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Training on the Operation of Animal Manure Crusher and Mixer in Dewi Sri Farmer Group

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ABSTRACT

The training and operation of the animal manure crusher and mixer at Dewi Sri Farmer Group aims to increase efficiency and productivity in processing the into organic fertilizer. This tool is designed to simplify the process of crushing and stirring animal manure mechanically, which has been done manually and takes considerable time and energy. The training program includes counseling on the benefits and use of the tool, demonstration of how to operate, and hands-on practice by farmers. With this training, it is expected that farmers can operate the equipment properly, maximize the benefits that can be obtained, and improve the quality and quantity of organic fertilizer production. The application of this technology is also expected to help Dewi Sri Farmer Group in managing the organic fertilizer supply chain more effectively and efficiently. This activity also supports the implementation of several SDGs including SDG 9 (industry, innovation, and infrastructure), SDG 12 (responsible consumption and production), and SDG 15 (land ecosystems).

Keywords: Crusher, Mixer, Organic Fertilizer, SDG 9, SDG 12, SDG 15

Introduction

Dewi Sri Farmer Group has long been recognized as one of the most productive and innovative farmer groups. They not only focus on increasing agricultural yields but also strive to adopt new technologies and methods that can improve the efficiency and sustainability of their farms. One of the latest steps taken by this farmer group is the introduction of a manure crusher and mixer. This animal manure crusher and mixer is designed to facilitate the processing of animal manure (Lestari et al., 2023), which is one of the important components in making organic fertilizer. Organic fertilizer from animal manure has many benefits, including improving soil fertility, reducing dependence on chemical fertilizers, and helping to maintain ecosystem balance (Bhunia et al., 2021). However, manual processing of animal manure is often time-consuming and labor-intensive. With this tool, it is expected that the processing of animal manure will be faster, and more efficient, and can increase agricultural productivity.

The training and operation of these tools is part of a farmer empowerment program that aims to improve the knowledge and skills of Dewi Sri Farmer Group members. This program involves a series of activities, ranging from counseling on the benefits and use of tools, demonstration of how to

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operate, to direct practice by farmers. It is expected that with this training, farmers can operate the tools properly and maximize the benefits that can be obtained.

Material and Methods

The method of implementing Dewi Sri farmer group training activities is divided into several parts which also describe the resolution of problems at the target partner location. This training was held on July 13, 2024 at Paseban Jajar Gumregah, Gandusari District, Trenggalek Regency, East Java Province. Participants who attended this activity were members of the Dewi Sri farmer group totaling 20 people.

Pre-activity

Conducting initial surveys and in-depth interviews with farmer group members to further explore partner needs and problems faced by the Dewi Sri Farmer Group. In this activity, priority formulation of problems that can be solved by the community service team is also carried out. After obtaining initial data on partner problems, then a literature study is carried out to deepen knowledge in solving partner problems. Literature studies were carried out during the proposal submission period to assess whether the planned problem-solving solutions were in accordance with theoretical studies and previous programs so that it was hoped that the implementation and downstream of technology could achieve maximum results.

Activity implementation

Figure 1. Activity documentation

The activity process begins with the creation of the technology offered, namely in the form of a crushing and stirring machine for animal manure. This can increase the optimization of crushing and stirring when compared to manual methods (Aprilianti et al., 2020; Leman et al., 2017). Furthermore, operation training is carried out which aims to train partners to operate the machine by existing standard operating procedures (SOP). By running the machine according to the SOP, efficiency and effectiveness can be realized (Kurnia et al., 2023). In this operation training, elements of occupational

safety and health (K3) are also conveyed, so that accidents due to work can be minimized as much as possible. Not only operation training, partners are also provided with maintenance training aimed at how to carry out machine maintenance and repair damage due to daily use. The maintenance carried out includes cleaning parts that are prone to corrosiveness, post-use cleaning, grace on bearings, and other simple maintenance. The main purpose of this maintenance is to extend the working life of the machine and minimize operational costs so that work productivity can increase. The process of implementing tool operation training activities can be seen in the documentation in Figure 1.

Post activity

After the activity, partners are still assisted in using the tools. This is done to minimize work errors until the partners truly master the technology. The last stage is monitoring and evaluation. In addition, field visits will also be conducted to monitor the application of the techniques that have been learned and will be evaluated every 3 months.

Results and Discussion

The main objective of this community service program is to increase the organic fertilizer production capacity of Dewi Sri farmer group. Therefore, a technology is needed that is able to smooth animal manure mechanically, namely by designing and making an animal manure crusher that can be adjusted to the level of fineness and at the same time can be used to stir which is used as raw material for organic fertilizer. The crushing and stirring machine technology of animal manure implemented in Dewi Sri farmer group is operated using a gasoline engine.

The working principle of the animal manure crushing and stirring machine is through a mechanical process that utilizes the rotation of the drive engine, where the shaft and drive motor are connected via a V-belt (Mindarta et al., 2018). Furthermore, the blades on the shaft will rotate for the crushing and stirring process of animal manure (Niu et al., 2023). The animal waste that has undergone the crushing process will come out through the output hole by passing the screening process first. Based on the test results, the designed animal manure-crushing machine has a production capacity of 300 kg/hour. The production capacity using the machine can be increased by designing a larger machine such as enlarging the volume of the animal manure container, adding knife blades, and using a larger power (Mahato et al., 2015). The production process of organic fertilizer made from animal manure produced by Dewi Sri farmer group is compost with cow manure as raw material. The steps of the production process of animal manure as a raw material for organic fertilizer are:

1. Prepare the animal manure to be produced, then sort it from foreign objects such as stones, plastic, and wood.
2. Performing the crushing process with the help of an animal manure crushing machine.
3. Mixing the crushed cattle animal manure with other ingredients to accelerate the fermentation process.
4. Stirring all ingredients until they are evenly mixed using an animal manure mixer.
5. Fermentation process by placing the ingredients that have been mixed well in a closed room and allowed to stand for 1 week.
6. In order for the smell of the mixture of organic fertilizer ingredients to disappear after the fermentation process, the aeration process is carried out by letting it stand for three weeks without a lid.
7. Organic fertilizer with the basic ingredients of cattle animal manure is ready to use.

Based on the results of the effectiveness of testing the animal manure crushing machine, 100% of respondents strongly agreed that the quality of the results of crushing animal manure was very good, while 0% of respondents agreed. Furthermore, 90% of respondents also stated that the machine used was quite easy to operate. Other parameters, as many as 100% of respondents stated that the

production quantity was high and 100% of respondents stated that the process of crushing and stirring animal manure became easier.

Conclusion

The level of effectiveness of the implementation of the animal manure crusher technology applied in Dewi Sri Farmer Group Members shows that in general, the machine can function optimally with a production capacity of 300 kg / per hour with a rotation speed of 1300 RPM with 4mm mesh. The increase in production capacity reached 287.5%. Mesh fineness uniformity can be achieved by increasing the time required at different engine rotations. This is expected to help MSMEs engaged in the field of organic fertilizer to produce more fertilizer so that they can meet market demand. From the results of this community service activity, the understanding of the Dewi Sri farmer group regarding the use of tools is increasing. In addition, the abundant waste of animal manure in the community can be utilized properly.

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References

Aprilianti, N. W., Sutoyo, & Purwanti, E. W. (2020). Perception of farmers on the use of compost on rice farming in Harapan Farmer Groups, Pogalan Village, Pogalan Sub District, Trenggalek Regency. *Journal of Social and Agricultural Economics*, *13*(1), 92–98.

Bhunia, S., Bhowmik, A., Mallick, R., & Mukherjee, J. (2021). Agronomic efficiency of animal-derived organic fertilizers and their effects on biology and fertility of soil : A review. *Agronomy*, 1–25.

Kurnia, H., Riandani, A. P., & Aprianto, T. (2023). Application of the total productive maintenance to increase the overall value of equipment effectiveness on ventilator machines. *Jurnal Optimasi Sistem Industri*, *1*, 52–60. https://doi.org/10.25077/josi.v22.n1.p52-60.2023

Leman, A. M., Wahab, R. A., Zakaria, S., Feriyanto, D., & F, M. I. (2017). *The development of mixer machine for organic animal feed production: Proposed Study*. *AIP Conference Proceedings, 1885*(1), 020158. https://doi.org/10.1063/1.5002352

Lestari, W. D., Adyono, N., & Nisa, F. L. (2023). Peningkatan kapasitas produksi pupuk organik CV. Tiga Lima Jaya melalui Hilirisasi Teknologi Penghancur KOHE. *E-DIMAS: Jurnal Pengabdian Kepada Masyarakat*, *14*(4), 809–815.

Mahato, N., Ansari, M. O., & Cho, M. H. (2015). *Production of Utilizable Energy from Renewable Resources : Mechanism, Machinery and Effect on Environment*. *Advanced Materials Research*, *1116*, 1–32. https://doi.org/10.4028/www.scientific.net/AMR.1116.1

Mindarta, E. K., Wibowo, A. A., Bagus, A., & Rahma, N. (2018). *Designing portable chopping plastic waste machine utilizing electric motor*. *MATEC Web of Conferences, 204,* 04005.

Niu, Y., Zhang, J., Qi, J., Meng, H., Peng, H., & Li, J. (2023). Design and test of soil–fertilizer collision mixing and mulching device for manure deep application machine. *Agriculture, 13*(3), 709.