



# The Organic Waste Processing: Training with Vermicomposting and Bioactive Starter for Vocational High School Students

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**Abstract.** The Green movement in schools so far has produced quite a lot of plant waste, both from perennials, ornamental plants and shrubs. Waste recycling solutions have not been fully implemented, so many useful potential was wasted away. The facts in the field showed that many forage wastes of school plants thrown away or stacked in temporary landfills. That community service aimed to introduce methods of waste decomposition for vocational high school students, namely SMK N 1, SMKN 2, SMK Diponegoro, SMK YPKK 3 and SMK Karya Rini. The methods: (1). Earthworms (*Lumbricus rubellus*) and bioactive starter was used and hopefully would produce organic fertilizer; and (2). Demonstrations and simulations that include practice vermicomposting with bioactive starter followed by treatment on organic waste. This activity was conducted in the Laboratory of Organic Waste Treatment - Department of Biology Education, Yogyakarta State University. The results: (1). The enthusiasm of the participants in the implementation of the community service was quite high, as evident from the many curious questions about processing organic waste with vermicomposting and bioactive starter for producing the high quality of organic fertilizer; (2). Followed-up activities were expected each participant could become a pioneer of organic waste processing at their respective schools, or even in the surrounding community. The activities of students could be monitored by communication through mobile phones numbers and whatsapp accounts.

**Keywords:** Organic waste · vermicomposting · bioactive starter · vocational highschools

## 1 Introduction

A shady, green and leafy school environment seems to be the hope of all school academics. Meanwhile, waste from the school environment seems to never be separated from its existence which always causes problems [3].

The awareness of the current academic community is increasingly aware of the green movement, which turns out to be on the other hand, it would cause problems, namely when it was faced with the waste produced by the shady plants in the school environment [2]. Efforts to pile up and then dispose of forage waste produced from the yard around

the school, seem to be only a temporary solution, besides this it would seem to waste the potential of the forage waste [4].

In relation to the concept of Life Skills-Oriented Education (Life Skills) where education services must be oriented to the development of life skills, it was necessary to have a concept of education oriented on life skills through a broad-based education approach (Broad-based Education). Through close collaboration with various parties by paying attention to cultural, social, economic factors, and values prevailing in society, Yogyakarta State University (UNY) is not just implementing the curriculum, but the results must be used by the wider community. As a higher education institution, UNY was responsible for the implementation of the Tri Dharma of Higher Education (TDPT). As a consequence of this responsibility.

This activity aimed to: (1) provide knowledge, attitudes, and life skills to SMK students in Depok District, in terms of decomposition of school forage waste with helped by earthworms (*Lumbricus rubellus*), (2) apply Vermicomposting followed by bioactive starter treatment to produce premium quality organic fertilizer, so that it could be used to maintain plants around the school to be greener, sustainable and at the same time cheaper.

### **1.1 Troubleshooting Framework**

The community in that case was the school students group from SMK (vocational schools) who were expected to have a concern for solving the waste problem in their respective schools, which could then utilize the resulting product as a useful material. Forage waste from school shade plants was one that students could handle. One of the factors that determine the success of this effort was technical support for processing that was safe and not difficult to implement [6]. Thus, we need an appropriate strategy to change the behavior of these students by way of counseling and demonstrations. Student behavior, in that case, awareness of the importance of making efforts that have added value from green forage waste in schools needs to be grown by means of counseling to increase knowledge, skills, abilities, and attitudes about the need to apply organic waste treatment with helped by earthworms as decomposers [5]. The resulting compost product was then treated with the addition of a bioactive starter.

### **1.2 Realization of Problem Solving**

To realize the solutions to the problems mentioned above, the following steps have been implemented:

1. Provide counseling to understand vocational students in the Depok, Sleman sub-district about the potential for school forage waste.
2. Demonstration of preparation, treatment and implementation of decomposition assisted by earthworms. Followed by bioactive starter treatment on compost that had been decomposed by earthworms.
3. The practice of applying the vermicomposting method with continued bioactive starter treatment, then it is used as premium organic fertilizer.

### 1.3 Target Audience

The target audience for this activity, in the early stages, were SMK students in the Depok sub-district, Sleman Regency. Vocational school students were chosen because they assumed that every student from this type of school was equipped with sufficient understanding of technical matters to carry out an activity that provided benefits and added value. This activity was related to: (1) Student empowerment program in supporting green movement activities in schools. (2) The technical unit for processing organic waste in the Department of Biology Education, Faculty of Mathematics and Natural Sciences, UNY as a facilitator, both technical and human resources support.

This community service activity uses 2 methods, namely counseling and demonstration. (1). Counseling on the decomposition of school forage waste with the help of earthworms (*Lumbricus rubellus*), and (2). Demonstrations and simulations covering the practice of Vermicomposting were continued with bioactive starter treatment to produce premium quality organic fertilizers. This activity was carried out at the Organic Waste Treatment Laboratory, Department of Biology.

Education, Faculty of Mathematics and Natural Sciences, UNY. Assessment of the program result was carried out in the context of assessing the ability of participants to understand and practice the vermicomposting method and the treatment of bioactive starters.

At the final stage of the extension and demonstration activities, an evaluation was carried out to determine the level of success of the program, then the results of the evaluation are used to reflect whether the process that has been carried out previously has been as expected or not, if improvements and improvements had not been attempted. After reflection which includes analysis, synthesis, and assessment of the results of activities and the results of actions that had been taken, problems (shortcomings) usually arise that need attention, then improvements were made to these weaknesses. Thus, in the next stages of activities, the existing problems could be resolved and the activities would become more qualified.

The evaluation methods used were: (1) Monitoring the competence of participants, namely the ability of participants to understand the method in question during the counseling process, and (2) Direct observation of the ability of participants to apply it in practice and through direct practice in the field or at the student's home school.

## 2 Discussion

### 2.1 Implementation of Community Service

In the initial plan, there were 5 SMKs invited, namely SMKN 1, SMKN 2, SMK Diponegoro, SMK YPKK 3 and SMK Karya Rini. SMK Karya Rini, in the last preparation, was unable to send a representative because there was a final school exam. The total number of school delegates who attended consisted of 26 students with 4 instructors (teachers or employees). The internal implementer of the service team consisted of 3 lecturers, 3 employees and 5 vermicomposting research students. Implementation of activities in PPG Room 2 of the Biology Lab and in the Organic Waste Processing Unit, Biology Garden Lab, Faculty of Mathematics and Natural Sciences, UNY.

The implementation of the selected activities in the classroom was intended to provide an overview of the service activities carried out while at the same time motivating vocational students that vocational schools (vocational) had a strategic role in preparing intermediate skilled workers in the future [10]. Skilled personnel in organic waste management in the community were still very much needed, therefore that community service activity was expected to contribute ideas and experiences for these middle-skilled candidates.

Various benefits and business opportunities were also presented in class, so that participants could better appreciate how important (organic) waste treatment was in the future. A very significant added value would be obtained if the waste treatment later could be used as premium compost, which is expensive [10].

The use of organic waste degrader organisms, on this occasion the type of earthworm (*Lumbricus rubellus*) used, was still a new thing for the service participants. This was still quite foreign to them and was considered a new addition of knowledge that was very useful and could be applied in the school and home environment [9, 11].

Organic waste treatment which was exemplified in the Biology garden laboratory environment, Faculty of Mathematics and Natural Sciences UNY still relies on the fermentation process of fermenter microorganisms, the temperature generated from this process must be high enough and this gives the advantage that spoilage microorganisms would not be able to survive. Fermentation would be able to degrade organic waste into good compost components. In the early stages can produce a good planting medium. If the quality was to be increased to a premium quality fertilizer, then a Nitrogen-enriched microbial starter must be added, namely EM4 (Effective Microbe generation 4).

## **2.2 The Enthusiasm of the Participants**

During the implementation, the enthusiasm of the participants was very high, it could be seen from the indicators of the number of responses and questions related to the methods and methods of managing or processing waste with helped by earthworms. Student assistants wanted to know more about how to install organic waste treatment in schools, composting techniques and the range of costs required for minimal installation requirements. The feedback information was given in detail by the waste treatment technician at the Organic Waste Management Unit, Department of Biology Education, Faculty of Mathematics and Natural Sciences, UNY.

After finishing the activity, outside the schedule for the service, it turned out that there was still a group of participants from SMK N 2 who seriously consulted more with the service implementers at the Biology garden laboratory.

## **2.3 Follow-Up Activities**

The next step that could be applied after the implementation of service activities was that participants could apply their knowledge around their respective schools. Participants were expected to become pioneers of school organic waste management at the level of their respective school environments. Awareness that any waste generated by activities in schools could have high economic value if treated with a good and targeted technical touch [6].

School administrators, through the head of the school environment section, could further provide directions so that waste management was not limited to separating the types, but also the results of sorting organic waste could be processed further. That process could be expected to produce various planting media or high quality organic fertilizers. Go green as a slogan in schools and around student life could be manifested in a concrete form [4].

## 2.4 Monitoring of Further Activities

Monitoring activities for follow-up activities of service participants at school could be done through communication via smart phones and the like, either through WA groups that exist between participants, could also be done by direct contact with former participants. All contact number documentation was stored by the service team.

Thus, the benefits and impacts of the service activities that have been carried out could be followed up in the schools of each participant, even after the participants graduate from their education in their respective schools [4].

## 3 Conclusion

Treatment of organic waste with microbial fermentation provides an advantage because the spoilage microorganisms would not be able to survive so that they were able to degrade organic waste into good compost components. The method of waste management and processing with helped by earthworms gave new hope in the context of utilizing soil animals in degrading organic waste. Assistance was still needed for students who want to know more about how to install organic waste treatment units in schools, composting techniques and the range of costs required for minimalist installations. Viewed from that side, the PKM activities that have been carried out need to be continued.

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**Authors' Contribution.** Ciptono, Suhandoyo and Tri Harjana conceived of the presented idea. Ciptono, Suhandoyo developed the theory and performed the computations. Tri Harjana. Verified the analytical methods. Suhandoyo encouraged Ciptono and Tri Harjana to investigate a specific aspect in vermicomposting and supervised the findings of this work. All authors discussed the results and contributed to the final manuscript.

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