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PKM "Amerta Nadi" Farmers Group Bunutin Village, Bangli District Bangli Regency

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A B S T R A C T

The majority of Bunutin Village residents depend on agriculture, livestock, and plantations for their livelihoods. In addition to crops, cattle raising and the utilization of cow dung have also developed, a practice previously considered a lucrative pastime. The objectives of this activity for partners of the "Amerta Nadi" Farmers Group are: to increase their knowledge and skills in cattle farming and to utilize solid cow dung for compost, reducing the use of inorganic fertilizers in their areas and meeting increasing market demand, supporting quality and quantity, and ensuring continuous production. Technological advancements in cow dung processing will provide significant added value for partner farmers, primarily through improved manure quality and increased income.

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INTRODUCTION

Bangli District is one of four (4) sub-districts in Bangli, consisting of nine administrative villages developing according to the potential and characteristics of each village. Bunutin Village, located in the southern part of Bangli District, is a rapidly developing agricultural area. In addition to its beautiful scenery and landscape and fertile soil, Bunutin Village has developed several types of food crops, horticulture, plantations, and livestock that have economic value for sale (Anonymous a, 2023). Bunutin Village covers an area of 4.74 km2, representing 8.43% of the sub-districts in Bangli Regency. It has 265 mm of rainfall, 20 rainy days, and an average daily temperature of 25°C. It is a flat area with an altitude of 250 m above sea level, making it highly suitable for the development of food crops, horticulture, plantations, and livestock (Bangli Central Statistics Agency, 2024).

Bunutin Village is administratively located in Bangli District, Bangli Regency, Bali Province. It is approximately 33 km from Denpasar by road. According to Anonymous a (2023), the administrative boundaries of Bunutin Village are as follows:

1. Northern Boundary: Tamanbali Village.
2. Southern Boundary: Sidan Village.
3. Western Boundary: Tukad Sangsang.
4. Eastern Boundary: Tukad Blulung.

Bunutin Village consists of five hamlets: 1) Dadiapuri Hamlet, 2) Bunutin Hamlet, 3) Guliang Kawan Hamlet, 4) Dukuh Hamlet, and 5) Selati Hamlet. The majority of the Bunutin Village community relies on agriculture, livestock farming, and plantations for their livelihoods. In the agricultural sector, the commodities cultivated by farmers are primarily food crops, including rice, corn, and sweet potatoes, which thrive and thrive thanks to the local climate. Farmers also cultivate horticultural crops such as oranges, rambutans, durians, bananas, and guavas, while plantation crops include coconuts, coffee, and cocoa. In addition to crops, cattle, pigs, chickens, and ducks have also been raised, which can contribute to family incomes.

Currently, in Bunutin Village, 310 people raise cattle, and 772 are raised individually or in groups, managed simply or in pens (Anonymous a, 2023). The potential for developing various types of crops, coupled with the high demand for organic fertilizers and the increasing demand for alternatives to inorganic fertilizers, provides an opportunity for the community to utilize, process, and develop cow dung into more valuable products, thus improving the community's welfare. Currently, cow dung, as manure produced, is only sold cheaply without any fermentation process to increase the added value of farmers.

Plants require sufficient nutrients that can be sourced from organic fertilizer from cow dung. Many researchers have proven that cow manure has a significant effect on plant growth if properly processed. The results of Prasetyo's (2014) study found that the treatment of 90 tons of cow manure resulted in the highest red chili production of 302.58 grams per plant, but this was not significantly different from the treatment of 36 tons of chicken manure per hectare. Researchers Ribeiro et al. (2017) obtained the best dose of cow manure for soil chemistry of 30 tons ha-1 (soil organic C) and improved soil fertility by increasing and yielding mung bean plants in the dry weight of dried seeds per plant. A similar finding was obtained by researchers Mokh. Bay'ul et al. (2021) that the treatment of 25 tons ha-1 of cow manure was able to form a dry plant weight of 10.20 g, this condition experienced a 67% increase compared to the treatment without cow manure. The weight of cobs per hectare of 15 tons ha-1 cow manure treatment was 11.47 tons ha-1 while the weight of 25 tons ha-1 cow manure treatment was 17.09 tons ha-1 which indicated an increase of 49%. Furthermore, Basuki and Anistya (2022) stated that the application of cow manure significantly affected the height, diameter, total wet weight, total dry weight, and root length. The S2C4 treatment (60 g cow manure + 100 g cocopeat) provided optimal results for diameter and total dry weight, the S3C4 treatment (90 g cow manure + 100 g cocopeat) on root length, the S2C0 treatment (60 g cow manure) on NPA, the S3C0 treatment (90 g cow manure) had a good effect on total wet weight, and the S1C2 treatment (30 g cow manure and 50 g cocopeat) on sengon height. From the results of laboratory tests, it was found that the nutrient content of organic cow manure C was 35.65%, total N 2.16%, available P 512.75ppm, available K 626.00 ppm, DHL 18.00 mmhos/cm (Anonymous b, 2023).

The good content of cow manure was studied on spring onion plants and it was found that the application of cow manure with a dose of 20 tons ha-1 had a good effect on the average fresh weight of plants per polybag, namely 195.04 g and the weight of plant consumption per polybag, namely 169.29 g in spring onion plants (Saida et al., 2023). Researchers Meliana et al. (2021) proved that the treatment of cow manure with a dose of 30 tons ha-1 showed higher growth but the results showed the highest plant pod weight -1, plot pod weight -1, pod weight ha-1, which were respectively 971.667 g, 22.6722 g and 25.911 tons ha-1. To increase the effectiveness of fertilizer, cow manure can be mixed with rabbit manure. It has been proven that a mixture of cow and rabbit manure in the research of Wirajaya et al. (2024) obtained K 1 rabbit manure + cow manure gave the highest value for the fresh weight of harvested fruit per plant, namely 250.63 g. The Caliber V3 variety gave the highest value for the fresh weight of harvested fruit per plant, namely 252.87 g. By looking at the nutrient content and the role of fertilizer from cow manure that can be mixed with rabbit manure to increase crop yield/production, it is necessary to improve the quality, quantity and continuity of production to meet market demand that has begun to grow by preparing supporting production facilities. The high role of fertilizer from cow manure in increasing soil fertility that supports plant growth and yield, it is necessary to inform the results of the research to the community through community service programs.

The implementation of the Community Partnership Program (PKM) will partner with 1 (one) farmer group that has a strong will to progress and manage its business well, namely the "AMERTA NADI" farmer group consisting of 20 members and chaired by I Wayan Agus Martono with a number of cattle raised as many as 10 with adequate pens. The capacity of solid manure every day is quite large and is sold in wet conditions. This program will be directed at efforts to maintain and utilize cow manure properly, create drying house facilities, prepare compost bags for efficiency and effectiveness of fermentation, product packaging, business management of cow manure in the form of solid organic fertilizer made into compost.

Utilizing cow dung, previously overlooked, is a promising way to fill one's time profitably. It is hoped that this community service initiative, funded by Warmadewa University, will transform the farming community of Bunutin Village, including the "Amerta Nadi" farming group, in the areas of livestock and crop cultivation, as well as the processing of natural resources, especially cow dung, by maximizing the use of cow dung.

The purpose of this activity for partners is: increasing knowledge and skills of partners in cattle farming and utilizing solid cow manure as organic fertilizer in substituting the use of inorganic fertilizers in the partner area and can meet the increasing market demand supporting quality, quantity and continuous production. In addition, it can be an alternative that solid cow manure for communities around partners can be used as organic fertilizer in fertilizing cultivated plants. The touch of technology in processing cow manure will provide high added value for partner livestock farmers, especially from the quality of manure and increasing farmer income.

IMPLEMENTATION AND METHODS

This community service will be carried out in the "Amerta Nadi" farmer group and will start from March to October 2025. To ensure the smooth running of the community service activities, several stages are carried out. In planning this community service, the following methods will be used to facilitate and streamline the material absorption:

1. Interviews and discussions to identify problems faced by partners.
2. Direct face-to-face outreach to provide students with knowledge on the application of technology to utilize cow dung waste for composting, the importance of a drying house for solid fertilizer materials, proper and sustainable cattle farming, which prioritizes product quality and quantity, and improved organizational management to foster an entrepreneurial spirit and business management.
3. Materials and tools will be provided to students, which can be used as a means of implementation to improve the application of cow dung waste utilization and processing technology to ensure high-quality compost and continuous availability.
4. Hands-on practice will be guided by competent instructors in their respective fields, enabling students to understand and produce high-quality, solid organic fertilizer that is beneficial for plants, ensuring optimal and sustainable production.

5. Monitoring, mentoring, and evaluation: The project proponent will conduct regular monitoring and mentoring to ensure the success of the business being developed by the partners. At this stage, potential problems arising from the partners' operations will be analyzed and solutions will be sought. Following the monitoring, a final evaluation will be conducted of the community service materials provided and implemented by the farmer group members, including their use in horticultural crops in their fields/gardens and yards, and efforts to increase members' incomes.

RESULTS AND DISCUSSION

As a university that consistently upholds its Tridharma (Three Pillars of Community Service), Warmadewa University, with its Community Service Program (PKM) developed through community service activities, encourages its academic community to assist the community, particularly farmer groups in Bunutin Village, Bangli District, Bangli Regency.

This community service initiative has resulted in technology transfer and assistance with materials and tools, with the following outcomes for each solution:

Construction of a Drying House

Partner groups and members were motivated to improve quality, quantity, and continuity by constructing a drying house for fertilizer raw materials. All 100% of partner group members have implemented the project effectively and correctly. The drying house is now operational, and the availability of dry raw materials has increased. Solid cow manure compost is a crucial component in meeting market demand for quality, quantity, and continuity. Rapidly changing weather conditions hinder the availability of raw materials, making it difficult to meet the required processing volume. Solid cow manure requires drying before being shredded and fermented. To achieve this more quickly, a drying house is essential. The drying house was deemed essential to help farmer groups prepare raw materials more quickly, in greater quantity, and effectively. To provide a sense of security and comfort in preparing dry raw materials ready for shredding and fermentation, a representative drying house was constructed, allowing for greater raw material preparation. Supported by researchers Solichin *et.al*. (2018) by obtaining the 21-day-old compost, it is then removed from its container and continued with the drying process, by spreading it on a prepared tarpaulin. Drying is sufficient using sunlight. The drying process takes approximately 10-15 days. The partner group and 100% of its members have felt the benefits of the drying house by preparing more dry raw materials to be processed. It is increasingly felt that the availability of raw materials for cow dung compost from the drying house will motivate the Amerta Nadi farmer group to process their cow dung waste into compost during the fermentation process.

Technology Transfer for the Compost Bag Process

Cattle farming in the Amerta Nadi farmer group operates on limited land. Limited land ownership necessitates strategic planning to ensure efficient production processes to ensure high-quality, consistent production, and consistent production. With the availability of shredded cow dung ready for fermentation, limited fermentation space can be problematic. Technological advances have paved the way for efficient storage of processed materials, including the use of compost bags, which are widely available on the market. Researchers Destiasari *et al.* (2024) state that composting bags are compost containers that can be used for simple aerobic composting processes. Made from UV-resistant materials and with a porous texture, composting bags are resilient in various weather conditions, maintaining the stability of the composting process and providing good air exchange, as oxygen is essential for aerobic composting. Furthermore, composting bags offer a solution for limited land. The partner group and its members are 100% able to utilize compost bags properly so as to increase the added value of cow compost products.

Improving Cattle Cultivation Methods, Cow Manure Utilization, and Packaging

Improving the capabilities of livestock farmer group members through technology transfer is carried out by providing counseling and practical training on, among other things: 1) how to properly cultivate cattle so that they can grow and be healthy; 2) how to utilize cow manure to produce quality compost, which can be produced according to expectations in terms of quantity and how to ensure continuous availability, so that the product can compete in the market and attract consumer demand; 3) increasing the effectiveness of the abundant availability of cow manure and the efficiency of compost bag use in the fermentation process; and 4) how to market current products. The significant benefits of cow compost are demonstrated by the research results of Mangardi *et al.* (2023) that applying cow manure compost at a dose of 4 kg/m2 can increase the stem diameter of sweet corn plants. Applying cow manure compost at various doses can increase the weight of sweet corn cobs. The optimal dose of cow manure compost for sweet corn plants is 1 kg/m2. The outcomes achieved by the partner group and members are motivated to improve their understanding and implement proper and correct cattle farming, as well as to increase the efficiency and effectiveness of cow dung into compost, which contains nutrients that can meet plant needs, and how to market the packaged product. 100% of the partner group members have carried out cattle farming properly and correctly and understand the information provided. The healthier the cattle are, the better their growth and productivity will be. Packaging is one part of the attraction of the compost produced for consumers to buy, so to compete in the market, packaging needs to be made as attractive as possible. The members of the farmer group have been able to properly package the compost produced in plastic packaging and labeled.

Improving Group Management Capacity

Farmer groups, which exist at the lowest level of society, must be well-managed to ensure their continued existence. In the Amerta Nadi farmer group, with human resources at the forefront of the sustainability of planned programs, management capacity needs to be improved. Members' limited capacity to manage their groups across various activities needs to be improved through technology transfer, strengthening partner institutions, and structuring partner management to ensure the farmer group's organization operates effectively and efficiently through effective outreach and communication. According to Daniel *et.al.* (2006) in extension should be done with a participatory extension approach that provides benefits among others people will be more energetic, more committed and more responsible if they control their own environment rather than being done by an "authority" from outside. By Masmuh (2008) stated that communication allows people to coordinate their activities to achieve common goals, but communication is not only conveying information or transferring meaning. 90% of partner groups have been able to work together and compactly establish communication and develop their members so that they can be pioneers and continue to be transmitted to the surrounding community in running the organization they lead.

Materials and Equipment Assistance

The availability of materials and equipment used in the cow manure composting process will determine the success of the composting process. The Amerta Nadi Farmers Group in Bunutin Village requires materials and equipment that are more representative of field use, keeping up with current technological developments, resulting in the efficient and effective use of organic materials, particularly solid cow manure. The provided materials and equipment are expected to produce high-quality compost that is readily available and usable in the cultivation process. Fully supplied materials and equipment have been provided to partners for use in the drying and fermentation process of cow manure, improving quality and sustainability, and increasing the income of farmer group members.

Figure 1. Construction of the Drying House

Figure 2. Counseling

Figure 3. Removal of Dried Raw Materials from the Drying House

Figure 4. Spreading Raw Materials and Adding Bran Before Milling

Figur 5. Milling and Spraying a Mixture of Water, Molasses and EM

Figure 6. Checking the Results of the Spraying

Figure 7. Fermentation in Compost Bags and Stored

Figure 8. Harvest After the Fermentation Process is Over and Put Into Labeled Plastic Packaging Containers

Figure 9. Weighing the Compost

Figure 10. Press the Compost Plastic Packaging for Sale

Figure 11. Compost with Packaging Ready to Be Marketed

Figure 12. Group Members and Packaged Compost Products

CONCLUSIONS AND RECOMMENDATIONS

The "Amerta Nadi" Farmers Group in Bunutin Village, Bangli District, Bangli Regency, has successfully adopted all the materials provided during this Community Service Program (PKM). This is demonstrated by, among other things:

1. Partner group members have demonstrated a commitment to participating in extension programs, interacting during extension sessions, engaging in field practice, and providing mentoring.
2. Partner group members are motivated to engage more actively in utilizing cow dung and processing it properly into compost.
3. A drying house and compost bags are available to increase the amount of raw materials available for fermentation, resulting in production with quality, quantity, and continuity to meet market demand, and a good compost packaging process.
4. The group and its members are able to run the organization better.
5. The provision of materials and tools has supported group activities to achieve quality, quantity, and continuity of compost products and supported increased agricultural production.
6. The farmer group's income has increased from the sale of its products.

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