

Improving parents and teachers' knowledge about household organic waste composting

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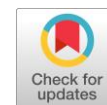
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Received 2020-10-02; accepted 2021-04-21; published 2021-04-22

ABSTRACT

Organic waste is still underestimated by most people, so it always ends up in landfills. How to process organic waste into compost has been widely informed. However, community participation in self-managing organic waste still has not increased. Therefore, this community service activity aims to provide knowledge about household organic waste processing. The methods used in this program include lectures and discussions, demonstrations, and pre-post tests for evaluation. This program was carried out on November 30, 2019, with the target of participants, namely parents and teachers of Permata Hatiku School. This program was carried out on November 30, 2019, with the target of participants, namely parents and teachers of Permata Hatiku School. The various composting methods presented in the lectures include the composter bin method, takakura, bio-pore, and jugangan (holes) in the ground. In addition, it was also explained the basic principles of composting and how to make a bio-starter. The demonstration was carried out by practicing how to make a natural bio-starter known as local microorganisms (MOL) from rotten fruits. Composting was demonstrated by using the composter bin method with kitchen waste. The program materials were well received by the participant. It was proved by an increase in the post-test score, compared to the pretest score.



KEYWORDS

Organic waste
MOL
Compost bin



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1. Introduction

Waste, especially organic waste, is still seen as one-sided for most people so that organic waste always ends up in landfills. Based on the data from the Ministry of Agriculture in 2017, Indonesian waste is dominated by organic waste, which is 60% [1]. Organic waste is the rest of the consumption that is easily decomposed [2]. With this nature, this waste should be processed so that it does not cause negative impacts on the environment. This is indicated by the fact that when we are close to the landfill, it will smell a very pungent unpleasant smell. This smell arises from the formation of organic waste decomposing gas in the landfill. Gases that can be formed in landfills include carbon dioxide, methane, carbon monoxide, hydrogen sulfide, ammonia, and others [3]. In addition, the pile of garbage in the landfill will also produce *Lindi* water which is black and contains various organic and inorganic compounds that have the potential to pollute the surrounding environment. Following Law No. 18 of 2008 on Waste Management, it is stated that everyone in the household waste management is obliged to reduce and handle waste in an environmentally sound manner. Therefore, the government through the Environment Agency (DLH) always tries to educate the community to manage household waste through 3R (Reduce, Reuse & Recycle) [4]. The various information about solicitations and instructions on how to manage waste, especially organic waste, has also been widely spread. In this industrial 4.0 era, information is increasingly more accessible to the public through social media. In addition, the community of garbage activists is also popping up in the community. Sleman government reported that there are 194 Independent Waste Management Groups (KPSM) which are the means of community-based household waste management

organizations at the RT/RW/Padukuhan level [5]. However, it is still not maximally increasing the participation of the community in managing the entire waste in Sleman. According to a survey conducted by Waste4Change in 2019 of 429 respondents spread across major cities in Indonesia, only 22.4% have processed their organic waste into compost in their homes [6]. This percentage shows the low public concern for organic waste. So no wonder, if until now, there is still the problem of overcapacity in various landfills, which leads to the occurrence of open dumping. Therefore, it takes a lot of effort from various competent parties to educate the community to be willing and able to process organic waste.

Permata Hatiku is an integrated Islamic school that organizes early childhood education as well as kindergartens. This school is located in Sidoarum, Godean, Sleman. Permata Hatiku School has a school committee that is committed to strengthening the relationship between 35 parents of students and the school which is represented by 12 teachers. The commitment is realized through various activities, one of which is by holding meetings that aim to add insight to parents and teachers. Various speakers have been presented, such as parenting experts, health experts, psychologists, and others, who bring a variety of topics. One interesting topic to discuss is the topic of the environment, especially garbage. In 2018, Permata Hatiku School Committee presented a speaker, an environmental activist who provides material on the issue of household waste in Indonesia. Then in 2019, this waste issue was followed up by conducting training on how to process household organic waste. This theme was chosen because the data of organic waste is higher than inorganic waste. In addition, based on the results of pre-tests conducted before the activity was held, it is known that all participants know the definition of organic waste and composting. However, on the technical question of composting, for example, whether it is MOL and whether the animal organic waste is suitable for composting, as many as 80% of participants' answers are wrong. This indicates that the partner's knowledge of composting is quite good, but has not been practiced. Therefore, this devotional activity aims to educate the parents and teachers of Permata Hatiku School to process household organic waste through counseling and demonstrations. The form of education is done not only by providing information in writing or oral, but also through practice or demonstration so that partners can learn directly how to process organic waste. With this activity, it is expected that the awareness that waste is everyone's responsibility as a producer of waste, that processing organic waste into compost is easy to do, and the participation of partners in processing organic waste will decrease the volume of waste transported to a landfill.

2. Method

This service was held on November 30, 2019, with the target of participants, namely parents and teachers of Permata Hatiku School. The methods used in this devotional activity are lectures, discussions, demonstrations, and evaluations of activities through pre-tests and post-tests. See schematic of implementation method [Figure 1](#). The activity begins by giving a pre-test to the participants to know the level of knowledge of the participants before the material is delivered. Furthermore, participants were given counseling on various types of organic waste, definitions of composting, factors that affect composting, composting stages, the manufacture of natural bio-activators, composting methods suitable for household scale, and problems encountered in composting. After the material was delivered indoors, the event continued with a demonstration of natural bio-starter making and composting by the composter barrel method, see [Figure 3](#), and [Figure 4](#). Tools and materials used in the demonstration include composter barrels, used plastic bottles, cups, knives, spoons, kitchen waste, dry leaf litter, finished compost, rotten fruit, granulated sugar, and well water. The devotional activity ends by carrying out a post-test to find out if there is an increase in knowledge in participants related to the material that has been delivered. Pre-tests and post-tests are conducted using questionnaires with the same 10 questions.

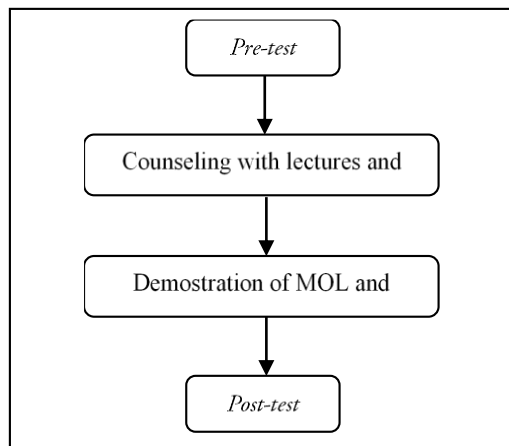


Fig. 1. The Scheme of Implementation Method

3. Results and Discussion

The training activity to process household organic waste into compost was attended by 10 parents and 12 teachers of Permata Hatiku School. The number of participants was only 21% of the total number of parents. However, this number did not dampen the enthusiasm of participants in participating in the training activities. This activity is divided into two sessions. The first session was counseling in the form of the presentation of the theory of composting, which was conducted in the room, which was then continued with the discussion. The second session was a demonstration in the schoolyard to practice the theory that had been discussed in the first session. Counseling is done by lecture method and counseling materials are distributed in the form of training modules. This module is expected to be a practical guide for trainees when practicing composting in their own homes. The materials presented in this session include various types of organic waste, definitions of composting, factors that affect composting, composting stages, composting methods suitable for household scale, and problems encountered in composting. Composting is a biochemical process involving microorganisms as decomposing agents that remodel organic matter into compost [2]. Organic waste will be decomposed naturally by decomposing microbes that exist in the environment. However, this decomposition is not controlled, causing unpleasant odors, can invite flies and maggots, lowers aesthetics, and takes a long time to decompose. Therefore, for perfect and fast decomposing, various factors must be controlled so that the results of decomposing or composting can be obtained with good quality. These factors are the C/N ratio, material size, material composition, temperature, humidity, aeration, and pH [7]. It was conveyed to the trainees, that of the overall factors, the size of the material is the most easily attempted factor in importing household organic waste. Household organic waste must be chopped or cut into small pieces before being composted. This is so that the waste is easily decomposed or eaten by decomposing microorganisms so that the composting time can be faster. Enumeration of household organic waste can be done with simple equipment, such as knives or scissors. Kurnia research, et al. (2017) shows that the size of the material affects the quality of compost. This study compared material sizes of 1 cm, 1.5 cm, and 2 cm and variations of 40%, 50%, and 60% moisture content. Based on the research, the results were obtained that compost using a material size of 1 cm and water content of 60% has the best quality based on SNI 19.7030.2004 on compost specifications from domestic organic waste [8].

The theory of composting method given to the trainees includes composter barrel method, *takakura* basket, bio-pore hole, and hole/*jugangan* in the ground. These methods are delivered because each has its advantages and disadvantages. For example, for the method of compost barrels and baskets *takakura* is intended for houses that have narrow land while the method *jugangan* for houses with large vacant land. Composting treatment of composter and *takakura* methods is more complicated than the *jugangan* method. While bio-pore is an anaerobic composting method, which requires the simplest treatment and

can import any organic waste including bone remains [9]. However, bio-pores have a small capacity so it takes a lot of bio-pores so that the bio-pores do not quickly fill up.

In addition to organic waste, there are other materials needed to compost, namely bio-starters / bio-activators. Bio-stater/bio-activator is a solution or material containing many decomposing microorganisms that can speed up the composting process. Artificial bio-activators are widely available in agricultural stores, such as EM4, *stardec*, and *orgadec*. However, bio-activators can also be made from natural ingredients that are around us. This natural bio-activator is often known as MOL or local microorganisms. According to Purwasmita M (2009) in Hadiwidodo, et al (2018), the main components that must be fulfilled in MOL-making materials are carbohydrates, glucose, and sources of microorganisms [10]. Therefore, in this devotional activity, it is conveyed and taught how to make a natural bio-activator that utilizes rotten fruits and sugar solutions. After all the theories and discussions were presented, the activity continued into the second session, namely demonstrations. Figure 2 shows the atmosphere of the counseling session which is the provision of composting materials with lectures in the schoolroom.



Fig. 2. Figure (a) The Delivery of Material on Composting Theory; Figure (b) Making Bio-starter

The demonstration took place in the school's front yard using equipment and materials prepared by the extension. In this session, it was demonstrated how to make a natural bio-starter /MOL and composting method with composter barrel method. At the MOL-making show, the ingredients used are rotten mango, granulated sugar, and well water. After MOL is made with these three ingredients in a used plastic bottle, MOL is then left for 1 week, and the bottle cap is opened every two days to remove the CO₂ gas formed due to the fermentation process by microorganisms. After one week, MOL is ready to be used as a bio-activator in the composting process. In making MOL, the water used must be well water, because if using water from PDAM, then microorganisms will die. After all, PDAM water contains chlorine intended to kill pathogenic microorganisms in water. Fruits that are often used to make MOL usually have a sweet taste, such as papaya, pineapple, and banana. And the source of glucose from granulated sugar can be replaced with cane drops (molasses). Composting demonstration by composting barrel method is done by using materials in the form of kitchen waste and leaf litter. This method is demonstrated because composter barrels are easy to make compared to the *takakura* basket method which requires many components. Composter barrels can also make use of used buckets, pots, or any barrel as a composting process container. The main requirement of the container is that the base of the container can be perforated with a drill and has a lid. To make compost, it takes brown organic waste that usually has low water content, such as rice husks, saws, dried leaves, and the like. This type of waste functions as a source of Carbon (C) so that the C/N ratio of compost material is met and absorbs excess water in the compost heap. In general, kitchen waste has high moisture content and high nitrogen content. The following is an overview of the situation of the demonstration session of making and composting MOL with a compound barrel.



Fig. 3. The Demonstration of Natural Bio-starter Manufacturing (MOL)



Fig. 4. Composting Practice with Composter Tong Method

This devotional activity is evaluated with pre-test and post-test that aims to find out if the material is well received by the trainees. The evaluation was only directed to 10 respondents of parents. Evaluation is done by sharing questionnaires consisting of 10 simple questions. This questionnaire is used for both pre-test and post-test.

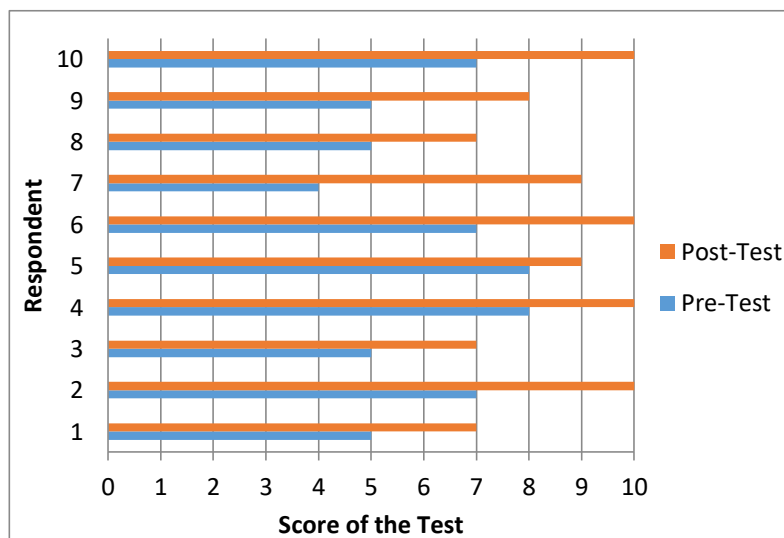


Fig. 5. The Graph of Participant Knowledge Improvement, Before and After Training

Figure 5 shows the questionnaire result data from 10 selected respondents. The results of the analysis showed that there was an increase in respondents' knowledge. Before the material is delivered, there is one

correspondent who can only answer 4 questions correctly, then after the material is delivered, he can answer 9 questions correctly. The impact of this activity was seen that the knowledge of 100% of respondents about the materials provided in the service activities at Permata Hatiku School has increased. With the training activities, the community will feel more understanding and clear because the material delivered at the time of counseling has been practiced directly in front of the participants [11]. With this increasing knowledge, it is expected that partners can start processing organic waste in their homes. Then, to motivate partners to participate in processing waste, assistance is required through activities in the following year. However, due to the Covid-19 pandemic in 2020, these activities have not been able to be carried out.

4. Conclusion

The training activities of processing household organic waste into compost for parents and teachers of Permata Hatiku School have been running smoothly and successfully. The activity consisting of counseling sessions and demonstration sessions was attended by participants enthusiastically. Based on the results of evaluation through pre-test and post-test, there was an increase in participants' knowledge after attending the training activities, which showed that the training materials were well received.

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