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Analisis Efektivitas Sosialisasi Pemanfaatan Kotoran Kambing Etawa dan Daun Sintrong (*Crassocephalum crepidioides*) sebagai Kompos di Desa Kalianyar, Kabupaten Bondowoso

Analysis of Socialization Effectivity of Jamnapari Manure and Thickhead (*Crassocephalum crepidioides*) Leaf Utilization for Compost Production in Kalianyar Village, Bondowoso Regency

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Abstrak

Pemanfaatan kotoran kambing etawa di Desa Kalianyar, Kabupaten Bondowoso belum optimal dikarenakan minimnya pengetahuan petani terkait pengelolaannya. Hal tersebut menjadi masalah tersendiri karena potensi dari kotoran kambing etawa yang cukup bagus untuk digunakan sebagai bahan baku kompos. Selain itu, tumbuhan sintrong juga banyak ditemukan di Desa Kalianyar namun masyarakat mengenalnya sebagai gulma. Tujuan kegiatan ini adalah untuk mengukur efektivitas sosialisasi pemanfaatan kotoran kambing etawa dan daun sintrong sebagai bahan baku kompos di Desa Kalianyar, Kecamatan Ijen, Kabupaten Bondowoso. Petani sebagai responden dipilih secara *random sampling* dan uji T digunakan sebagai dalam penelitian ini. Setelah hasilnya terbukti signifikan, pengukuran efektivitas sosialisasi (ES) yang dapat diketahui dari nilai *pretest* dan *post-test* dilakukan dengan jumlah responden sebanyak 11 orang. Melalui metode yang digunakan kegiatan ini berjalan sangat efektif dengan nilai efektivitas 81.8% dilihat dari adanya peningkatan nilai *post test* petani dibandingkan dengan nilai *pretest* setelah dilakukan demo dan penjelasan.

Kata Kunci : kotoran kambing etawa, daun sintrong, kompos, efektivitas sosialisasi, metode *layering*

Abstract

The optimization of Jamnapari manure in Kalianyar Village, Bondowoso Regency has not been considered to be optimal because of the lack of knowledge of farmers regarding its management. This becomes a problem itself as Jamnapari manure has a decent potential to be utilized as compost. Additionally, the thickhead plant is widely spread around Kalianyar Village, but it is also known as weeds by the villagers. The aim of this program is to analyze the effectiveness of the socialization of Jamnapari manure and thickhead utilization as the base materials of compost in Kalianyar Village, Ijen District, Bondowoso Regency. The respondents were chosen through a random sampling method and the t-test is used as the methodology in this research. After the results were proven to be significant, the measurement of socialization effectiveness (ES), which can be measured from the score pretest and post-test obtained by the farmers, was conducted with 11 respondents. Through used method, it was found that the obtained effectiveness value of 81.8% which gives evidence that this program was running very effectively due to the score increase on the post-test compared to the pretest's score after the demonstration and socialization.

Keywords : *Jamnapari manure, Crassocephalum crepidioides, compost, socialization effectiveness, layering method*

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Introduction

Kalianyar Village is located in Ijen District, Bondowoso Regency at 1.434 m above sea level. This village is widely known for its tourist destination, Ijen Geopark. Besides its tourism, Kalianyar Village develops from its agriculture and pastoral farming sector as most of the villagers work as farmers. The main agricultural commodities of Kalianyar Village include carrots, cabbage, coffee, potatoes, celery, and leek.

However, the farmers of Kalianyar Village still tend to rely on synthetic fertilizers as a support for the agricultural sector of the village. The Utilization of synthetic fertilizers has become a general practice in agriculture in recent decades, primarily as a result of the Green Revolution (Rinardi, 2019). The main advantage of synthetic fertilizer is its capability to supply quick and accurate nutrients for plants which results in a positive impact on agricultural products. However, synthetic fertilizer also has its challenges in terms of its usage as it becomes a threat to the continuity of the land over a long period (Ahmad, 2014). Moreover, the high cost of synthetic fertilizers results in many farmers facing difficulties in providing them (Rinardi, 2019).

Due to the difficulties faced by farmers in using synthetic fertilizers, the utilization of compost is a crucial aspect of modern sustainable agriculture as an ameliorant (Dariah, 2015).In the context of its sustainability, utilizing compost becomes more relevant as a companion to synthetic fertilizers because this kind of usage is able to increase soil fertility, reduce the dependability towards synthetic fertilizers, optimize organic waste, and reduce greenhouse gas emissions(Aguilera et al., 2013). Therefore, this community development program managed to optimize Jamnapari manure and thickhead (*Crassocephalum crepidioides*) leaf as both of these base materials are available in relatively large quantities in Kalianyar Village. This utilization is done in order to produce organic compost that can be utilized by the farmers.

Jamnapari manure is produced by the Jamnapari goat, which is a goat that has high economic value and is able to produce milk with high fat content. According to (Irawan, 2021), Jamnapari manure has a great potential to be converted into compost as it has macronutrients and micronutrients. (Sari, 2015)added that organic compost generated from Jamnapari manure contains C 6,18%, N 1,047%, P 0,531%, and K 0,209%, with a low C/N ratio of 5.902. These components are adequate to provide essential nutrients to the soil.

Meanwhile, the thickhead is a herbaceous plant that could be utilized as a vegetable, including by the villagers of Kalianyar Village (Olalekan & Ayodeji, 2013). This plant could grow between 40 cm - 100 cm tall and has the ability to grow in a wide range of pH and temperature, with a pH of 2 - 12 (Optimal: 4 - 10) and temperature of 50°F – 86°F (optimal: 59°F – 68°F) (Bechtloff et al., 2017; Ayodele et al., 2020). Additionally, every flower of thickhead can produce 91 - 150 seeds, making every plant capable of producing 750 - 1150 seeds. Because thickhead plants have high survivability and are easy to reproduce, they tend to have uncontrolled growth thus making these plants become weeds (Sakpere et al., 2013).Therefore, the leaves of thickhead plants are suitable to be used as a base material for compost and contain macronutrients that are essential to support the growth and development of plants. This is supported by the research by (Hossain, 2011) that found that a 60 days-old thickhead plant contains N 4.04%, K 81.09 mg/g, Ca 7.89 mg/g, Mg 1.76 mg/g, P 2.77 mg/g, S 1.69 mg/g, and Si 0.49 mg/g.

As one of the ways to elevate the quality of the agriculture and environment sector in Kalianyar Village, it is crucial for the farmers in the village to understand organic compost, including how to make it. This represents the realization of the 15th goal of Village SDGs (Sustainable Development Goals) centered, “Village cares about terrestrial environment”, that serves as a derivation of the 15th goal of SDGs, life on land that has the goal to, “Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.”. Hence, the aim of this research is to analyze and identify the effectiveness of the socialization of Jamnapari manure and thickhead utilization as raw materials of compost in Kalianyar Village, Ijen District, Bondowoso Regency and analyze effectivity of the socialization based on respondent characteristic.

Methodology

The layering method, a technique for creating compost by forming a layer with every utilized material, was used to create the organic compost in this community development program in Kalianyar Village. The material used was Jamnapari manure, thickhead, agriculture waste such as coffee husk, EM4, molasses, water, and trash bags, while the tools were hoe and bucket. The EM4 and molasses were mixed into the water. Meanwhile, the compost's base materials Jamnapari manure, thickhead, and coffee husk were also mixed into another place. After that, Jamnapari manure, thickhead, and coffee husk were put into the trash bag as the first layer. The solution consisting of EM4 and molasses was then poured onto the first layer. The layering procedure was repeated until all of the created components were put inside the trash bag. The layering scheme is illustrated in Figure 1. After the layering process, the trash bag was tied to make sure the compost was isolated from the outside air to create an anaerobic environment. Lastly, the compost was stored for a few weeks until it was ready to be used as an organic fertilizer. The trashbag needs to be opened regularly to prevent accumulating air produced from the composting reaction.

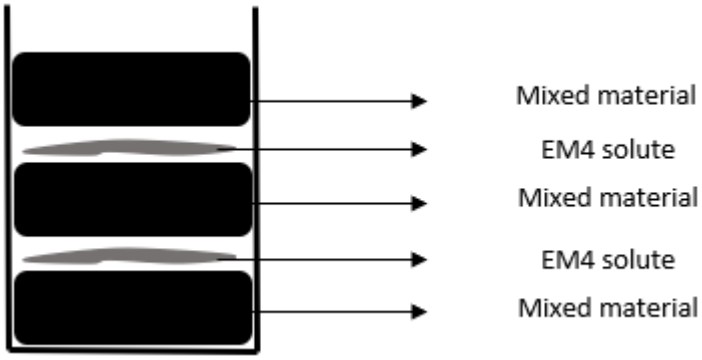

Figure 1. Layering illustration

The methods used in the community development program in Kalianyar Village were identifying problems and potential in the agricultural sector, program planning, and measuring community knowledge before and literature studies as the basis for establishing programs that were given to the participants, demonstration activities programs to show the process in detail to the public, and program evaluation activities.

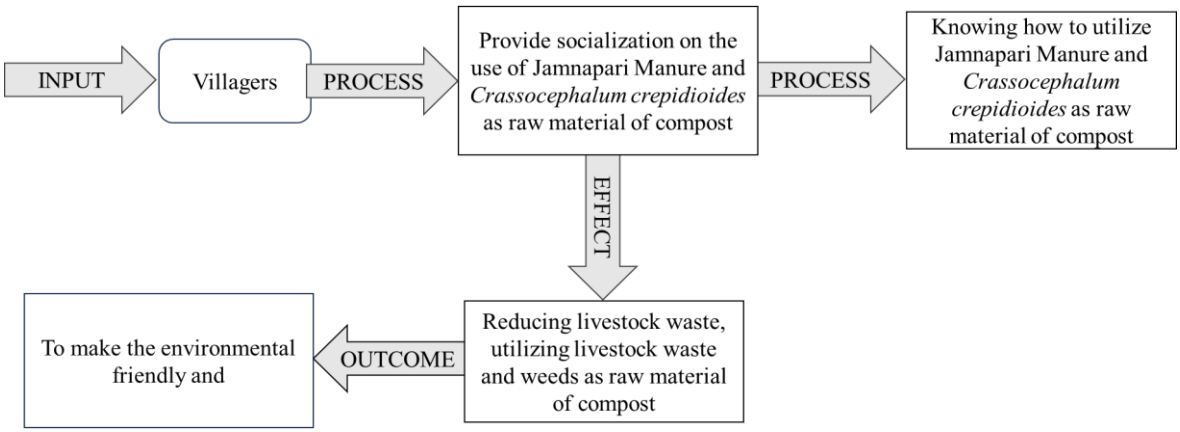

Figure 2. Problem-solving framework

Details regarding the programs and activities in the program are shown in Table 1.

Table 1. Methods of the program

No	Methods	Activity
1	Identification problem, potential, and participants	Survey potential and problem in Kalianyar village, ages, area ownership, last education, and plant commodity on participants were taken as their data
2	Literature study	Looking for references in the form of journals or credible sources
3	Program planning	Compilation and establishment of solutions related to identified problems
4	Program implementation	Introduction related to the manufacture of manure mixed with *Crasocephalum crepidioides* as a land repairer to the farmers
5	Knowledge measurement	Doing pretest and post-test to find out the increase of farmers' understanding of the program
6	Demonstration	Live demonstration and guidance in the form of leaflets
7	Evaluation	Determining the development of values obtained through pretest and post-test activities

The mechanism or stages of the compost production program implementation are shown with the flowchart in Figure 3.

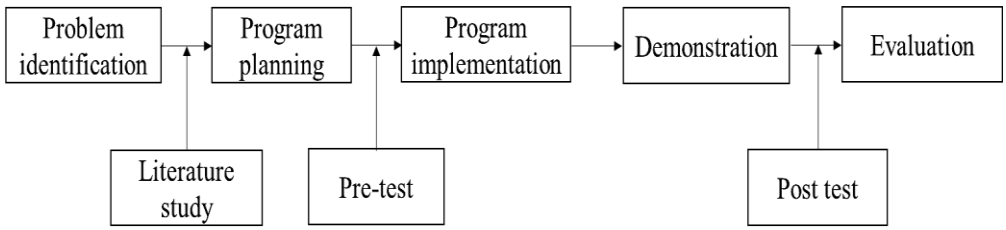

Figure 3. Mechanism of program implementation

After providing a demonstration of the compost production process to the participants, an evaluation was carried out to determine the impact of this program. Evaluation is carried out by comparing participants' knowledge before and after the elucidation. Knowledge indicators are obtained from the results of the pretest and post-test. there are 10 variables used to identify farmers' knowledge in this research, such as the definition of compost, definition of molasses, composition of compost, thickhead plant function, compost's process making, fermentation process in composting, benefit of compost, compost's application timing, manure's drying, EM4 definition.

The pretest and post-test serve as instruments that measure participants' knowledge and insight regarding the use of manure mixed with *Crasocephalum crepidioides* as a soil conditioner. The discussion in the pretest and post-test contained the purpose of making compost from raw material, the composition of the compost, the compost production process, and things that need to be considered in the production process. After getting the results before and after the intervention, an analysis was carried out using the T-test. If the result showed significant, the effectiveness of the socialization was measured. The formula used to determine the effectiveness of the elucidation is as follows:

Measurement of Effectivity Socialization (ES) by (Ginting, 1993):

$$ES = \frac{Behavioral\ Events}{Target\ behavior\ change} \text{ x } 100\%$$

$$ES = \frac{X2 - X1}{MS}$$

Description:

X2 = *Post-test* average
X1 = *Pre-test average*
MS = Maximum Score

The result of the effectiveness of these elucidations can be classified below based on the classification that has been put forward by Ginting, 1993:

1. Low Category (Less effective) : < 33.33%
2. Medium Category (Effective) : 33.33% - 66.66%
3. High Category (Very Effective) : > 66.66%

Hypothesis analysis conducted to know how significant the socialization through farmer's knowledge about compost production. The hypotheses are as follows:

- H0 = the socialization is not significant for improving the farmer's knowledge about compos production
- H1 = the socialization is significant for improving the farmer's knowledge about compos production

Result and Discussion

The program was held on August 16th, 2023, on Kalianyar Village in the front yard of a resident of Kalianyar Village's house. Kalianyar village is considered to be a suitable place for the implementation of this community development program as there are many accessible pastoral and agricultural commodities available. Based on the available commodities, Jamnapari manure and thickhead leaves were chosen due to their ability to provide sufficient nutrients for plants after these materials are converted into organic compost. Coffee husk, which was the remains of the previous coffee harvesting, was also added during the compost production demonstration.

The socialization method is used to carry out the community development program. The program stages consisted of: **(1) Problem identification**; to find out the problem faced by farmers in Kalianyar Village that could be solved by utilizing natural resources and human resources. **(2) Program planning**; after identifying problems with the literature study, according to (Aliyah et al., 2019), program planning is one of the stages conducted with taking opportunities for the future. **(3) Program implementation**; the explanation of the prepared compost production program was conveyed to the villagers. Prior to the explanation regarding the compost-making process, farmers were given a pre-test in the form of sheets of paper. **(4) Demonstration and practice;** the team demonstrated the steps of making compost, followed by the practices of the farmers themselves. There were two groups of farmers, each group consisted of five people and created one trash bag filled with compost. **(5) Evaluation;** a review where the team re-explained the materials was conducted, followed by the post-test. Magdalena et al., (2021)mentioned that a post-test is a learning assessment instrument that is still effectively carried out to determine the target insights and outcomes from the learning process.

Characterization of Respondents based on Ages Range

Figure 4 shows that almost all the villagers (90.9%) who participated in the elucidation and demonstration were 22-49 years old. According to Law No. 13 of 2003, people around 15-64 years old are considered to be within the productive age range and workforce. Therefore, the people of Kalianyar Village have the potential to work as farmers and are capable of developing their knowledge and skills.

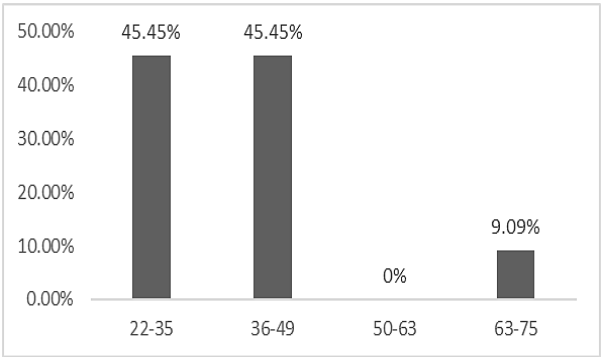

Figure 4. Characterization of Respondents based on Ages

Characterization of Respondents based on their Last Education

Figure 5 shows that a portion (45.05%) of the participants had elementary school as their last education, while the rest had junior high school and senior high school as their last education. According to Law No. 20 of 2003 concerning the National Education System (SISDIKNAS), it is a mandatory requirement for Indonesian citizens to complete a minimum of 9 years of education. This proves that the mentioned participants in the program are categorized as having a low formal education. Hence, it is expected that this elucidation can increase the knowledge and enthusiasm of the farmers of Kalianyar Village.

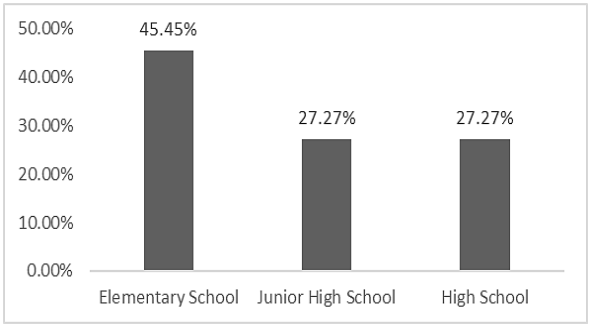

Figure 5. Characterization of Respondents based on Last Education

Characterization of Respondents based on Land Area Ownership

There were 72.73% of the participants who had a land area of 1 Ha (Hectares), while 27.27% had a land area of 1.5 Ha or 2 Ha (Figure 6). According to (Mamondol & Sabe, 2016), there is a positive correlation between land area and profit, as well as agricultural land must have a minimum area of 0.5 Ha to generate a profit. Therefore, it can be concluded that the farmers of Kalianyar Village are capable of developing their agricultural sector as their land is adequate to obtain financial gain.

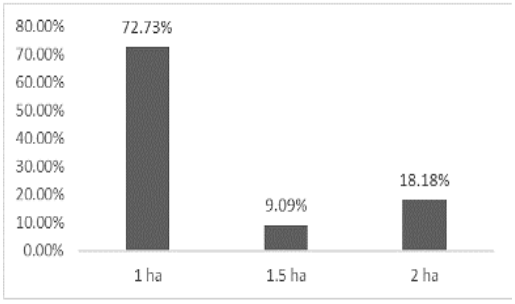

Figure 6. Characterization of Respondents based on Land Area Ownership

Characterization of Respondents based on Commodity

As shown in Figure 7, it can be seen that 60% of the participants were farmers in Kalianyar Village who plant coffee as their main agricultural commodity. Most of these farmers became coffee farmers due to the PTPN (PT Perkebunan Nusantara) XII Kebun Blawan which focuses on manufacturing coffee in the village. The availability of the PTPN XII Kebun Blawan gave the farmers motivation to manufacture coffee plants because the company serves as the main elucidator in coffee cultivation and market provider for the coffee farmers in Kalianyar Village. Siregar et al. (2019) added that PTPN plays a role as the well-being supporter of the society around it. Besides coffee, the villagers also cultivate and manufacture other plants such as cabbage and potato. These agricultural commodities are cultivated by the farmers based on their growth requirements which becomes an advantage for Kalianyar Village.

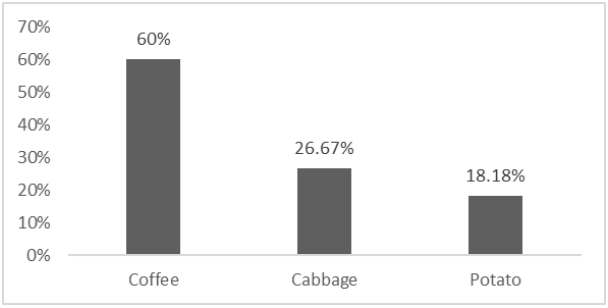

Figure 7. Characterization of respondents based on commodity

Determination of Compost Production Elucidation Program Effectiveness

Table 2. Comparison Farmer's Knowledge Towards Compost Production

Instrument	Mean	SD	t stat	p value	t Critical one-tail
Pretest	4.364	11.534	-5.9	0	1.833
Posttest	5.182	9.927			

Based on hypothesis test using T-test, p value (0) < α (0.05) means significant. It concludes H1 accepted that socialization is significant towards farmer's knowledge. The previous study also showed the same result that socialization can improve student attitude and knowledge due to training and socialization are essential to maintain balance and harmony (Cerit, 2019).

Table 2 illustrates the average score of the pre-test and post-test that the participants obtained in every question to find out whether there were any increases in the score between both tests. Every question asked in the pre-test and post-test was based on different variables. In the pre-test, the questions that less than 50% of the participants answered correctly were those discussing the definition of molasses, the timing of compost application, the definition of EM4, the compost-making process, the fermentation process, and the drying process of the manure. However, there are two variables that showed decreased scores after socialization, such as thickhead plant function, the benefit of compost, and manure drying. The decreased score was affected by a less comprehensive explanation by the facilitator. After the demonstration and explanation of the compost production process were done, a post-test was conducted as one of the requirements for understanding the effectiveness of the elucidation.

Table 3. Recapitulation of changes in the level of farmers' knowledge

No.	Variable	Score Average		Score Increase
		Pre-test	Post-test	
1	Definition of compost	7.27	8.18	0.91
2	Definition of molasses	0.91	3.64	2.73
3	Composition of compost	10	10	0
4	Thickhead plant function	8.18	6.36	-1.82
5	Compost's process making	1.82	2.73	0.91
6	Fermentation process in composting	3.64	3.64	0
7	Benefit of compost	6.36	5.45	-0.91
8	Compost's application timing	0	0.91	0.91
9	Manure's drying	3.64	1.82	-1.82
10	EM4 definition	1.82	9.09	7.27
	Total	43.64	51.82	8.18

From the ten measured variables (questions asked in the tests), there were five that displayed a score increment, two that remained the same between both conducted tests, and three that show score decrement. In addition, variables about compost composition obtained full scores between tests. It is predicted that the differences between variables are due to the difference in the number of participants between the pre-test and post-test, where there were more participants participating in

the post-test and they were not fully present during the demonstration. Moreover, the place chosen for the demonstration was not conducive enough that some of the participants were distracted.

To find out the level of effectiveness of the conducted elucidation, a formula was applied for the average score of the pre-test and post-test. The obtained effectiveness index was determined using the calculation below:

$$ES = \frac{X2-X1}{MS}$$

$$ES = \frac{51.82-43.64}{100} \text{x } 100\%$$

ES = 81.8% **(Very Effective)**

The obtained effectiveness index was then classified based on the classification stated by Ginting E., (1993)A value of 81.8% was obtained from the calculation, that is classified as very effective. Therefore, the intervention in the form of sharing and discussion was proven to be successful and able to increase the knowledge of the farmers from Desa Kalianyar that revolves around the optimization of Jamnapari manure and thickhead leaf as the base materials of organic compost. The 81.8% effectiveness can be shown that the participants made their own compost after the demonstration. The supporting factor that made the demonstration very effective is the majority of participants are farmers within the productive age range, as well as owning their own fields in which they are more exposed to agricultural experience. Therefore, it is evident that these farmers have the required capabilities to make compost despite some information being undelivered throughout the demonstration. Furthermore, not only a demonstration of the process was provided, but also a sharing session was conducted where the farmers could discuss their difficulties when making the compost. They were very enthusiastic about sharing their knowledge and experience with composting. These are the factors that support the effectiveness of our demonstration method.

Doing a demonstration is an effective way to improve the knowledge of the participants and practice it themselves, as an example in Bentang Village, Takalar Region (Asriadi, 2021). (Alhidayat & Latif, 2022), state that demonstration is effective in increasing the knowledge of audiences. In Takalar, the villager improved their lives by becoming more caring about agricultural waste as a compost material after getting it demonstrated by a consultant. A similar case was shown by the Kalianyar villagers, after a demonstration about the composting process, the villagers were very enthusiastic about collecting the waste of coffee beans to use as composting material. Therefore, socialization using demonstration or practical learning can be used to increase the knowledge and skills of the audience.

Conclusion

Based on the results of the study, it can be concluded that the program is proven to be very effective in enhancing the knowledge of the farmers regarding organic compost, with an effectiveness index of 81.8%. Based on the characteristics of the farmers as respondents aged around 22–75 years old, with their last education being mostly elementary school, and their highest agricultural commodity being coffee plants along with 1 Ha land area ownership it concludes that socialization about composting can be understood well by farmers. Even though most of the respondents did not know about composting technology due to their last education, all respondents can understand composting technology through this socialization. This means that there was a significant improvement in their knowledge after the demonstration.

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