

Workshop on community-based household organic waste management using ThrowbinC at the Aisyiyah Kampung Dadap Medan Organization

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Abstract: The problem of waste is one of the crucial problems faced by Indonesia. One of them is currently faced by Aiyisyah Kampung Dadap Organisation in Medan. Currently, the partner of Community service is facing a buildup of the amount of waste in the household. The accumulation of waste in the community is caused by the incompatibility of the schedule for transporting waste to the final disposal site (TPA) with the amount of existing waste, resulting in a buildup of waste. Based on the background above, this community service carries the theme of organic waste management by making a modified trash can that can be described directly with the larvae of the *Black Soldier Fly* (BSF) on a household scale. This trash can is used to accommodate household organic waste which will then be converted into compost in both solid and liquid form. The solution offered is the need for further processing of waste, especially household waste originating from food scraps so as not to cause garbage accumulation, one of which is by using technology in trash cans. The technology in the ThROWBinC trash can will immediately process and decompose the waste in it so that we do not have to wait for the schedule to transport waste to the landfill and it doesn't cause waste to accumulate. Trash can technology like ThrowBinC will be very useful if applied to the community, especially for household waste which provides the largest source of waste to the community and the environment.

Keywords: Waste Management, Household Waste, Organic Waste, BSF Larva

INTRODUCTION

The problem of waste is one of the crucial problems faced by Indonesia. From the data obtained from SIPSN (4), there are 41,807,931.49 tons/year of waste piles. SIPSN is a National Waste Information System that obtains waste data for 2021 from 201 regencies/cities throughout Indonesia. SIPSN data states that the percentage of the unmanaged waste is still high, which is around 65.54% or 27,401,885.91 (tons/year). From the SIPSN 2021 data, household waste is the largest producer of waste (49.9%) compared to other sources of waste, such as from traditional markets (19.1%); offices (7.9%); areas (7.7%); commercial center (7.5%); and public facilities (5.7%) where the most common type of waste is food waste (27.7%) compared to other types of waste, such as plastic (15.6%); paper/cardboard (12.4%); wood/twigs/leaves (12%); metal (7.3%); fabric (7%); glass (6.9%) and others (7.6%). Data obtained from SIPSN in 2021 (4) states that the achievement of reducing and managing waste whose sources come from households and the like has only reached around 7.41% while new waste handling is around 27.05% or around 11,309.996.55 (tons/year) (4). Some of the data above indicate that more comprehensive waste management is needed at the household scale to overcome the waste problem in partner cities. The partner for community service activities is the Aisiyah Kampung Dadap organization.

The partner (Aisiyah Kampung Dadap organization) is located in Medan. Currently, partners are facing a buildup of the amount of waste in the household. The accumulation of waste in the community is caused by the incompatibility of the schedule for transporting waste to the final disposal site (TPA) with the amount of existing waste, resulting in a buildup of waste. The waste that has been dumped into the TPA is just thrown away without being processed and causes a hill of garbage.

Garbage hills that accumulate continuously can disturb the community and cause disease outbreaks and pollute the environment; whereby accumulating the amount of existing waste can cause environmental pollution and result in negative impacts on living things, such as the emergence of unpleasant or foul odors that cause air pollution and can interfere with human respiration. This environmental pollution also has the potential in the long term to cause disasters such as floods and landslides (1). Waste management in the city of Medan has not found an integrated and sustainable solution. When viewed from the data collected by SIPSN (4), it is stated that Medan has a waste pile of 645012.56 tons/year, with waste handling amounting to 328.500.00 tons/year. On the other hand, SIPSN also states that the reduction of waste or recycling in the city of Medan has only reached around 19,584.87 tons/year,



or around 3.04%. If it is reduced to the problems of partners, one of the substantial problems faced by the women of the Asiyah Kampung Dadap organization every year is the accumulation of their household waste, especially organic waste. This is because there is an *overload* of weekly waste transportation to the Final Disposal Site (TPA) in the city of Medan, especially the East Medan sub-district which is a partner area. Several studies before have found the benefit of larva from *Black Soldier Fly* (BSF) as decomposer rubbish organic. The idea of using larva BSF for processing rubbish organic as there are almost 100 years which then where many studies show several species of fly suitable for degrading organic waste, namely the house fly species (*Musca domestica* L.) or fly soldier black (*Hermetia illucens* L.) (5). reviewed from side health, BSF is safe for humans because it has no potential to spread disease (2). In terms of the ability to degrade, it is known that 2,000 larvae or larvae of BSF are estimated to degrade about 1 kg of household food waste per day (6). Utilization of larva from *Black Soldier Fly* gives profit potential, especially for countries with low and medium income levels (7). Temporary, Supriyatna *et al* . (8) find that rubbish organic can be outlined Larvae BSF Becomes biomass protein tall and have potency as feed cattle. In line with In this regard, the study conducted by Liu *et al* ., (9) stated that *Black Soldier Fly* larvae speed up the process and can improve the quality of the final compost. If it is related to the lack of partner skills in managing an organic waste household, the guidance carried out for the women of the Aisiyah organization was assessed as still lacking when it is associated with household organic waste management where the value of empowerment and skills, as well as the ability to manage waste, have not been achieved. The potency to utilize BSF larvae has a large scale to be carried out by mothers mother of the Aisiyah organization, Dadap village, Medan. In the long term, the use of larvae This BSF in addition to significantly reducing household waste is also economically charged with existence score sell from results side fertilizer compost organic good which characters liquid nor solid. Based on the background above, this community service carries the theme of organic waste management by making a modified trash can that can be described directly with the larvae of the *Black Soldier Fly* (BSF) on a household scale. This trash can is used to accommodate household organic waste which will then be converted into compost in both solid and liquid form. The solution offered is the need for further processing of waste, especially household waste originating from food scraps so as not to cause garbage accumulation, one of which is by using technology in trash cans. The technology in the ThROWBInC trash can will immediately process and decompose the waste in it so that we do not have to wait for the schedule to transport waste to the



landfill and it doesn't cause waste to accumulate. Trash can technology like this will be very useful if applied to the community, especially for household waste which provides the largest source of waste to the community and the environment. Evaluation of the feasibility of BSF larvae to decompose mixed municipal organic waste has been carried out on a medium scale in Costa Rica where waste reduction has occurred ranging from 65.5 to 78.9%; however this percentage also depends on the daily amount of waste added to the experiment as well as on the availability of a drainage system (7).

METHOD

The location of this community service activity is carried out at the Aisyiyah Organization, Jalan Mustafa, No. 1 Medan Glugur. The audience for this activity was the people in the village of Dadap Jalan Mustafa, No. 1 Medan Glugur. The discussion in this service is community-based household waste management through Throwbinc. The technology for making trash cans goes through the following stages: BSF larvae will enter the pile of garbage and decompose the waste. BSF larvae can reduce unpleasant odors arising from the decomposition of waste, eliminate pathogenic microbes, and reduce compounds that have the potential to cause environmental pollution. In addition, the waste that has been decomposed can be used as animal feed with high protein content.

In this ThROWBInC there are 4 sections consisting of a section for the entry of organic waste, the second section is a filter, a third section is a place for BSF larvae and the last section is the remaining liquid produced from household organic waste. The flow of the entry of waste into the ThROWBInC trash can starts from the first part, namely when the garbage is put into the bin, it will be chopped by the machine counter. Then the filter in the second part will open where the BSF larvae will decompose the organic waste into solid compost. As a final step, the remaining liquid from the organic waste is collected in the last part of the ThROWBInC trash can in the form of liquid compost. The implementation method began with a team of USU Faculty of Engineering lecturers who made an initial visit to the Medan Aisyiyah Organization intending to coordinate and agree with partners regarding counseling activities and discussing problems from the organization's partners. After the foundation agreed to become a service partner, it carried out Throwbinc assembly and manufacture activities, after that, a Focus Group Discussion (FGD) with the Aisyiyah Organization was held in terms of tool socialization and assistance as well as theoretical training on Throwbinc tools. Then proceed with service activities. Figure 1. is the flow of the Throwbinc service activity method.



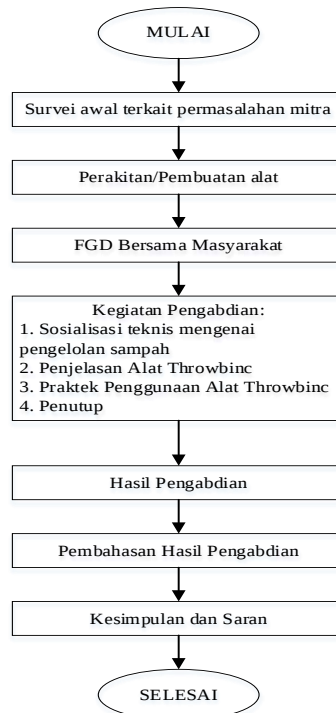


Figure 1. Flowchart of Community Service activities to the Medan Aisyiyah Organization (source: author's preparation, 2022)

RESULTS

Community service activities carried out at the Aisyiyah kampung Dadap Medan started at 11 AM. The location of extension is centered in the hall of the Aisyiyah organization. Twenty-five communities together with organizational partners, namely the aisyyah organization and the service team gathered while still paying attention to health protocols. The first activity begins with socialization and explanation and introduction of Throwbinc to the public which can be seen in Figure 2.



Figure 2. The Community Service Team and Aisyiyah Organization Gather in the Hall at the Opening of the Extension Activities (source: author's documentation, 2022)

The opening of the extension activities was led by the head of the aisyyah organization. The opening remarks contained appreciation for the implementation of positive educational activities for the service team and hopes for the community to be able to apply the processing concepts obtained in the future. The complete opening of the activity can be seen in Figure 3.



Figure 3. Foreword by Representatives of the Medan Aisiyah Organization (source: author's documentation, 2022)

The core of the outreach program begins with a brief explanation of the procedure for processing organic waste using BSF maggot media which is packaged in such a way as a Throwbinc tool, which later processed organic waste will be used as liquid fertilizer. The activity is carried out by filling organic waste into the Throwbinc tool, then the garbage will be chopped automatically by the tool. The shredded waste will be directly processed by BSF maggot media. The maggot used is a maggot aged 10 days after hatching. Organic waste that is processed in Throwbinc will become fertilizer after 18-21 days. After 18-21 days, the output that will be produced is maggot and liquid fertilizer which are ready to be sold in the market. The complete series of counseling events can be seen in Figure 4.



Figure 4. Distribution of tools and materials to the community with the Aisiyah organization at the Product Coloring Session (source: author's documentation, 2022)

Evaluation of the implementation of activities is carried out using observation and question-and-answer techniques to the community with the Aisiyah Organization. The timeline of activities, targets, and results achieved is elaborated in Table 1.

No.	Timeline of Activities	Target	Outcome
1	Dissemination of household waste organic waste processing into liquid fertilizer	The community understands the procedure for managing waste into a liquid fertilizer that is conveyed	procedures for managing waste into liquid fertilizer and enthusiastic about practicing it
2	Use of the Throwbinc	The community understands the working principle of the throwbinc tool in managing household organic waste	the community understands the working principle of the throwbinc tool in managing household organic waste and practices it directly during service activities
3	Q and A Session	The community can ask questions regarding materials and how to process organic waste	75% of the total community present actively participate in exchanging ideas and actively asked questions to the service team

The implementation of counseling on processing organic waste from household waste into liquid fertilizer using Throwbinc was responded to well and positively by the people on Jl Mustafa Medan. Extension activities run following the 5Rs of recycling (reuse, repair, refuse, reduce, recycle) principles and even the 6Rs and 7Rs and support the UN SDGs (Sustainable Development Goals) goals with a zero-waste environment. The activity is also following the principle of the bioconversion technique, by converting organic waste into liquid fertilizer which is beneficial from environmental and economic aspects, and the community is expected to be able to implement in the long term every waste treatment procedure in this activity.

The activity ended with a group photo session and the distribution of a plaque from the USU Faculty of Engineering service team to the community and partners, namely the Medan Aisyiyah Organization as community service partner.

CONCLUSION

This community service activity aims to increase public awareness and understanding of organic waste processing, especially household waste to preserve the environment and reduce the impact of waste. The expected result of this activity is an increased understanding of waste management and the implementation by the community starting from their environment. This community service activity is in the form of counseling and hands-on experience, where the community is taught directly to manage organic waste (household waste) with the Throwbinc tool and convert it into ready-to-use liquid fertilizer for the daily environment in the community at Jl Mustafa Medan.

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REFERENCES

- Nancy Y. Disasters Due to Garbage, Floods and Landslides [Internet]. 2021 [cited 2022 Feb 8]. Available from: <https://tirto.id/bencana-hasil-sampah-gunung-until-longsor-sampah-gaB Z>
- Wardhana AH. Black Soldier Fly (*Hermetia illucens*) as an Alternative Protein Source for Animal Feed. WARZOA. 2016;26(2):69–78.
- United Nations Goal 12 | Department of Economic and Social Affairs [Internet]. [cited 2022 Feb 12]. Available from: <https://sdgs.un.org/goals/goal12>
- SIPSN. SIPSN - National Waste Management Information System [Internet]. 2021 [cited 2022 Jan 25]. Available from: <https://sipsn.menlhk.go.id/sipsn/>
- ičková H, Newton GL, Lacy RC, Kozánek M. The use of fly larvae for organic waste treatment. Waste Manag. 2015 Jan 1;35:68–80.
- Rindhe SN, Chatli MK, Wagh RV, Kaur A, Mehta N, Kumar P, et al. Black Soldier Fly: A New Vista for Waste Management and Animal Feed. Int J Curr Microbiol Appl Sci. 2019 Jan 20;8(01):1329–42.
- Diener S, Studt Solano NM, Roa Gutiérrez F, Zurbrügg C, Tockner K. Biological treatment of municipal organic waste using black soldier fly larvae. Waste and Biomass Valorization [Internet]. 2011 Nov 18 [cited 2022 Jan 28];2(4):357–63. Available from: <https://link.springer.com/article/10.1007/s12649-011-9079-1>
- Supriyatna A, Kurahman OT, Cahyanto T, Yuliawati A, Kulsum Y, Supriyatna A, et al. The Potency of Black Soldier Larvae (*Hermetia illucens* L.) as a Source of Protein for Livestock Feed. Bioscientific J Biol Biol Educ [Internet]. 2018 Aug 29 [cited 2022 Jan 28];10(2):448–54. Available from: <https://journal.unnes.ac.id/nju/index.php/biosaintifika/article/view/14422>.
- Liu T, Awasthi MK, Chen H, Duan Y, Awasthi SK, Zhang Z. Performance of black soldier fly larvae (Diptera: Stratiomyidae) for manure composting and production of cleaner compost. J Environment Manage. 2019 Dec 1;251:109593.

