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Community services in an effort to utilize household food waste as organic fertilizer in addition to bioactivators in Balikpapan

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Abstract

Lack of household food waste management results in major environmental problems, such as bad smells and dirt, as well as greenhouse gas emissions, which adversely affect public health. The goal of this community services was to transform household food waste into organic fertilizer, so agricultural output, economize resources, and public health can be increased. The method used in this service was that of individual or one-on-one and group counseling. The benefit of the activity was to produce high-value compost generated from househol food waste and utilization of local resources. After conducting the community services, found that that the community of Klandasan Ulu in Balikapan, who was involved in the training on household food waste management, fathomed how to discover household food waste to become organic fertilizers with economic and environmental value by adding bioactivators at room temperature and facultative aerobic condition. The impact of this training on patterns of community garbage disposal action was also observed

Keywords: community services, household food waste, organic fertilizers, bioactivators.

1. Introduction

Due to limited resources, exponentially increasing population, rapid urbanization, and industrialization, environmentally acceptable household food waste treatment has become a global challenge. These factors are exacerbated in developing Asian countries by a lack of financial resources and insufficient management and technical skills within cities and government authorities (Hazra & Goel, 2009). Food waste, as a component of solid waste, has been identified as a significant social, nutritional, and environmental issue in developing countries (Thi et al., 2015).

Normally, food waste is generated as a result of human activity such as agriculture, industrial activities, and household waste. Food waste can be divided into three categories: food loss, which is food material that is lost during the preparation, processing, and production stages of the food supply chain, unavoidable food residue, which is the inedible part of the food material that is lost during this phase, and recyclable food waste. food waste that can be avoided is edible food material lost during the consumption phase (surplus and waste); and food waste that can be avoided is edible food material lost during the consumption phase (surplus and waste) (Lim et al., 2016).

Food waste can be disposed of by crushing, burning, depositing, or decomposing (Sasitharan et al., 2012). The most common methods of disposing of food waste are landfill (TPA) and incineration. TPA is a widely accepted method for managing food waste in the community because it is both cost-effective and simple to implement. However, because the number of landfills is becoming increasingly limited (Moh and Manaf, 2014), food waste management via TPA has become more difficult; on the other hand, the incineration method is very costly in terms of energy and high technology. Because it pollutes the air, this method is rarely used in the processing of food waste (Zhang et al., 2014). Both of these methods are unsustainable for dealing with food waste because they have significant environmental consequences.

Currently, food waste causes environmental problems due to improper municipal waste separation, which is linked to the production of greenhouse gases in landfills. According to Thi et al. (2015), food waste can emit greenhouse gases, which have a negative impact on climate change. As a result, we require another method of handling food waste that is both cost effective and environmentally friendly.

In Indonesia, the majority of household food waste is disposed of in landfill. Reducing food waste with composting is one tool for eliminating organic waste. Because of the large amount of food waste generated, bioactivators are needed to speed up the composting process. Various bioactivators extracted from plant and animal waste have been extensively researched and examined in the composting method (Sutrisno et al., 2020).

There are various ways to handle this issue, such as composting and anaerobic digestion which can both produce fertilizers, while also producing an energy source (Sang-Arun et al., 2013). However, many cases failed in the recycling of organic waste as an anaerobic digestion project in Lucknow, India, where the project lasted less than 2 years due to lack of input of organic waste into the system. It was found that the latter system was heavily contaminated with non-degradable waste (Kuriaen et al., 2014). Running anaerobi componic leaching plants typically go broke due to source separation issues as well as operational expenditures because the composters at the start of the process tend to have a much higher level of contamination than desired (Boonrod et al., 2012). the Umea strategy is, unfortunately, an exception; there are other ways of increasing the odds of success in organic waste recycling, as found in the case of the Metropolitan Daejeon City in South Korea, Sweden, and the Oxford City Council in the UK. Of all of these notable cases, a crucial, has to doings at the source with separate organic waste separation programs are already successful have identified, these things involve the general public is already using a concept (Task, 2018).

Bioactivators are free of harmful and unsafe substances, rendering them environmentally friendly. It consists of natural microorganisms and can cause bacteria in order to accelerate the phase of decomposition. They contain cellulolytic microorganisms. Cellulose from agricultural waste is the source of energy for the cellulosic microbe in the bioactivators. It means that cellulose is broken apart into simple carbohydrates in plant tissue that plants can quickly absorb. The bioactivators are constructed as an inoculant and applied to fresh rice paw or other field waste. The composting cycle may be shortened by one month from such inoculating agent. When composted with food waste, soil organic matter continues to increase, while at the same time reducing the need for chemical fertilizers, to maintain soil fertility (Harir & Ishiyaku, 2015).

Unfortunately, such a good research was rarely applied to the public. This article provides newly information on the training of Klandasan Ulu (Balikpapan) community in an effort to utilize household food waste as organic fertilizer with the addition of bioactivators, and obviously to improve waste separation practices at the source which is the main key to success, especially for recycling household food waste.

2. Materials and Methods

2.1 Dissemination

This activity was conducted to provide knowledge about food waste and how to treat household food waste. This dissemination was a direct material sharing session in a visual way. The method used was that of individual or one-on-one and group counseling. Participants consisted of the people of Klandasan Ulu, Balikpapan, who were invited directly by the extension team. At the community outreach session, they were given the opportunity to discuss with the speakers (Ilhamdi et al., 2019).

2.2 Training in the processing of organic fertilizer

The training adopted strategy applied by Cundari et al. (2019) which was carried out in various stages: 1) organic and inorganic household waste were manually sorted, 2) household food waste was separated and used for next step, 3) household food waste was chopped into smaller sizes, 4) small food waste was put into a drum and mixed with commercial bioactivators, compost sustaination, 5) the drum was put at room temperature, 6) the top of the drum was covered to speed up the composting or decomposition process, and 7) and after one month, the finished organic fertilizer was then ready to be applied to agricultural land owned by residents. This food waste processing tool consists of a drum as a place for the composting process to occur. The composting process drum was equipped with a screen with a perforated bottom. The composting process used was facultative anaerobic system, so it was stirred manually. Complementary items included sustaination compost bioactivators, gloves, and knives. The capacity of food waste was as much as 8-10 kg per drum.

3 Results and Discussion

This community services activity was held for 3 consecutive days, namely 12-14 February 2019 in Klandasan Ulu Village, Balikpapan. The core of the implementation of such community services activities includes 1) registration of participants; 2) opening the event, preceded by a prayer together. The event was started with a speech by the Head of the community service program KKN Group-8 (Phase V), followed by the official opening remarks by the Head of Klandasan Ulu village, Balikpapan; 3) presentation of basic material on the separation of household food waste from inorganic waste by the Environmental Agency of Balikpapan; 4) training on the producing of organic fertilizers from household food waste by adding commercial bioactivators, compost sustanaition.

In this community services, an explanation was made of the manufacturing process, namely the manufacture of solid organic fertilizers (Fig. 1). For producing the organic fertilizers, several materials were needed, such as cutting organic waste (Fig. 2) and bioactivators that could be obtained in the market (Fig. 3). Household food waste that has been mixed with bioactivators were stirred in the drum using a mixer then closed (Fig. 5). The production of organic fertilizer from household food waste process had been going on for

approximately 30 days. Due to the fact that it has not been expanded, the compost still needed further decomposition. To expand on the idea that thing before that was said above, due to the materials being mixed in with long, sizable rods and sizes, the composting process takes longer than expected. The amount of the raw material being fed in and the length of time that was required to process the raw materials into compost did as well as that process decomposition both increased. This indication was showed by previous study (Jiang et al., 2015).

Fig. 1 Dissemination of household food waste in Klandasan Ulu, Balikpapan.

Fig. 2 Illustration of household food waste. (https://yoursay.suara.com/news/2020/03/16/141255/bioteknologi-pemanfaatan-sampah-rumah-tangga-perkotaan?page=all)

The way in which this community service program (Fig. 6) was directed at the training in sorting of organic and inorganic household waste and altering of household food waste into useful organic compost. Up to 65 percent of the attendees have never sorted for organic and inorganic waste. To date, waste was already mixed with organic and inorganic waste into one garbage. Most of the waste was not reduced, reused, or recycled. The waste was thrown away to landfill. The degree of interest of the population in the management and composting of household food waste was just up to 45%.

There was also no optimum degree of indirect public involvement in waste management. On average 40% of the occupants have never been indirectly active in waste management. The local government management was very few still participating in offering proposals and criticisms. Residents discussed waste disposal, but the implementation process had not yet been maximized. The residents' ability to take part in counselling, socialization and preparation was 50%. The same results were showed by previous activity conducted by Cundari et al. (2019). This suggested that the residents were accepting community service activity with themes which were specifically relevant to the residents and that they want to improve their awareness. Moreover, the approach to local government as well as local residents was quite not hit. It was assumed that distributing booklets is needed, so that the number of activity participants could be greater and better. In addition, it was also necessary to monitor and evaluate program applications by participants in community service activities.

Fig. 3 Bioactivator, Compost Sustaination. (https://sustaination.id/shop/for-reasons/local-economy-support/bioaktivator-kompos/)

Fig. 4 Donating drum by a participating student of Group B8 KKN (Phase V) - Klandasan Ulu, Balikpapan.

Fig. 5 Container for making organic fertilizer using a drum.

Fig. 6 Community services team on household food waste training.

4 Conclusion and Suggestion

Managing household food waste was an activity that requires an understanding of the community situation and the application of appropriate strategies to achieve goals as efficiently as possible. This work is the first to demonstrate the community services in an effort to convert household food waste to be organic fertilizer using bioactivators in Klandasan Ulu, Balikpapan. It was found that there were obstacles from the community to participate in this activity that had an effect on the achievement of community service program goals. The results of the observations show that this community assistance activity has succeeded in increasing the pattern of community action in disposing of waste, but it has not had a substantial effect on the use of household food waste in gardening at home. For the next community service activity, it was suggested to prepare such an approach to local government as well as local residents, such as distributing booklets, so that the number of activity participants could be greater in number and understanding. In addition, it was also necessary to monitor and evaluate program applications by participants in community service activities.

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