Organic waste generally decomposes easily, producing an unpleasant odor, but it can also be reused as compost, biogas, or alternative energy if managed properly. (Siagian et al., 2022)

Inorganic waste is waste derived from human remains that is difficult for bacteria to decompose, requiring a long time, up to hundreds of years, to decompose (Hasibuan & Dalimunthe, 2020). The resulting waste holds potential resources if managed properly. Inorganic waste can be recycled, sold, or reused, while organic waste can still be used as raw material for compost.

Human activities in managing resources to meet living needs are increasingly diverse along with population growth. Population growth has resulted in significant environmental changes. These changes are influenced by increased consumption, which in turn increases waste volume. To reduce waste volume, communities must immediately prioritize waste management to prevent environmental pollution that disrupts cleanliness and health. Waste management activities are carried out through a 3R-based approach, namely integrated management and management from the source. 3R-based waste management encompasses efforts to reduce waste volume (reduce), reuse without prior processing (reuse), and recycle waste through specific processing processes (recycle). (Fahmi & Ratnasari, 2021).

Waste reduction efforts can be implemented through waste limitation, recycling, reuse, and waste sorting, with waste sorting being a key factor in facilitating disposal and recycling. The waste problem is an increasingly complex and urgent environmental issue that requires addressing. Population growth,

increased household activity, and low public awareness of waste management have resulted in increasing waste generation. One of the most common types of waste generated at the household level is organic waste, such as food scraps, leaves, and kitchen waste. If not managed properly, organic waste can produce unpleasant odors, become a breeding ground for disease, and pollute the surrounding environment (Dwipayana, 2022).

Senuko Village, as a continuously developing rural area, is also faced with waste management issues, particularly organic waste. Initial observations indicate that most residents still dispose of waste openly or burn it, potentially reducing air quality, soil pollution, and adversely affecting health. (Fia Firdani, 2023) has great potential to develop a community-based organic waste management system. The vast remaining land can be utilized for integrated waste processing, while the abundant availability of organic waste from households can be processed into compost that benefits local agriculture. This aligns with the characteristics of the Senuko Village community, most of whom earn their living in agriculture. Therefore, the availability of organic fertilizer from waste processing can support agricultural productivity while reducing dependence on chemical fertilizers.

The goal of the waste management program conducted by students participating in the Community Service Program (KKN) at Aisyah University Yogyakarta is to enable the Senuko Village community not only to reduce organic waste but also to reap dual benefits, both in terms of environmental health and household economics. Proper organic waste management will create a cleaner, healthier, and more comfortable environment to live in, while also being a concrete step in supporting environmentally conscious and sustainable village development.

2. Method

This outreach activity was implemented through two systematically designed stages to effectively achieve its objectives. To support the presentation, the 50th group of the 'Aisiyyah University Yogyakarta Community Service Program presented a resource person, Dikko Andrey Kurniawan, the manager of Sawo Kecil, which operates in the waste recycling sector. This outreach is expected to provide a deeper understanding and knowledge of the application of sustainable waste management.

2.1. Stage 1: Education on the Types and Benefits of Organic Waste

The first stage focused on providing an introduction to the types of organic waste commonly generated by people in their daily lives. This organic waste includes food scraps, leaves, and other household waste. Furthermore, the community was provided with an explanation of the benefits of organic waste management. This stage aimed to foster a deeper understanding and knowledge of organic waste. This fostered public awareness that organic waste is not simply waste but rather a valuable resource when managed properly.

2.2. Stage 2: Education on Organic Waste Management

The second stage focuses on providing materials related to techniques and methods for managing organic waste so that it can be utilized and transformed into something useful. In this stage, the community is introduced to various organic waste management methods, including educational ecotourism, maggot cultivation, composting, and rice husk charcoal burning techniques. It is hoped that this education will enable the community to implement appropriate organic waste management methods in their daily lives, thereby creating a cleaner and healthier environment.

3. Results and Discussion

3.1. Results

An educational activity on organic waste processing took place on Friday, August 29, 2025, at the RW 01 house, which coincided with the regular farmer group meeting. Nineteen participants, including members of the farmer group, attended the event. The resource person was Dikko Andrey Kurniawan, the manager of Sawo Kecil, which operates in the waste recycling sector. The event began with remarks from the head of Senuko Hamlet, followed by a presentation by the resource person. The material covered various types of waste, how to process inorganic waste (recycled weaving innovations), and how to process organic waste (maggot cultivation, the use of the Hi-Ember Tumpuk composter, and the production of charcoal from rice husks).

The material was delivered using an interactive lecture method, utilizing presentation media and a question-and-answer discussion. Several participants also shared their experiences in waste management, fostering an exchange of information and enriching mutual understanding. Educational sessions on maggot cultivation, making a stacked bucket composter, and how to make rice husk charcoal successfully increased the Senuko Hamlet community's understanding of organic waste management. During the discussion, participants appeared enthusiastic, asking several questions, such as how long it takes to raise maggots until they are ready to harvest, and what types of liquids can be used in the stacked bucket composting process. These questions demonstrated that participants not only understood the concept but were also interested in how to implement it in practice.

As a follow-up, the community expressed their desire to try making their own stacked bucket composter, which is easy to use at home to produce organic fertilizer and to start cultivating maggots, which can be useful as animal feed and play a vital role in reducing household organic waste. Meanwhile, the community has not been able to directly try the rice husk charcoal method due to limited equipment and space. Therefore, this activity serves as an initial step to gradually encourage adoption, starting with the simplest method and eventually progressing to methods that require specialized equipment, such as making rice husk charcoal.

3.2. Discussion

Organic waste management education in Senuko Hamlet helped increase residents' knowledge and awareness of the importance of managing household waste. Prior to the education, most residents were unfamiliar with how to process organic waste, but they had already been sorting organic and inorganic waste. This activity, delivered through explanations, discussions, and a question-and-answer session, allowed participants to understand various organic waste processing methods, including maggot cultivation, the use of a composter with a Hi-Bucket Stacked Biocompost Reactor, and the burning of cupping charcoal. However, no hands-on practice was conducted.

Black Soldier Fly (BSF) maggot cultivation was introduced as an effective way to process organic waste because BSF larvae can decompose waste quickly. In addition to reducing waste, maggots can also be sold as animal feed. Research by Hidayat (2024) showed that maggot cultivation education in Depok increased community understanding by 24% after the education, indicating that this method is quite effective in raising public awareness. Simply put, the maggot formation process begins when adult BSF flies lay eggs. These eggs hatch into larvae, the maggots themselves, in approximately four days. This phase is the most crucial because the maggots will feed and grow rapidly for 2-3 weeks by consuming organic waste. Once full and reaching their maximum size, the maggots will stop feeding and seek a dry place to transform into prepupae, then pupae or cocoons for about 14 days. After the pupal phase is complete, the maggots will emerge as adult BSF flies and be ready to lay eggs again, starting their entire life cycle again (Rihhadatul 'Aisy et al., 2024).

Komposter Ember Tumpuk (Hi-Ember Tumpuk) memberi wawasan kepada warga mengenai cara sederhana, murah, dan efektif mengolah sampah rumah tangga menjadi pupuk organik cair (POC) dan kompos padat yang bermanfaat untuk pertanian. Studi di Dusun Belang, Magelang, menunjukkan pelatihan penggunaan ember tumpuk memberikan pengaruh positif terhadap masyarakat khususnya kelompok tani, karena mereka bisa memanfaatkan bahan bekas dan membuat pupuk dari sisa limbah dapur atau kebun (Azizah et al., 2024).

Research conducted by Yuniati et al., (2025) proved that this technique, using simple containers such as used buckets or gallon jugs, is quite effective in handling household organic waste. An outreach program for PKK mothers in Sumberan Hamlet, Bantul, showed a significant increase in knowledge. Pretest results showed an average score of 44.67, while after training it increased to 84.67 with a p value of 0.000 ($p < 0.05$), indicating a significant change after the intervention. The working principle of the stacked composter uses a tiered system. The upper bucket is used to store organic waste, while the bucket below it functions to collect leachate that drips through a small hole in the bottom of the container. The decomposition process by microorganisms produces two main products, namely solid compost and liquid organic fertilizer (POC). Some of the advantages of this method include:

1. Practical for household use using simple tools such as used paint buckets or gallon jugs.
2. Environmentally friendly because it suppresses odors, prevents flies, and reduces the volume of waste sent to landfills.

3. Provides direct benefits in the form of organic fertilizer that can be used for houseplants and agricultural land.
4. Supports the economic aspect by reducing the cost of purchasing chemical fertilizers and opening up opportunities to produce products with market value.

Experience in the implementation of this method in Sumberan Hamlet shows that outreach activities and hands-on practice not only increase knowledge but also foster community awareness and participation in independent waste management. This situation aligns with the conditions of the Senuko Hamlet community, the majority of whom work as farmers. Therefore, the use of a stacked composter can provide dual benefits, such as maintaining environmental cleanliness and increasing agricultural yields through the use of homemade organic fertilizer.

Rice husk charcoal is an organic material used as a soil conditioner. It can be obtained from the incomplete (partial) combustion of rice husks. This process can kill pathogens, thus sterilizing the charcoal. Rice husk charcoal contains the nutrients SiO₂ (52%), C (31%), K (0.3%), N (0.18%), P (0.08%), and Ca (0.14%), along with several other nutrients, with a pH of 6.8 (Musdi et al., 2021). In soil, rice husk charcoal functions to improve the physical, chemical, and biological structure of the soil. Rice husk charcoal can increase soil porosity, making it looser, and increasing the soil's ability to absorb water. Rice husk charcoal has the ability to bind water well, does not clump easily, has good porosity, and is light and sterile (Nule et al., 2021).

Rice husk charcoal can be used to improve soil quality in land rehabilitation efforts and support plant growth and development. Furthermore, rice husk charcoal can also increase the nutrient content of the soil, albeit in limited quantities. Therefore, the application of rice husk charcoal is highly beneficial for improving agricultural land quality, especially when there are large areas of open land or land degradation and low soil fertility (Novianti et al., 2022). Burning rice husk charcoal from organic waste offers an alternative waste processing method. This method can also be used to produce natural liquids useful in agriculture (natural pesticides). Research in Getasan Village shows that utilizing waste ash into charcoal briquettes helps reduce waste accumulation at the Landfill (TPS R) (Helmy et al., 2025).

Overall, this educational activity provided the Senuko Hamlet community with a good understanding of various organic waste processing methods. Although direct practice has not yet been carried out, the presentation of the material is an important step in changing the community's mindset about the importance of sustainable waste management. The next step is to guide the community in implementing these methods directly in their daily lives.

4. Conclusion

The organic waste management education program implemented by students from the Yogyakarta Community Service Program (KKN) at Aisyiyah University in Senuko Hamlet has had a positive impact on increasing community understanding and awareness of the importance of environmentally friendly waste management. The material presented covered the types of organic waste and their management methods, such as maggot cultivation, the use of stacked bucket composters, and the technique of burning rice husks to produce charcoal.

Although no hands-on practice was conducted during this activity, the community's enthusiasm was evident in their active participation in the question-and-answer session and discussion. This demonstrates a desire to change the way they view waste not as a waste to be discarded, but as a potential resource to be utilized in the future. It is hoped that the community will implement these organic waste management methods in their daily lives, thereby creating a healthier, cleaner environment and supporting sustainable and environmentally conscious village development efforts.

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