



Waste Management Training through Composting

A Creative Solution for the Community of Sinduadi Village, Sleman

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ABSTRACT

This activity aims to provide education on waste and its potential dangers, while also conducting training on how to process household organic waste into compost. The activity was held in Sendangadi Village, Mlati, with 40 participants. It was a workshop where a speaker delivered a specific topic, followed by a discussion based on the presentation. In this training, participants were asked to bring organic waste, such as leftover green vegetables and fruit scraps from their household kitchens, to be used as materials for composting. The activity emphasized the importance of active community involvement in waste management, community-based composting methods, and the economic potential of compost as an alternative business opportunity. As a result of the activity, the community gained valuable knowledge about waste management. Additionally, the feedback was overwhelmingly positive from both village officials and participating residents. The participants demonstrated high enthusiasm and interest in applying the knowledge gained, particularly in practicing composting at home using organic waste as raw material a practical solution to reduce waste in their environment.

Keywords

Community-Based
Composting
Training
Waste Management

JSCD

Journal of Social and Community Development

Vol. 2, No. 01, pp. 27-37

Article history

Received 20 December 2024

Revised 9 March 2025

Accepted 13 March 2025

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journal.iistr.org/index.php/JSCD
DOI: 10.56741/jscd.v2i01.796



Introduction

Household waste management has become an increasingly urgent environmental issue, including in Sinduadi Village. The growing population and economic activities in the village contribute to an annual increase in household waste generation. According to Susanti et al. [1], ineffective waste management can lead to severe negative impacts, including soil, water, and air pollution. Additionally, it poses significant risks such as disease transmission and environmental degradation, ultimately affecting the quality of life and creating unhealthy and uncomfortable living conditions for residents.

With rising awareness of the importance of effective waste management, innovative strategies are essential to address related issues [2]. Sinduadi Village residents need to be empowered through training programs that promote sustainable waste management practices. Such efforts aim to reduce waste generation and transform organic waste into compost, minimizing environmental harm and improving the community's quality of life.

Systematic, effective, and sustainable measures are necessary to prevent the worsening of household waste management issues. Active community participation and support from government bodies and related institutions are crucial [3]. These measures include awareness campaigns on waste management importance, training on composting techniques, and providing adequate waste disposal facilities. An integrated approach is anticipated to enhance waste management in Sinduadi Village, mitigating negative impacts and improving residents' quality of life.

Composting is considered one of the most effective and sustainable household waste management methods [4]. Hamidah et al. [5] describe composting as a natural process that decomposes organic materials, such as food scraps, leaves, and kitchen waste, into compost a nutrient-rich fertilizer for gardening and farming. By converting organic waste into compost, communities can reduce the waste sent to landfills and contribute to environmental preservation. Composting is environmentally friendly, economical, and easy to implement, particularly in rural areas like Sinduadi, where the potential for organic waste management is high but underutilized.

However, in Sinduadi Village, public awareness of the benefits of composting remains limited. Most residents either dispose of household waste improperly or burn it, leading to further negative consequences such as air pollution and health risks. A lack of knowledge and technical skills in organic waste management is a significant barrier to optimal waste management practices in the village [6]. Thus, household-scale composting training is essential to enhance residents' capacity to manage their waste, reducing the environmental burden caused by household waste.

The household-scale composting training in Sinduadi Village is designed to provide a concrete solution to the village's waste management challenges. This program offers an in-depth

understanding to the community of the importance of eco-friendly and sustainable waste management [7]. It aims to shift mindsets about waste and encourage residents to adopt composting practices in their households [8]. Participants will gain practical skills in compost production, enabling them to utilize local resources efficiently without external dependency.

The program is inclusive, involving all societal levels in Sinduadi Village from families and youth to community leaders and village officials. Broad participation is expected, as community synergy is vital for the program's success. By fostering collaboration among residents, the program aims to establish a culture of responsible and sustainable waste management [9].

The training also has the potential to improve economic welfare. Compost produced from organic household waste can be used in agriculture and horticulture or sold as an economic commodity [10]. This opens new economic opportunities for Sinduadi Village residents, particularly those with agricultural land or horticultural businesses. Thus, the program not only addresses environmental issues but also contributes to enhancing residents' livelihoods through the productive use of organic waste.

The role of the Sinduadi Village government is crucial in supporting the implementation of this composting training program. Support can include waste management policies, funding for training operations, and the provision of necessary facilities [11]. Collaborations with non-governmental organizations (NGOs) and environmental groups can strengthen the program, with technical assistance and effective socialization playing key roles in ensuring smooth implementation and optimal results.

This program aligns with national initiatives promoting community-based waste management [12], [13]. Government efforts include community outreach, waste management infrastructure development, and incentives for active participation. Consequently, this composting training contributes not only locally but also nationally, supporting sustainable development goals in the environmental sector.

In summary, the household-scale composting training in Sinduadi Village is a strategic step toward addressing pressing waste management issues. Through this program, residents are encouraged to actively participate in organic waste management, gaining practical skills and understanding the importance of their role in maintaining environmental cleanliness. By implementing composting techniques, they can significantly reduce waste generation and environmental harm. Furthermore, the program's economic benefits, such as increased agricultural productivity and reduced reliance on chemical fertilizers, make it a sustainable and impactful initiative [14], [9]. With collective efforts, Sinduadi Village can achieve a cleaner, healthier, and more sustainable environment.

Literature Review

A. Waste Management

Effective waste management is a pressing issue for communities worldwide, particularly with the growing volume of waste generated due to population growth and economic activities. Research by Edidiamaka [15] emphasizes that unmanaged household waste can lead to severe environmental consequences, such as soil, water, and air pollution, posing risks to public health and the ecosystem. The need for innovative and sustainable solutions has been highlighted by Florêncio et al. [16], who advocate for community-based waste management strategies. These strategies involve empowering residents through education and training, enabling them to adopt eco-friendly practices like composting, recycling, and reducing waste at its source. Such initiatives not only minimize environmental impact but also enhance public awareness and participation in sustainable waste management efforts.

Recent studies have underscored the importance of integrating technical support with local knowledge to achieve successful waste management programs. According to Herniwanti et al. [17], composting at the household level is among the most effective methods for managing organic waste sustainably. This process not only reduces the volume of waste sent to landfills but also produces compost that can enrich soil fertility, contributing to agricultural productivity. Community engagement is crucial, as noted by Yasin & Mokhtar [7], who found that a lack of knowledge and skills often hinders the adoption of effective waste management practices. Therefore, collaborative efforts involving governments, non-governmental organizations, and local communities are essential to provide adequate infrastructure, training, and incentives. By fostering a collective sense of responsibility, communities can transition toward more sustainable waste management systems, creating healthier and cleaner environments.

B. Composting

Composting is increasingly recognized as a sustainable method for managing organic waste, transforming it into valuable compost that enriches soil fertility. According to Indraswari & Susilowibowo [18], composting utilizes natural decomposition processes to convert organic materials, such as food scraps, garden waste, and agricultural residues, into nutrient-rich fertilizers. This approach offers multiple benefits, including reducing waste volume, minimizing the environmental impact of landfills, and lowering greenhouse gas emissions from organic matter decomposition. Research by Ragazou et al. [19] demonstrates that composting at the household and community levels significantly contributes to waste management efficiency, particularly in areas with high volumes of organic waste. Additionally, the reuse of compost in agriculture or gardening reduces dependency on chemical fertilizers, promoting healthier ecosystems.

Despite its advantages, the widespread adoption of composting faces obstacles related to community awareness, technical skills, and resource availability. Aljarrah et al. [20] highlight that a lack of knowledge about composting methods and benefits often results in improper organic waste disposal, such as open burning or landfill dumping. Educational initiatives and training programs play a vital role in addressing these gaps by providing communities with the skills to implement effective composting practices. Consequently, promoting composting as an accessible and practical solution has the potential to improve environmental quality while fostering community resilience.

Material and Methods

The implementation of this program begins with providing outreach or campaigns to the residents of Sinduadi Village, Mlati Sub-district, Sleman Regency, regarding the dangers posed by waste. The campaign is followed by training on waste segregation and composting, using simple and easily accessible materials and tools, as part of a community-based waste management initiative. Residents are directly involved in the practice of making compost, guided by the program team. During the training, participants are encouraged to bring organic waste, such as vegetable scraps and fruit peels from their kitchens, to be used as raw materials for composting.

The outreach conducted by the team covers various topics, including the definition of waste, types of waste, the environmental and health hazards associated with waste, and issues related to finding safe landfill sites. Additionally, the activities emphasize the importance of active community participation in community-based waste management, methods of composting, and the potential economic value of compost as an alternative business opportunity. The composting training utilizes organic materials from households and gardens, along with the provision of composting tools and activator materials such as molasses or EM-4, supplied by the team.

Results and Discussion

The results of discussions and surveys conducted with the head of Sinduadi Village, along with direct observations of the village's environment, revealed numerous piles of waste scattered along the edges of paddy fields and the riverbanks that traverse the village. These waste piles consist not only of organic materials such as food scraps but also inorganic materials like plastic and metal, which are difficult to decompose. This situation creates a highly unattractive impression, tarnishing the natural beauty of the rural landscape that should be pristine. Moreover, these waste accumulations attract flies and other insects, posing health risks to the local community. The unpleasant odor emanating from the waste further exacerbates the situation, emphasizing the urgent need for campaigns to change residents' behavior regarding waste

management. In addition to campaigns, household-level composting training is also crucial as a concrete step to reduce the volume of waste in the area.

Further discussions with the head of Sinduadi Village revealed several key pieces of information regarding waste management in the village. One of the main challenges is the lack of adequate waste disposal facilities [21], [22]. As a result, residents tend to dump waste along the edges of paddy fields or resort to burning it as a quick solution. These actions not only damage the environment's aesthetics but also pollute the air with emissions from waste burning, which can negatively impact public health in the long term. This situation creates an unhealthy and uncomfortable environment to live in, threatening the quality of life for the local community.

Additionally, the residents of Sinduadi Village have never received adequate information or training on proper waste management. The lack of campaigns or initiatives to promote environmental cleanliness has led to low public awareness of the dangers and adverse effects of waste accumulation in their surroundings. Without sufficient understanding, residents fail to recognize the importance of sustainable and proper waste management. Therefore, there is an urgent need to raise community awareness and knowledge about effective waste management practices while offering practical solutions to address this issue.

The head of Sinduadi Village also revealed that the village has several greenhouses built through a government program [23]. Unfortunately, these facilities are currently neglected and underutilized. However, these greenhouses could be repurposed for various agricultural activities, particularly if residents learn to process their organic waste into compost. With training in composting and an understanding of its importance, residents could significantly reduce the volume of waste in the village [24]. Moreover, the compost could be used as an eco-friendly and cost-effective fertilizer for plants grown in the greenhouses.

To achieve the desired change, the target participants for the composting training and environmental campaign in Sinduadi Village were set at 40 individuals, consisting of active members of the Family Welfare Movement (PKK) and youth members of the village's youth organization. This group was selected due to their significant influence within the community, especially in disseminating information and driving behavioral change [25], [26]. Actively involving them in the program is expected to spread critical messages about waste management and environmental cleanliness effectively to the entire village. According to Syah et al. [27], the involvement of PKK groups is anticipated to accelerate the adoption of best practices in waste management within their environments.

Furthermore, PKK members and youth organization members are expected to act as change agents by educating other residents about practical and straightforward household waste management methods. With a solid understanding of waste management, they can serve as role models for the community, thereby raising awareness of the importance of maintaining

environmental cleanliness. This approach aims to foster sustainable behavioral changes within the community, transforming Sinduadi Village into not only a cleaner and more comfortable place to live but also a model for better environmental management for other villages.

The activities are scheduled to take place on Sunday, September 8, 2024, at the Sinduadi Village Hall. The date and venue were carefully considered by the organizing committee in collaboration with the village head to ensure the program could be attended without disrupting the participants' daily activities. It is hoped that the campaign and training will run smoothly, receive full participation from the invited attendees, and produce lasting positive impacts on the village community in the long term.

Preparation for the program was conducted throughout July 2024, involving lecturers and students in various planning and technical aspects. The lecturers were responsible for preparing materials for the environmental campaign and composting training, while the students in the team managed various technical preparations. These included drafting invitation letters, designing and producing banners for the training, borrowing equipment, arranging transportation for the team, and procuring materials needed for composting training. All preparations were carried out meticulously to ensure a successful event on the day of implementation [28], [29].

On the day of implementation, Sunday, September 8, 2024, the event commenced at the Sinduadi Village Hall with active participation and high enthusiasm from the participants. Lecturers, supported by students, delivered materials on environmental campaigns and composting training. Before receiving the presentation, participants first completed a preliminary questionnaire to assess their initial understanding of the importance of waste management. Subsequently, they received an in-depth explanation of effective waste management, the negative impacts of waste on the environment and health, and simple techniques to reduce household waste. Additionally, participants were introduced to various types of waste and methods for processing organic waste into compost, which is highly beneficial for household-scale agriculture [30],[31].

At the end of the composting training, participants were asked to complete a questionnaire prepared by the team. The questionnaire was designed to measure the extent to which the materials presented were understood by the participants. Additionally, it served as an evaluation tool for the team to identify areas for improvement or enhancement in future similar activities. Participant feedback helps the team assess the program's effectiveness and take corrective steps for future initiatives [32]. The following are the results of the initial and final questionnaires that have been completed by participants.

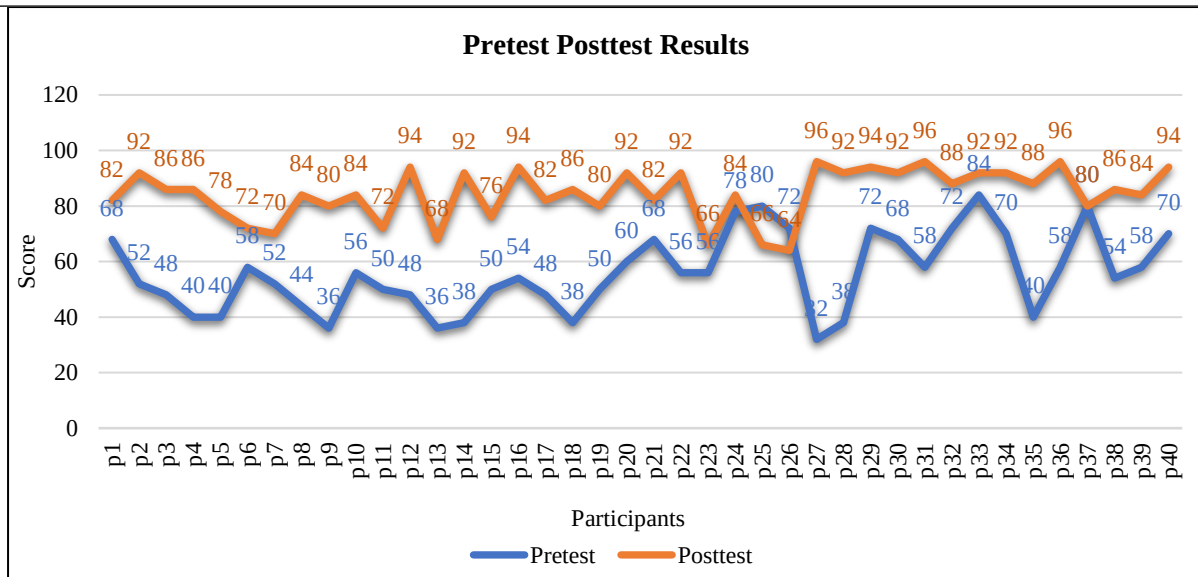


Fig 1. Pretest Posttest Result

Based on the image data above, descriptive statistical analysis was conducted on the pretest and posttest scores of 40 participants. The pretest results showed a minimum score of 32,00 and a maximum score of 84,00, with a total accumulated score of 2.230. The average score for the pretest was 55,75, indicating the participants' initial level of understanding before the intervention. In contrast, the posttest results showed a significant increase, with scores ranging from a minimum of 64,00 to a maximum of 96,00. The total posttest score reached 3.374, resulting in an average score of 84,35. This increase in the average score indicates that the intervention had a positive impact on participants' knowledge and understanding.

The composting training emphasized not only theoretical knowledge but also hands-on activities, encouraging participants to actively engage in the organic waste shredding process [33]. Participants were asked to bring organic waste from their homes, such as vegetable and fruit scraps, to be processed into compost. The organic waste was shredded using simple tools and processed using composting methods previously explained. This activity aimed to provide participants with practical experience in proper organic waste management, enabling them to implement it in their homes

Conclusion

The composting training received highly positive feedback from village officials and the community. Participants demonstrated great enthusiasm in applying the knowledge they had acquired, particularly in processing organic waste into compost as a practical solution for reducing household waste. Additionally, they provided constructive suggestions, such as the importance of monitoring the composting results to ensure that the techniques applied were

correct. This monitoring is also expected to serve as a platform for participants to discuss challenges and improve the program's long-term effectiveness.

To ensure the program's sustainability, regular monitoring and evaluation through periodic visits or online supervision are necessary. Continuous assistance, such as consultation sessions and learning communities, will help participants overcome composting challenges. The development of practical guides in the form of modules or video tutorials can also serve as useful references. Furthermore, advanced training on the use of compost for household agriculture and the development of compost-based products can enhance its economic value. Support from village authorities and relevant stakeholders in providing facilities and academic assistance will strengthen the program's effectiveness, ensuring that its benefits are widely felt and sustained over time.

Conflict of Interest

The authors declare that there is no conflict of interest.

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