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Optimize Household Waste Management

Yunita Rakhmawati[1] *, Umi Fitriyati[2], Ajeng Daniarsih[3], Farid Akhsani[4], Wachidah Hayuana[5], Zahra Firdaus[6]

[1,2,3,4,5,6]*Uniersitas Negeri Malang / Jalang Semarang No. 5 / Malang*
** E-mail: yunita.rakhmawati.fmipa@um.ac.id*

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Abstract

Based on data from the Ministry of Environment and Forestry for 2021, the highest waste production in Indonesia is household waste and food waste. The existence of this waste has not been utilized optimally because the habits of the Indonesian people in storing waste are still low. Meanwhile, organic waste from food scraps can be utilized in the form of liquid organic fertilizer. Liquid organic fertilizer is more practical and easily absorbed by plants. Liquid organic fertilizer (POC) made from banana peels, on average, showed positive results on plant growth. In addition, efforts to process POC from organic waste are one of the efforts to support sustainability efforts by reusing organic waste for the environment. Appropriate technology is one approach that can be taken to take advantage of the potential around with tools and materials that are easy to obtain but have considerable potential. Therefore, it is necessary to introduce simple, effective technology so that the community can develop innovative liquid fertilizer development to become wider. Egoponics is one of the school's efforts to maximize the school's potential in directly introducing and studying organic plants to students.

This community service activity aims to increase students' knowledge and skills in making liquid organic fertilizer. The method used is counselling, demonstrations, and training in making LOF involving class XI students of SMAN 8 Malang. The result of this activity is an increase in students' knowledge and skills in making LOF. Overall this community service activity ran smoothly, and suggestions for further activities are to develop a type of LOF from specific materials based on the largest constituent elements. So that this LOF will be easier to apply according to the needs of plants.

Keywords: Liquid organic fertilizer; organic waste; knowledge

Abstrak

Berdasarkan data dari Kementerian Lingkungan Hidup dan Kehutanan pada tahun 2021, produksi sampah tertinggi di Indonesia adalah sampah rumah tangga dan sisa makanan. Keberadaan limbah tersebut belum dimanfaatkan secara optimal karena kebiasaan masyarakat Indonesia dalam memilah sampah masih rendah. Sementara itu sampah organik yang berasal dari sisa makanan bisa dimanfaatkan dalam bentuk pupuk organik cair. Pupuk organik cair lebih praktis dan mudah diserap oleh tanaman. Pupuk organik cair (POC) yang dibuat dari kulit pisang rata-rata menunjukkan hasil positif terhadap pertumbuhan tanaman. Selain itu, upaya pengolahan POC dari hasil sampah organic merupakan salah satu upaya dalam mendukung upaya keberlanjutan dengan memanfaatkan kembali sampah organik untuk lingkungan. Teknologi tepat guna merupakan salah satu pendekatan yang bisa dilakukan untuk

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memanfaatkan potensi sekitar dengan alat dan bahan yang mudah diperoleh namun memiliki potensi yang cukup besar. Oleh karena itu, perlu diperkenalkan teknologi sederhana tepat guna agar masyarakat dapat mengembangkan inovasi pengembangan pupuk cair ini menjadi lebih luas. Egoponik merupakan salah satu upaya sekolah untuk memaksimalkan potensi sekolah dalam pengenalan dan pembelajaran tentang tanaman organic kepada siswa secara langsung. Dalam kegiatan pengabdian masyarakat ini, bertujuan untuk meningkatkan pengetahuan dan keterampilan siswa dalam pembuatan pupuk organik cair tersebut. Metode yang digunakan adalah penyuluhan, demonstrasi, dan pelatihan pembuatan LOF yang melibatkan kelas XI Siswa SMAN 8 Malang. Hasil dari kegiatan ini adalah meningkatnya pengetahuan dan keterampilan siswa dalam pembuatan LOF. Secara keseluruhan, kegiatan pengabdian ini berjalan lancar, dan saran untuk kegiatan selanjutnya adalah mengembangkan jenis LOF dari bahan spesific berdasarkan unsur peyusun terbesarnya. Sehingga LOF ini akan lebih mudah diaplikasikan sesuai kebutuhan tanaman.
Keywords: Pupuk organik cair; limbah organik; pengetahuan

INTRODUCTION

Organic waste comes from materials containing organic compounds, such as food waste, animals, feces, and plants. Decomposing microorganisms can degrade this type of waste. Household and food waste are the highest waste production in Indonesia (Ministry of Environment and Forestry, 2021). The use of manure and compost requires the availability of a considerable amount of livestock waste and agricultural waste. The existence of the two sources of fertilizer is not enough for large tracts of agricultural land or plantations. Therefore, people usually buy from outside the area, which causes high production costs. On the other hand, every house produces organic waste daily due to household waste. However, it has not been optimized because Indonesian behavior of sorting and choosing waste is still low (Katadata Publication Team, 2020).

Based on the background of these problems, it is necessary to develop the use of banana peel waste and other organic waste in the concept of zero-waste products so that all parts of food can be utilized. Several studies on the effectiveness of liquid organic fertilizers (LOF) from banana peels show good crop yields. The treatment of banana peel waste and other organic waste is being implemented as an innovation of value-to-use waste products (Amelia *et al.*, 2019). Therefore, it is necessary to introduce simple appropriate technology so that the community can develop innovations in developing this liquid fertilizer to be wider. The main target of the community service program is students of SMAN 8 Malang class XI. Furthermore, the results of making this liquid fertilizer are expected to develop into a home industry as household waste is successfully used.

The advantage of using LOF is that its application is more practical than solid organic fertilizers. Plants absorb these nutrients more efficiently and contain microbes that are rarely found in solid organic fertilizers. In addition, liquid and solid organic fertilizers can activate the nutrients in solid fertilizers. Another advantage of LOF is that the manufacturing process is relatively more practical and fast than solid organic fertilizers (Erickson Sarjono Siboro, Edu Surya and Netti Herlina, 2013). Based on this, this community service aims to increase students' understanding

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of household waste management. The results are expected to be able to use household waste as liquid organic fertilizer.

GENERAL DESCRIPTION OF THE COMMUNITY, PROBLEMS, AND TARGET SOLUTIONS

General description

SMAN 8 Malang, which is located in the center of Malang, has the concept of developing TOGA and hydroponics in schools as a means of education for students and has been part of the *adiwiyata* school program since 2017. Developed plants are typical of TOGA, including mustard greens. School residents, including students, maintain and care for plants using natural materials (SMAN 8 Malang, 2021).

Problem

Household waste can be used as a basic material for making liquid organic fertilizer to increase organic plants' potential yield. Through a simple cementation process, organic liquid fertilizer that is cheap, abundant, and durable will be obtained. This will certainly reduce the cost of fertilizer production and can be used to become a business opportunity (Dewi *et al.* , 2020) .
With the availability of livestock waste and agricultural waste, it is necessary to make organic fertilizer. However, the two materials are not enough if they are applied on a large scale. On the other hand, households are the largest producers of organic waste in Indonesia, so their use needs to be optimized. SMA 8 has an egoponic plants cultivated by the school and maintained by school residents including students. Meanwhile, a lot of organic waste was found in each student's home. To reduce and utilize organic waste at home, students are included in managing the waste and applying it.

Target solution

Based on the background of these problems, it is necessary to develop the use of banana peel waste and other organic waste in the concept of zero-waste products so that all parts of food can be utilized. Several studies on the effectiveness of liquid organic fertilizers from banana peels show good crop yields. The treatment of banana peel waste and other organic waste is being implemented as an innovation of value-to-use waste products (Amelia *et al.*, 2019). Therefore, it is necessary to introduce simple appropriate technology so that the community is able to develop innovations in the development of this liquid fertilizer to be wider. To maximizing utilization of organic waste in the student's house, implement appropriate technology related to manufacturing liquid organic fertilizers, introducing, and applying the management of household waste and other organic waste management is needed.

METHOD

The method used in this activity is the Participatory Action Research (PAR) approach by meeting the needs of students in maintaining organic plants through making organic fertilizers. Implementing this community service activity was carried out in several stages. The initial stage is coordinating with SMAN 8 Malang for the technical implementation of activities. Before training on making LOF to students, socialization and technical briefings were conducted. The next stage is training on household waste treatment, and the last stage is monitoring the post-activity evaluation.

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LOF itself was produced in several stages. Firstly, the litter was chopped into small pieces to facilitate fermentation. Afterward, littering was mixed with molasses, EM4, and water. Then, the mixture is fermented for one month to optimize microbial decomposition. The next step was harvesting fertilizer by separating liquids and solids by filtering to obtain organic fertilizer liquid. The last stage was liquid fertilizers diluting them first, which can be applied by spraying LOF on plant parts or watering at the root.

RESULTS AND DISCUSSION

Characteristics of Respondents

The participants of this community service activity were 46 students of class XI SMA Negeri 8 Malang. This group was chosen to support ergoponic activities developed by the school. The characteristics of respondents based on age and gender are found in table 1 below.

Table 1. Characteristics of Respondents

Characteristics of Respondents	Percentage
Age	
15 years	11%
16 years	72%
17 years old	17%
Gender	
Man	37%
Woman	63%

Table 1 explained that the majority of participants' ages were 72%, with a composition of 37% male and 63% female.

Community Service Activities

LOF-producing activities were generally divided into three stages: preparation, implementation, and evaluation. In the preparatory stage, this LOF was a preliminary study in the Greenhouse Department of Biology, Universitas Negeri Malang. The study to find out the effectiveness and duration of fermentation. Fermentation is the process of decomposition of organic substances carried out by microorganisms. In this case, decomposing microorganisms are obtained from the bio activator of the EM4 solution. This bio-activator can speed up the process of LOF formation and improve its quality (Meriatna, Suryati and Fahri, 2019).

At the implementation stage, the service team coordinates with the school for the smooth running of training activities for making LOF to students. One day before the training, the team conducted a briefing to the students regarding the things they needed to bring, especially the garbage for ingredients obtained from their homes. The briefing was conducted as a form of education by involving students in providing tools and materials. So, students are expected to know when they will practice independently.

Furthermore, the implementation of training consists of providing material and training on the manufacturer itself. Students were also given leaflets as a means of initial information and can be used as a guide for applying this activity in their respective homes. The provision of media was chosen to make it easier for participants to understand the material and the flow of its

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creation. This media conveys knowledge, information, or other information to the public by including visual elements (Hidayat, Mahmuriyah and Safitri, 2016).

After that, the service team provided counseling and conducted demonstrations on the making of LOF. Then, participants in groups also carried out the practice of making LOF accompanied by a service team to facilitate activities in small groups. This method was chosen to implement the practice more effectively because each group member has the opportunity to learn information faster than the facilitator of each group (Gusti, Mahaza and Lindawati, 2020).

The next stage was storing LOF in the fermentation stage for one month. The LOF mixture is put in a plastic jar measuring 1300 ml and labeled, including the date of manufacture. However, larger quantities can be produced using a sealed bucket.

After completing the training activities, discussions and questions and answers were carried out related to the activities. In addition, students were also asked to fill out a questionnaire to find out the improvement in student's knowledge. All students get new information and increased knowledge about LOF. The results of filling out the questionnaire related to other aspects are found in figure 4. Figure 4 shows some information related to students' knowledge and behavior toward organic fertilizer processing. In questions related to knowledge about the use of household waste, most (80%) of students already know about the use of household waste. The remaining 20% do not know if the waste can be used for other purposes. In questions related to student behavior, if they find a large amount of household waste, as many as 52% dispose of it, and 48% are used as compost/animal feed. Furthermore, the majority (67%) expressed their interest in using this LOF on the question of interest in fertilizer utilization. As 33% were still hesitant to apply it because the hesitant students are less interested or do not have plants at home, they do not know what they will use.

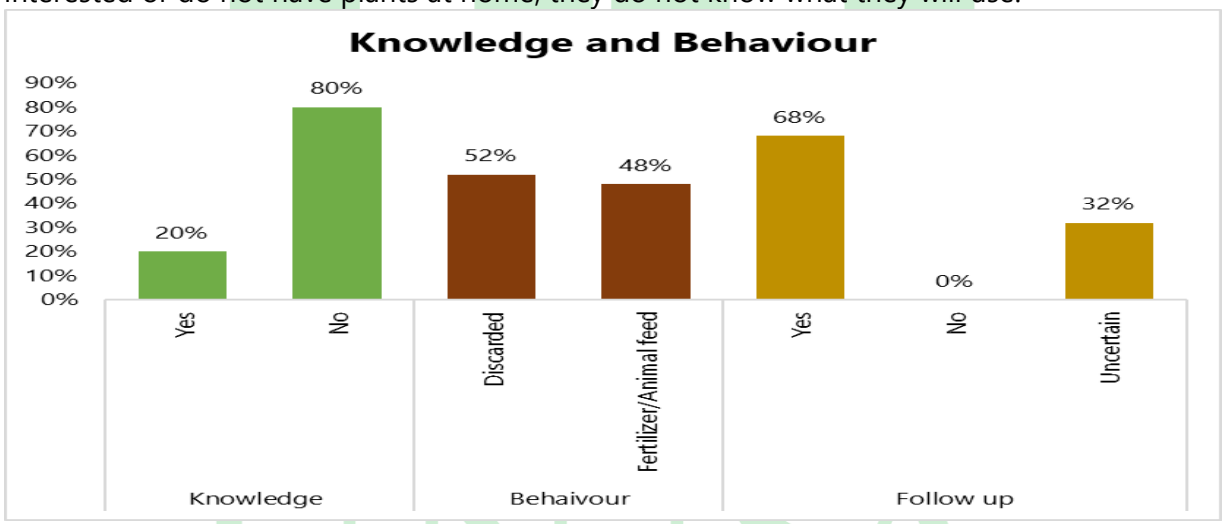

Figure 4. Participant's Knowledge and Behavior

After one month after the implementation, the service team returned to school to check the results of the LOF fermentation. Then provide information related to how to harvest LOF and its use. LOF that had been fermented for one month was filtered to separate liquids and solids. After that, the solids are re-filtered with a cloth and squeezed out to maximize the fertilizer liquid. Before application in plants, dilution is carried out in advance and is ready for use.

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CONCLUSIONS AND SUGGESTIONS

This community service activity took place well and according to plan. Participants actively participate from pre-implementation activities to evaluations, so their knowledge of making LOF increases. In addition, participants are interested in utilizing LOFs in their home environment. The next community service activity suggests making specific LOF derived from materials with many nitrogens, phosphor, and potassium elements, such as using banana peel waste, egg shells, dry plants, and others to comply with plant needs.

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