



Utilization of Livestock Waste for Organic Production: An Environmentally Friendly and Sustainable Solution

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Abstract: Livestock waste is a source of environmental pollution if not managed properly. Its utilization for organic fertilizer production can be an environmentally friendly and sustainable solution. This community service activity began with location identification in Tallumae Village, Sidrap Regency. counseling and training on making organic fertilizer from cow feces. The training participants had high enthusiasm to gain knowledge about the technology of processing cow feces into environmentally friendly organic fertilizer. The results of the extension and training activities showed a very positive response from farmer groups and communities in Tallumae Village. The existence of farmer groups and community members in Tallumae Village who use organic fertilizer is able to provide a stimulus to the surrounding community to make organic fertilizer from livestock waste. There are even community members who have implemented the organic fertilizer on vegetable crops and the results are very satisfying. The utilization of livestock waste into organic fertilizer can reduce the use of chemical fertilizers.

Keywords: Environmentally friendly; Livestock waste; Organic fertilizer.

Introduction

Sustainable farming systems aim to protect the environment without destroying it. There are four systems that can be implemented: 1) organic farming, 2) integrated farming, 3) low external input farming, and 4) integrated pest control (Salikin, 2003). Integrated farming system (IFS) as a concept of farming system that combines two or more farms (Channabasavanna et al., 2009; Jayanthi et al., 2009; Ugwumba et al., 2010; Massinai, 2012; Walia & Kaur, 2013; Jaishankar et al., 2014) where there are input-output linkages between commodities and biological recycling processes (Prajitno, 2009; Changkid, 2013; Massinai, 2012; Thorat et al., 2015), which use low external inputs (Devendra, 2011; Nurcholis & Supangkat, 2011; Hilimire, 2011) and utilise resources efficiently (Bosede, 2010; Balemi, 2012 and Soputan, 2012), and apply various techniques so as to increase production, productivity and income of

farmers and sustainably (Gupta et al., 2012; (Manjunatha et al., 2014; Thorat et al., 2015).

Integrated farming system of rice and cattle with utilization of cattle waste and rice crops is more feasible than monoculture farming system (Mukhlis et al., 2019). The corn-cattle integrated farming model through the utilization of cattle waste and corn crops is very feasible to cultivate and develop (Mukhlis et al., 2023).

The agricultural sector, including the livestock sub-sector, is one of the sub-sectors that contributes significantly to the Indonesian economy. The livestock sub-sector is also very instrumental in providing various animal products such as meat, milk, eggs, and other processed products that are the basic needs of the community. In addition, the livestock sub-sector also produces waste that can be processed into economically valuable products.

Livestock waste is one of the sources of organic waste, the amount of which continues to increase along

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with the increase in livestock population. This waste consists of solid manure, urine, feed residue, and wastewater generated from the production process in the livestock sector. If not managed properly, livestock waste can become a serious environmental problem, such as water, soil and air pollution. Methane gas produced from the decomposition of organic waste also contributes to global climate change.

On the other hand, livestock waste has great potential to be used as a base material for making organic fertilizer. Organic fertilizer is a more environmentally friendly alternative to synthetic chemical fertilizers, as it can improve soil fertility naturally, reduce environmental pollution, and support sustainable agriculture. The process of processing livestock waste into organic fertilizer can not only reduce negative impacts on the environment, but also provide added economic value for farmers.

In an era that increasingly emphasizes the importance of sustainability and efficiency in resource management, the utilization of livestock waste for organic fertilizer production is a very relevant solution. This waste treatment not only helps address waste issues, but also supports an integrated farming system that combines the livestock and agriculture sectors in a mutually beneficial cycle. In addition, this livestock waste treatment also supports environmentally friendly agriculture (Mangalisu et al., 2021).

According to Sukamta et al (2017) that the amount of manure released by cattle every day is around 12% of body weight and if no processing is done it will cause environmental pollution, a source of disease and can spur an increase in methane gas, disturbing the beauty and comfort of the community and can even trigger global warming. Livestock waste produced in the form of animal manure contains nutrients that are very beneficial to the soil. This is because livestock manure contains nutrients in the form of phosphorus and potassium which are quite high. Next

Tallumae Village, Watang Sidenreng Sub-district, Sidenreng Rappang District is one of the villages where most of the people work as farmers. In addition to farming, Tallumae villagers also raise livestock (cattle) as an additional job. Livestock waste generated from livestock raising has not been optimally utilized by farmers and communities in Tallumae Village. Therefore, efforts are needed to process livestock waste into products or organic fertilizers that have economic value so as to provide additional income for farmers and their families. According to Gunawan et al (2022) organic fertilizers can be sourced from animal parts, animal waste, dead plants, or other organic waste that has passed the engineering stage. This organic fertilizer can be liquid or solid, can be added with microbes or mineral content which has benefits as an effort to

increase the content of nutrients and soil organic matter and improve soil biological, chemical and physical properties. Organic fertilizers have benefits on soil chemical properties as a supplier of macro nutrient content composition such as Mg, S, Ca, N, P, K and micro nutrients such as Zn, Mo, Cu, Co, B, Fe, and Mn, can also help optimize soil cation exchange capacity. Organic fertilizers also have benefits on soil physical properties, one of which is to improve soil structure. The benefits of organic fertilizers on soil biological properties are as a source of food and energy for soil meso and micro fauna. Organic fertilizers are divided into manure and compost. There are solid and liquid organic fertilizers. Liquid organic fertilizer can be made from cow urine. Cow urine contains growth stimulating substances that can be used as growth regulators including IAA (Semaun, 2021). Due to the various benefits of organic fertilizers, the use of organic fertilizers is increasingly encouraged to improve soil health and maintain the sustainability of agricultural businesses that pay attention to ecosystem balance.

Method

The method of implementing community service activities is as follows:

Observation and site selection

Observation activities were carried out to ascertain the condition of the location and conduct interviews with the community including community leaders, local government and community organizations to be able to understand the problems faced and identify urgent needs. Location selection aimed to clarify the characteristics of Tallumae Village related to the condition of agricultural land and livestock.

Socialization

The socialization of the community service program aims to make the community understand the program so that there is no misunderstanding in the implementation of the program. In addition, this socialization also aims to gather more information related to the problems and solutions needed. This socialization was attended by local RT administrators and village heads as well as people both who joined farmer groups and people who did not join farmer groups around the activity location. Thus, it is hoped that this community service activity can provide outcomes that are in accordance with community needs.

Activity Implementation

This activity was carried out in two locations, namely at the Grand Zidni Pangkajene hotel and at the location of the community farm. Activities carried out at

the Grand Zidni Hotel were socialization / delivery of material on making compost from livestock business waste and making liquid organic fertilizer from noni fruit waste bioactivator. Farmers enthusiastically asked questions during the presentation of the material. Furthermore, the practice of making liquid and solid organic fertilizers from livestock waste was carried out at the farm location. The materials used for making solid organic fertilizer are cow dung, bran, burnt husk, EM4, molasses. While the ingredients for liquid organic fertilizer are noni fruit, cow urine, molasses and EM4. These materials are all easily obtained because they are available around the location of PKM activities. While the tools used are hoes, tarpaulins, buckets, shovels, jergen, sacks and other tools.

Result and Discussion

Geographically, Tallumae Village, Watang Sidenreng Sub-district is a lowland village where the majority of the population work as farmers. The main commodity grown is secondary crops. Apart from working in the agricultural sector, Tallumae villagers are also involved in the livestock sub-sector and other small businesses. Tallumae Village borders Tanete Village to the north, Bulucenrana Village to the south, Kalosi Village and Bulucenrana Village to the east and Watang Sidenreng Sub-district to the west.

People in Tallumae Village have not utilized livestock waste and agricultural waste optimally. By utilizing livestock waste as a base material for making organic fertilizer coupled with EM4 as a bioactivator is very good for organic fertilizer for plants. EM4 as a bioactivator is useful to accelerate the decomposition process so that it can produce organic fertilizer with the right level of maturity. A fast decomposition process is useful for producing organic fertilizer quickly and the right level of maturity to reduce the possibility of phytotoxicity in plants. According to its benefits, fertilizer can be divided into two types, namely organic fertilizer and inorganic fertilizer. Both types of fertilizers have weaknesses and advantages. Organic fertilizers have the advantage of being able to improve the chemical and physical properties of the soil, although in its use a large amount is needed compared to inorganic fertilizers for the same land area. Inorganic fertilizers can be more easily absorbed by plants, easily decomposed, but there are also disadvantages, namely the price of inorganic fertilizers is high and can cause the soil to become hard and reduce the sustainability of agriculture in general. The high price of inorganic fertilizers is an

obstacle for rural communities who mostly work in the agricultural sector and is often complained about by farmers. Therefore, the processing of livestock waste into organic fertilizer is one of the solutions to this challenge for business activities and to support the plantation and agriculture sectors in Tallumae Village, Watang Sidenreng Sub-district, Sidrap District.

Counseling on the utilization of livestock waste has been carried out and adjusted to the potential in Tallumae Village. The socialization participants consisted of 2 farmer groups and one of the farmer groups was a farmer women group with a total of 20 people. The socialization activities aimed to provide education and understanding to farmer group members about the benefits of organic fertilizer and the process of making organic fertilizer from livestock waste.

The socialization activities went smoothly and the participants were enthusiastic to discuss during the counseling. In addition to material on the utilization of livestock waste as organic fertilizer material, material was also presented on pests and diseases in plants and how to control them using both organic and non-organic pesticides.

Based on the results of interviews and visits in the field, the growth of plants, especially vegetables treated with organic fertilizer, was very good. This shows that the organic fertilizer made during the practice at the farm site has a considerable impact on the community because it can reduce the use of inorganic fertilizers. The growth of vegetables planted by the community in Tallumae Village such as mustard greens has wide leaves, ornamental plants have very good growth (Figure 3). The results of PKM conducted in Tallumae Village are in line with the results of PKM conducted by Gunawan et al (2022) which showed that the organic fertilizer produced can be used to help improve the fertility of farming products from the village community.

Lectures on practical methods of making compost from livestock business waste and making liquid organic fertilizer from noni fruit waste bioactivator

Socialization activities / delivery of material on practical methods of making compost. Raw materials for making compost from livestock business waste and making liquid organic fertilizer from noni fruit waste bioactivator were carried out at the Grand Zidni Hotel. All farmer group members enthusiastically listened to the delivery of the material and asked questions during the discussion session.



Figure 1. Submission of material on practical methods of making compost and liquid organic fertilizer

Practice of Making Organic Fertilizer

The next activity was the practice of making liquid and solid organic fertilizers from livestock waste at the farmer's farm location. The materials used for making solid organic fertilizers are cow dung, bran, firewood husk, EM4, molasses. While the ingredients for liquid

organic fertilizer are noni fruit, cow urine, molasses and EM4. These materials are all easily obtained because they are available around the location of PKM activities. While the tools used are hoes, tarpaulins, buckets, shovels, jergen, sacks and other tools.



Figure 2. Practice of Making Organic Fertilizer at Farmer's Farm Site

Implementation of organic fertilizer in ornamental vegetable crops

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Figure 3. Implementation of organic fertilizer in ornamental vegetable crops

Conclusion

The use of livestock waste for organic fertilizer production is an environmentally friendly and sustainable solution to the problem of waste and the needs of modern agriculture. Livestock waste processed into organic fertilizer can reduce environmental pollution, reduce the use of harmful chemicals, and increase soil fertility naturally. In addition, this system supports the concept of a circular economy, where waste is converted into valuable products, thereby reducing the burden on the environment and promoting more sustainable agriculture. Thus, good livestock waste management provides the dual benefits of preserving the environment while increasing agricultural productivity.

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