

## **Training in Composting Efforts to Develop Economically Value Compost Products by Family Welfare Empowerment (FWE) Batuan Village, Sukawati District, Gianyar District, Bali**

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### ABSTRACT

The Community Service Activities Conducted in Batuan Village, Sukawati, and Gianyar-Bali Aim to Increase Knowledge and Skills of Family Welfare Empowerment (FWE) In Managing Composting to Become Fertilizer Products That Have Economic Value. FWE has become a leader in waste management at the household level. The methods used include observation, counseling or education, direct practice, monitoring, and evaluation. Based on the results, 100% of FWE can use tools for the composting process to produce organic compost with economic value, 100% understand the use of compost, and 100% are skilled in using compost as quality organic compost. FWE in Batuan Village, after receiving socialization and training, commits to sorting waste and making compost into organic fertilizer with economic value.

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## **INTRODUCTION**

Garbage that accumulates and is not reused can hurt the environment and public health. Therefore, waste management is a solution to waste accumulation, which is the responsibility of every citizen (Mahyudin, 2014). Waste management activities can make waste able to be reused optimally so that it will have a positive impact on health, the environment, and the community's economy (Naila Aulia Rahmah, Novita Sari, 2021). Waste management is a systematic, comprehensive activity, and the IAEA includes the collection and handling of waste (Harahap, 2016). The waste reduction includes activities to discuss landfill waste, waste recycling, and reuse of waste, while waste handling includes activities to sort waste according to the type, amount, and nature of waste, activities to collect waste from waste sources to temporary storage sites, activities to transport waste from temporary storage to final processing sites, management activities to change the characteristics, composition, and amount of waste, as well as final waste processing activities in the form of safely returning waste and residue from previous processing to environmental media (Sukorini et al., 2014).

Compost includes organic fertilizers that are produced through the degradation of materials originating from living things. In other words, compost is fertilizer produced from organic materials through a decomposition process (Agnesa & Afifi, 2022). Compost has various benefits for the soil, including loosening the soil, improving soil structure, increasing soil binding capacity to water, providing nutrients for plants, increasing the types of organisms and biological activity in the soil, and suppressing growth or disease attacks on plants (Thesiwati, 2018). Compost can be made in stages, including preparation, monitoring of pile temperature and humidity, turning and watering, as well as planting and storage (Hastuti et al., 2021).

The process of making compost can be done by adding a bioactivator, which plays a role in breaking down organic matter into the elements N, P, K, Ca, and Mg, which are returned to the soil, and the nutrients CH<sub>4</sub> and CO<sub>2</sub>, which can be absorbed by plants. One of the Bioactivators that can be used is Effective Microorganism-4, commonly known as EM4 (Rulyana et al., 2017). EM4 is a mixture of beneficial microorganisms with a total of about 80 species that can work effectively in fermenting organic matter, including photosynthetic bacteria, *Lactobacillus* sp., *Streptomyces* sp., yeast (yeast), and actinomycetes (Jalaluddin et al., 2017). Using EM4 will speed up the composting process when compared to natural composting (Suryanto, 2019).

Cleansing of trash is one of the 7 points of Sapta Pesona, or conditions that must be realized in order to attract tourists to an area or region in Indonesia. These seven points are contained in the Decree of the Minister of Tourism, Post, and Telecommunications No. 5/UM.209/MPPT-89 concerning Guidelines for the Implementation of Sapta Pesona (Siska Wahyu Rahmawati, Sunarti, 2017). Ecotourism has been widely implemented in various regions of Indonesia as a platform that contributes to reducing emissions (Choi et al., 2020). Considering that so far, tourism has been the fastest-growing industry in the world, which makes a significant contribution to increasing carbon dioxide

emissions (Paramati, S.R., and Alam, 2017), The concept of ecotourism is the answer to management that prioritizes local community involvement and is no longer centralized (Oktami et al., 2018).

Processing waste into organic fertilizer usually uses fermentation technology that utilizes microorganisms in the form of bacteria. The steps in manufacturing are providing equipment for making, providing raw materials, mixing ingredients, fermenting, and checking, and after 2 weeks, it is ready for use (Saenab et al., 2018).

Batuan Village is located in Sukawati District, Gianyar Regency, Bali Province. In order to prioritize the empowerment of the people of Batuan Village, Sukawati District, and Gianyar Regency, especially in Batuan Village. The location plan for TPS 3R Batuan Village, Sukawati District, Gianyar, Bali, can be seen in Figure 1.



Figure 1. Location Plan for TPS 3R Batuan Village, Sukawati District, Gianyar, Bali

The target we set this time was housewives who are members of the Family Welfare Empowerment Team (FWE) in Batuan Village, Sukawati, and people who are not yet economically productive but have a strong desire to become entrepreneurs. Besides, it can also be used as an additional livelihood that plays a role in helping to increase family income.

With community service activities funded by Warmadewa University, it is hoped that the Family Welfare Empowerment (FWE) community of Batuan Village, Sukawati, will have the skills and insights in managing local natural resources and an entrepreneurial spirit to be able to open up business opportunities related to the condition of Batuan Village. By being given an Introduction to Composting training activity in TPS 3R Development Efforts, it is hoped that the community will be able to produce and market their compost products and thus be able to increase productivity and entrepreneurship. From the Family Welfare Empowerment (FWE) of Batuan Village, Sukawati, it is proposed that community service activities take the form of training on Introduction to Composting in 3R TPS Development Efforts in Batuan Village, Sukawati District, Gianyar Regency, Bali.

## **THEORETICAL REVIEW**

Animal husbandry and agricultural waste are wastes that people often complain about because the presence of these wastes disturbs the comfort of the people around the livestock and agricultural areas. The disturbance is in the form of an unpleasant odor emitted by gases, especially ammonia gas (NH<sub>3</sub>). In addition, livestock and agricultural waste can cause environmental pollution and can damage environmental quality and public health (Fatma Wati, 2019).

A fertilizer is a substance or material that contains one or more substances needed for plant growth and development. Fertilizers contain substances that plants need to provide nutrition. The use of artificial fertilizers can be reduced by applying organic fertilizers (compost) (Sauli, 2022).

Organic fertilizers are fertilizers consisting of organic materials derived from plant, animal, or human remains in solid or liquid form that have undergone decomposition. Organic fertilizers consist of several types, including green manure, manure, and compost. Compost is the result of the weathering of various materials originating from living things such as leaves, plant stems, dirt, and garbage (Irawan et al., 2021).

Many compost fertilizers are made by farmer groups and small and medium entrepreneurs, and some have even been sold to the community. However, it has not been registered with the Ministry of Agriculture or the Ministry of Trade. Some examples are: (1) compost (PK A) with basic ingredients of compost in the form of cow dung, husk charcoal, sawdust, dolomite, and DD11 decomposer; the compost has a moisture content of 37.8%; pH 9.69; Nitrogen 0.74%; P<sub>2</sub>O<sub>5</sub> 0.084; K<sub>2</sub>O 0.013%; C-Organic 18.14%; Ca-dd 0.564 me/100 g; (2) PK B with the basic ingredients of chicken manure, cow manure, goat manure, quail manure, roasted husks, and Trichoderma; (3) PK C with the basic ingredients of cow manure, goat manure, titonia, husk charcoal, PGPR, dolomite, and DD11 decomposers; (4) PK D on the packaging of this fertilizer has included the nutrient content in the fertilizer, including 1.8% Nitrogen; P<sub>2</sub>O<sub>5</sub> 2.7%; K<sub>2</sub>O 1.8%; CaO 2.5%; moisture content 20–30%; pH 6.5–7%; and a C/N ratio of 25–30%, with the basic ingredients of chicken manure, husk ash, dolomite, humic acid, and EM4; (5) PK E has a water content of 27.073%; pH 9.07; Nitrogen 1.121%; Phosphorus 0.228%; Potassium 0.648%; C-Organic 11.418%; Ca 1.267%; Mg 2.241%; and C/N 10.19, with the basic ingredients of cow dung, husk charcoal, sawdust, titonia, and coconut fiber soaking water (Imam Wahyu Wirahadi Syah Putra, 2020).

Livestock manure compost is fertilizer derived from animal manure, both chicken, cow, goat, and quail manure, which is given a decomposer to speed up the maturation process. Application of livestock manure compost can assist in the formation of soil aggregates or as a granulator, which causes the soil structure to become loose so that the soil is easy to cultivate and has sufficient pores for soil water and air content. Therefore, water and air in the soil will be sufficient for the needs of plants and various other living things in the soil (Linggar Yus Kristanty, 2020).

Adding livestock manure compost to the soil serves to increase the organic matter content of the soil. Adding organic matter to the soil can

improve the physical properties of the soil as well as increase the soil's ability to bind water so that soil moisture is maintained and available for plants. Organic matter plays an important role in the physical properties of soil, which include unit weight, porosity, water-holding capacity, and penetration resistance. Organic materials that have undergone weathering are hydrophilic because they have a high enough ability to absorb and hold water (Nenobesi et al., 2017).

Cow feces contained 12.24% organic C, 18.6% hemicellulose, 25.2% cellulose, 20.2% lignin, 1.67% nitrogen, 1.11% phosphate, and 0.56% potassium, with a C/N ratio of 16.6-25% (Sihotang, 2010). Of course, this can have great potential if cow feces are processed into compost, which can generate big profits for breeders (Mashur, 2020).

## **METHODOLOGY**

This Community Partnership Program will be implemented with partners, namely the Family Welfare Development Team (FWE) Mobilizing Team for Batuan Village, Sukawati District, Gianyar Regency, Bali Province, with the method of implementing PKM activities for Introducing Composting in the TPS 3R Development Effort planned with:

### **Observation**

To achieve the desired goals in community activities, preliminary observations were made to determine the level of partner knowledge, environmental conditions, and the approval process. Coordination with partners to find out the time and place of implementation as well as materials needed by partners. The approach used in this Community Service activity is training and technical guidance to improve skills in making organic fertilizer. A participatory approach is used to solve partner group problems (Laily et al., 2023). Any problems that arise will be analyzed and solved together with the group members involved in this activity. To be successful, the pilot area model is used as an alternative, encouraging the development of the Family Welfare Development Group paradigm with an empowerment approach and improving the quality of human resources. After that, educate partners about waste, especially domestic organic waste and its problems, as well as how to sort and manage waste properly and correctly (Dwicahyani et al., 2022).

### **Counseling/Education**

The implementation phase begins with an increase in KWT's understanding of the composting technique based on cellulolytic microorganism bioactivation. Educational and counseling activities for KWT Bungoeng Jeumpa members were carried out using leaflets and brochures (Dewi Junita, Agustinur, Sumeinika Fitria Lizmah, Muhammad Afrillah, Nana Ariska, 2023).

The implementation method is carried out with a learning-by-doing approach or through direct learning and practice. Implemented in the form of counseling, integrated training, and participatory practice (together with residents), under the supervision of the executor and followed by assistance. In

fostering and empowering the community through socialization, education, and an introduction to the importance of waste processing for environmental sustainability, education on processed products (compost) is continued with training on making and packaging waste compost products (Kadir et al., 2023). Education and counseling are aimed at providing basic understanding and information to the public (Sutianto Pratama Suherman, Arafik Lamadi, 2023).

### **Direct Practice**

The next stage of implementation is improving the skills of the Family Welfare Development Group (FWE) by doing hands-on practice on the composting technique. As for the workings of composting organic waste with a composter that uses a compost trash can, namely: Separate organic and non-organic waste. Dispose of organic waste in the compost trash can, then spray the molasses into a spray bottle or bottle that has been given small holes. Sprinkle sand, soil, or cow dung to prevent 2-3cm maggots. Close the garbage tightly if you don't throw the trash back so that it is perfectly fermented. Furthermore, trash can be filled repeatedly as long as it has not reached its maximum period (various sizes are available). For one week of use, it will emit POC (liquid organic fertilizer), which can be seen from the hose at the bottom to accommodate POC. POC is harvested every 2 days until the color is black. When it reaches its maximum period (the trash is solid), Close the bin for 2-3 weeks and don't fill it again. Open the lid of the barrel to produce compost. Then it is used again and again, as before. For barrels that are 12 months or 120 liters and 24 months 200 liters, there is a side door. Only 6 months of compost can be harvested without waiting a long time (Dahlia et al., 2022).

### **Monitoring and Evaluation**

In the final stage, an evaluation will be carried out using a questionnaire regarding the final understanding of KWT members regarding the composting technique based on cellulolytic microorganism bioactivators (Agustinur & Yusrizal, 2021). The results of the evaluation will be analyzed descriptively. The success of empowerment activities, increasing knowledge and skills, as well as evaluation of practical activities, use or utilization of waste raw materials and machines for the composting process (Suharman et al., 2022).

Community service monitoring can work together with village officials by utilizing decomposing liquid assistance from the environmental service so that it can be handled properly to bring benefits to creative housewives. There is guidance from universities such as Indo Global Mandiri University and assistance from students with discussions on input and the role of fertilizer and how to handle it, and good solutions are offered (Lesi Hertati, Asmawati, Lili Syafitri, and Terttiaavini, 2023).

## **RESULTS**

The activity was carried out on Saturday, May 6, 2023, with the title "Composting Training in an Effort to Develop Compost Products with Economical Value by Empowering Family Welfare (FWE) Batuan Village, Sukawati District, Gianyar Regency, Bali". Demonstration to provide an

understanding of Appropriate Technology (TTG) for the composting process and training on organic fertilizer compost, providing knowledge about product packaging, labeling, marketing, and entrepreneurship. Participants who took part in this activity were 10 people from the Family Welfare Empowerment Group (FWE) in Batuan Village, Sukawati District, Gianyar Regency, Bali. The PKM team also donated tools and materials to make compost products that have economic value. A summary of the activity results is shown in Table 1.

Table 1. Activity Results (Output)

No.	Type of activity	Achieved output (Output)
1	Appropriate Technology Counseling (TTG) in the introduction of composting in TPS 3R Development Efforts	100% of the partners of the Family Welfare Empowerment Group (FWE) in Batuan Village can use tools for the composting process to produce organic compost fertilizer that has economic value.
2	Education on how to use composting in the TPS 3R Development Effort	100% of the Partners of the Family Welfare Empowerment Group (FWE) in Batuan Village understand the use of compost in the TPS 3R Development Effort.
3	Training to improve skills in the utilization of composting in the Efforts to Develop TPS 3R as a quality organic compost	100% of the partners of the Family Welfare Empowerment Group (FWE) in Batuan Village are skilled in using compost in the Efforts to Develop TPS 3R as quality organic compost.

This community service activity has been published in electronic mass media. The implementation of this activity involved 2 lecturers from the Food Science and Technology Study Program, Faculty of Agriculture, Warmadewa University, namely: Ni Luh Putu Putri Setianingsih, S.Si., M.Sc., and Ir. I Wayan Sudiarta, MP., and 1 lecturer from the Agrotechnology Study Program, Faculty of Agriculture, Warmadewa University, namely: Dr. I Nengah Muliarta, S.Si., M.Sc. The implementation and results of organic compost fertilizer can be seen in Figure 2.



Counseling of the Unwar PKM Team to Partners of the Family Welfare Empowerment Group (FWE) in Batuan Village, Sukawati District, Gianyar Regency, Bali



Submission of tool donations from the Unwar PKM Team to Partners of the Family Welfare Empowerment Group (FWE) in Batuan Village, Sukawati District, Gianyar Regency, Bali



Photo with the Unwar PKM Team (3 Lecturers and 3 Students) and 10 representatives of Family Welfare Empowerment Group Partners (FWE) in Batuan Village, Sukawati District, Gianyar Regency, Bali



Organic fertilizer composting training by the Unwar PKM Team to Partners of the Family Welfare Empowerment Group (FWE) in Batuan Village, Sukawati District, Gianyar Regency Bali



Organic fertilizer composting training by the Unwar PKM Team to Partners of the Family Welfare Empowerment Group (FWE) in Batuan Village



The result of composting organic fertilizer

Figure 2. The Implementation and Results of Organic Compost Fertilizer

## **DISCUSSION**

In the context of perfecting community service, it is hoped that all parties will receive benefits that are useful in producing output such as scientific writing, posters, activity flyers, and activity brochures. The results of this community service activity, it proves that providing counseling and interviews in the form of lectures can increase participants' knowledge about household waste management. According to previous research, environmental cleanliness, level of health and comfort, and changes in healthy lifestyles affect development innovation. A waste-free compost waste bank reflects a healthy environment. Likewise, the results of the conclusion that after being given counseling on a healthy lifestyle about the impact of diseases caused by household waste that is not quickly cleaned, the emergence of germ seeds and unpleasant odors becomes a nest for mosquitoes and flies (Maghfiroh et al., 2021). From lectures on healthy lifestyles, it was found that the level of community knowledge increased, counseling provided more understanding to the community, and counseling participation increased (Herlinawati et al., 2022).

### **Economic and Social Impacts**

The implementation of this activity had an impact on the Family Welfare Development Team (FWE) Team for Batuan Village, Sukawati District, Gianyar Regency, Bali Province, namely that a group consisting of 10 representatives of FWE members could independently process compost ready for marketing. With the diversification of food products, compost products have added value and can increase the income of the Family Welfare Development Team (FWE) Team of Batuan Village. Apart from being a product that can be processed by all groups, compost has various benefits for plant fertility. The PKM implementation team also donated tools for processing compost products to support partners in starting to produce compost products and market them so that they become another source of income. Thus, this activity can certainly improve the welfare of the community, especially the FWE in Batuan Village, Sukawati.

### **Partner's Contribution to Implementation**

Community Partnership Program activities regarding compost fertilizer products by FWE Batuan Village, Sukawati were carried out on Sunday, May 6, 2023, in the form of counseling or theoretical studies to provide an understanding of the material for Appropriate Technology (TTG) for processing compost, packaging techniques, and techniques for marketing, which were attended by 10 representatives from FWE members. All partners (100%) actively participate in activities, and partners expect continuous assistance in processing waste into innovative compost fertilizer products.

### **Implementation of Community Service**

FWE Batuan Village, Sukawati, is very enthusiastic about learning how to process compost. The participants independently wanted to practice making

compost until they started marketing it. Furthermore, the PKM team will continue to assist in the processing of compost into high-quality and globally competitive compost products. The next plan is that the implementation team plans to accompany the group to seek a P-IRT permit so that the product can be marketed more widely.

### **CONCLUSIONS AND RECOMMENDATIONS**

Community service activities have been running smoothly. FWE Batuan Village, Sukawati, has been able to independently implement compost processing. Partners, by 100%, already know how to process good compost. The community, especially the FWE of Batuan Village, Sukawati, needs to consistently process compost so that they can produce even better products.

### **FURTHER STUDY**

Strategic steps to realize the next plan are to provide counseling regarding preparations for applying for a permit at the Health Service (P-IRT).

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