

Empowering Farmers' Groups through Awareness Raising and the Practice of Sustainable Organic Fertiliser Production in Baran Village, Cawas: Collaboration between Community Service Programme Students and PTX

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ABSTRACT

Farmers' dependence on chemical fertilisers in Baran Village, Cawas Sub district, Klaten Regency is one of the challenges in implementing sustainable agriculture. The continuous use of chemical fertilisers can reduce soil fertility. The utilisation of livestock manure in Baran Village has not yet been optimised. This initiative focused on training farmers in the production of organic fertiliser from livestock manure as a means of utilising the existing potential in Baran Village, whilst also providing information on the benefits and stages of organic fertiliser production. The activity took place on 14 July 2026 at the Baran Village Hall, utilising methods of awareness raising, discussion and hands on practice with members of the farmers' group. Data were collected through observation, documentation and literature review, and analysed using a qualitative descriptive approach. The results of the activity showed that farmers believed livestock manure could be used directly without undergoing any fertiliser production process. Through these outreach sessions and practical training in organic fertiliser production, farmers gained an understanding of the benefits of producing organic fertiliser, the materials used, and the stages involved in its production. Consequently, the utilisation of livestock waste can serve as an alternative to reduce dependence on chemical fertilisers whilst supporting environmental management and the implementation of sustainable agriculture in Baran Village.

KEYWORDS: *Livestock manure; Organic Fertilizer; Outreach and hands on training; Sustainable Agriculture*

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a. INTRODUCTION

Farmers' dependence on chemical fertilisers has reached an alarming level. Whilst chemical fertilisers can increase crop yields in a short space of time, their continuous use can degrade the physical, chemical and biological quality of the soil. It is a fact that the majority of agricultural land in Indonesia contains, on average, less than 2 per cent organic matter, whilst a good level of organic matter is between 3 and 5 per cent. This situation is exacerbated by the sharp rise in the price of chemical fertilisers. Therefore, concrete efforts are needed to utilise local resources, such as livestock manure, which can be processed into organic fertiliser that is inexpensive, environmentally friendly and sustainable.

In general, agricultural land in Indonesia is experiencing a decline in fertility and soil degradation, as well as a fall in productivity, particularly in intensively farmed rice fields. The causes include: a) an imbalance in soil nutrient levels; b) nutrient leaching and deficiency; c) a decline in soil organic matter content; d) the shallowing of the plough layer; e) contamination by agrochemicals or waste; f) a decline in microbial populations and activity; and g) salinisation/alkalisation (Wiwik Hartatik, Husnain, 2015). Soil plays a crucial role as the medium in which plants grow and develop. Furthermore, soil also serves as the primary source of nutrients that are essential for sustaining plant life (Abadan et al., 2025). Soil is greatly influenced by the balance between its physical, chemical and biological properties. According to Raksun, A. (2016), amongst these three aspects, the biological properties of soil play a vital role in maintaining land productivity, particularly through the active role of soil organisms such as microorganisms, soil fauna, and the enzymes present within it (Raksun, 2016). However, the excessive use of inorganic fertilisers in modern agricultural practices has led to a decline in the quality of soil's biological properties. This is characterised by a reduction in microorganism populations and a decline in soil enzyme activity, which ultimately has a negative impact on the long term fertility and productivity of the land (Widianingsih et al., 2025). Soil fertility can be optimised to enhance crop growth and productivity by applying organic fertiliser. Organic fertiliser consists of plant residues, food waste and animal manure that have undergone a lengthy process known as decomposition. The process of producing organic fertiliser serves to reduce the ratio of nitrogen to other nutrients. The advantages of organic fertiliser include being environmentally friendly, the potential to increase farmers' incomes, and the ability to improve soil fertility by repairing physical damage to the soil caused by the use of chemical fertilisers.

Excessive use of chemical fertilisers has even led to a sharp rise in their prices (Abadan et al, 2025). The decline in soil quality is caused by the excessive use of inorganic fertilisers, which can damage soil structure and reduce soil biological activity (Wiwik Hartatik, Husnain, 2015). Reliance on chemical fertilisers can lead to soil degradation, a decline in microbial biodiversity and increased production costs (Roidah, 2013).

In the village of Baran, a sub district of Cawas in Klaten Regency, where the village of Baran is an area with extensive rice fields, farmers' groups in this region rely heavily on chemical fertilisers to boost crop yields. Straw burning is a common practice, which has a negative impact on agricultural soil fertility as it leads to the loss of essential nutrients in the soil. Nitrogen (N) levels have decreased by up to 80 per cent, phosphorus (P) by 25 per cent, potassium (K) by around 21 per cent, and sulphur (S) by between 40 per cent and 60 per cent (Abadan et al, 2025). Furthermore, through our Community Service Programme (KKN) group's collaboration with the local farmers' group in the village, we developed a concept for establishing sustainable agriculture in partnership with PT X and the KKN students from Universitas Islam Negeri Raden Mas Said Surakarta.

Given the conditions in this village, a transformative shift is required from agricultural practices reliant on chemical fertilisers which can damage the environment towards a sustainable and environmentally friendly farming system. The use of organic fertilisers on crops is the primary solution for restoring soil fertility and enhancing long term productivity. According to research by Widianingsih (2025), organic fertilisers play a vital role in improving soil structure, enhancing the activity of soil microorganisms and providing nutrients (Widianingsih 2025). Organic fertilisers can

increase the population of soil microbes, which act as biochemical catalysts in the processes taking place within the soil. Other studies have shown that the application of organic fertiliser can increase the nutrient content in the soil, such as total N, total P and total K, which has a positive impact on plant growth and production.

Excessive use of chemical fertilisers can lead to a decline in soil quality and fertility physically, chemically and biologically. This can hinder plant growth, reduce the efficiency of nutrient uptake, lower agricultural productivity, and pollute the environment whilst posing a risk to human health. Therefore, the use of chemical fertilisers must be carried out judiciously and balanced with the use of organic fertilisers to maintain soil and agricultural sustainability (Bisht, Nikita & Chauhan, 2020). The regular application of organic fertilisers can improve water retention, thereby facilitating nutrient uptake by roots for growth and development (Hamzah & Siswanto, 2023).

This initiative focuses on training in the production of organic fertiliser from livestock manure as part of an effort to utilise the potential available in Baran Village. The initiative provides information on the benefits of organic fertiliser, the materials used, and the production stages, followed by hands on practice so that participants not only understand the material but are also able to try the production process themselves. Through this activity, the community can learn that livestock manure waste has value if managed properly and can be utilised as organic fertiliser to support agricultural activities. In addition to helping reduce waste in the environment, the use of organic fertiliser can also serve as an alternative to chemical fertilisers, meaning farmers do not have to rely entirely on them (Syah et al., 2025). This activity demonstrates that the use of organic fertiliser can be one of the steps towards reducing the excessive use of chemical fertilisers. The gradual adoption of organic fertiliser also plays a role in maintaining soil fertility, utilising available local resources, and promoting the adoption of more environmentally friendly and sustainable agricultural systems in Baran Village.

b. METHOD

This activity was carried out on Tuesday, 14 July 2026, at the Baran Village Hall, Cawas, Klaten. The Farmer Group Empowerment Activity through Socialisation and Practical Training on the Production of Sustainable Organic Fertiliser in Baran Village, Cawas, through collaboration between Community Service Programme (KKN) students and PT X, utilised methods of socialisation, discussion and hands on practice with members of the farmer group. This method was chosen to enhance participants' knowledge and skills regarding the use of organic materials as environmentally friendly fertilisers, whilst supporting the implementation of sustainable agriculture. The activity was carried out through collaboration between KKN students, PT X, the village government, and the farmers' group, ensuring that both the delivery of material and the practical sessions could proceed effectively.

The activity began with a presentation on the importance of using organic fertiliser and its benefits for soil fertility. Following the awareness raising session, participants were given the opportunity to discuss the agricultural challenges they faced and various alternatives for applying organic fertiliser on their land. Subsequently, participants took part in a practical session on organic fertiliser production, guided by KKN students and PT X, so that the material presented could be understood and applied directly. At the end of the activity, an evaluation was carried out through a group discussion to assess the participants' level of understanding and to gather feedback for improving future activities (Syah et al., 2025).

The approach used in writing this scientific article is qualitative descriptive, focusing on the implementation of farmer group empowerment activities through awareness raising and practical sessions on the production of sustainable organic fertiliser in Baran Village, Cawas Sub district. Data were obtained through observation during the implementation of the activities, documentation in the form of photographs and programme reports, as well as a literature review of books, journals and scientific sources relating to sustainable agriculture and community empowerment.

c. RESULT AND DISCUSSION

The Community Service Programme (KKN) is a form of community service; in the field of food and agriculture, we focused on the farmers' group in Baran Village, Cawas, Klaten, who showed enthusiasm for participating in awareness raising sessions and collaborative practical sessions with PT X and the KKN students from Universitas Islam Negeri Raden Mas Said Surakarta. The aim was to provide knowledge on the process of making organic fertiliser, which took place on 14 July 2026 in the village hall of Baran. Figure 1 illustrates the farmers' group's keen interest in taking part in the awareness raising and practical sessions during this event. The material presented by the speaker from PT X covered the principles of organic fertiliser production, its benefits, and the methods involved. Organic waste, such as animal manure, has the potential to be processed into organic fertiliser with the aim of improving soil fertility and reducing the use of chemical fertilisers. The use of organic fertiliser also improves the physical properties of the soil, particularly its structure, and enhances its fertility.



Figure 1. Awareness Session on Organic Fertiliser Production

The next stage involved a practical session on organic fertiliser production. Following the presentation, the farmers' group in Baran Village carried out the process. This involved the production of organic fertiliser using animal manure as the primary raw material. Indeed, livestock manure, which was previously regarded as waste, is now utilised to improve soil quality and agricultural productivity. As well as producing environmentally friendly fertiliser, the management of organic waste is also an effort to reduce environmental pollution caused by livestock waste. This practice aims to improve knowledge, skills and self reliance in the management of organic waste. Utilisation of organic waste.

Ingredients for Making Organic Fertiliser



Figure 2. Materials for Making Organic Fertiliser

Animal manure is the primary raw material in the production of organic fertiliser. The nutrient content in animal manure plays a vital role in plant growth and long term soil health. The production of organic fertiliser utilises materials such as livestock manure (80 per cent), dolomite (10 per cent), activated carbon (10 per cent) and Probiodex liquid (0.2 per cent), mixed in a covered container. Based on the results of discussions during the awareness raising session, it emerged that farmers in Baran Village believed that livestock manure could be used directly without any fertiliser production process. The nutrient content of goat manure, both in its fresh and decomposed states, showed a decrease in nitrogen content. Fresh goat manure contains 0.77 per cent nitrogen, 0.36 per cent phosphorus, 0.77 per cent potassium, organic carbon of 26.2 per cent with a C:N ratio of 12 per cent, whilst decomposed goat manure shows a reduction in organic matter to 2.23 per cent, a higher phosphorus content of 1.24 per cent and an increase in potassium to 3.69 per cent, as well as a decrease in organic carbon to 19.1 per cent with a C:N ratio of 11 per cent. Goat manure with high nitrogen and phosphate content and a low C:N ratio at the critical threshold plays a significant role in the nitrogen mineralisation process and the stability of the agricultural system (Washaya et al, 2023).

The process of making organic fertiliser



Figure 3. The Process of Producing Organic Fertiliser from Animal Manure

The production of organic fertiliser involves several processes, such as the collection of organic materials including animal manure and organic waste which are gathered in a specialised container to undergo decomposition; an initial mixing stage, in which animal manure is blended with other waste materials such as straw to create an optimal carbon to nitrogen ratio for microbial activity; and the addition of supplementary minerals such as dolomite, lime and rice husk charcoal to provide nutrients for the compost. Dolomite, or magnesium, forms the core of the chlorophyll molecule the green pigment involved in photosynthesis. Dolomite can raise the pH of acidic soil and provide calcium to strengthen plant structure. Lime, or calcium (Ca), is used to strengthen cell walls, improve disease resistance and enhance nutrient uptake; furthermore, lime can neutralise soil acidity and boost the activity of soil microorganisms. Rice husk charcoal can improve soil structure, increase water holding capacity, and provide energy for soil microorganisms to aid nutrient uptake and enhance soil aeration. Next comes the fermentation and decomposition process, whereby organic matter is allowed to break down through the activity of microorganisms for approximately 3–6 months until it becomes mature compost of a dark brown colour. Good compost has a normal temperature with a moisture content of 20–25 per cent, it is odourless and dark brown in colour, with a composition of 2 per cent N, 1 per cent P and 1.5 per cent K. Prior to this, the compost must be turned over to introduce oxygen and accelerate the decomposition of organic matter. This turning is carried out every two days; once the colour changes to dark brown, it indicates that the organic matter has begun to decompose and is transforming into mature compost. Once the fermentation and decomposition processes are complete, the compost is checked for maturity to ensure it is ready

for use. This is done by observing several characteristics, such as the colour of the compost, which should turned dark brown, its soil like texture, and the absence of odour. If there are still materials that have not decomposed, these are separated to continue the decomposition process.

From an economic perspective, the use of organic fertiliser has positive impacts, such as lower production costs, as farmers do not need to purchase large quantities of chemical fertiliser, and livestock manure which was previously of no value now provides added value as a fertiliser commodity. The application of organic fertiliser at a rate of 1.5 to 3.0 tonnes per hectare, combined with a reduction in the dose of synthetic NPK fertiliser by 25 per cent from the recommended rate that is, from 175 kg/ha to 130 kg/ha has been shown to boost rice yields on Type C tidal lands by 5.4 per cent compared with the control treatment using 175 kg/ha of NPK, this increase is attributable to the role of animal manure, which contains 1.1 per cent nitrogen and improves the physical, chemical and biological properties of the soil, thereby providing nutrients sustainably, however, the yield increase remains relatively lower when compared to the application of biofertilisers, which can boost productivity by up to 18 per cent under conditions of reduced NPK dosage (Dwijatmoko et al., 2024). Another study states that organic fertilisers can improve the efficiency of chemical fertiliser use by up to 25% without reducing crop yields (Wiwik Hartatik, Husnain, 2015). This indicates that shifting from chemical to organic fertilisers is a sound strategy for sustainable agriculture.

d. CONCLUSION

The awareness raising activities and practical sessions on organic fertiliser production in Baran Village provided farmers' group members with new knowledge and experience regarding the utilisation of livestock manure as a raw material for organic fertiliser. These activities also highlighted the benefits of organic fertiliser for soil fertility and the stages of its production, thereby enabling livestock manure which had previously not been utilised to its full potential to be put to good use in agricultural activities. The delivery of the material, followed by hands on practice, helped the farmers' group members to understand the process of making organic fertiliser more easily. This is important because agricultural activities in Baran Village still rely heavily on chemical fertilisers; therefore, the use of organic fertiliser can serve as a gradual alternative to reduce dependence on chemical fertilisers and make use of the resources available in the local environment.

The outreach and hands on practice methods employed were well suited to the needs of the farmer group empowerment activities in Baran Village. The outreach session provided an understanding of the importance of organic fertiliser, its benefits for soil fertility, and the materials that can be used. Subsequently, the hands on practice gave farmer group members the opportunity to observe and understand the process of converting livestock manure into organic fertiliser. This approach is well suited to the conditions in Baran Village, which has significant potential for livestock manure but has not yet utilised it to its full potential. The initiative also delivers environmental and agricultural benefits, as livestock manure can be processed into a useful resource whilst serving as an alternative to reduce the excessive use of chemical fertilisers. From an economic perspective, the utilisation of livestock manure can also help reduce the need to purchase large quantities of chemical fertilisers.

To ensure the sustainability of the initiative, the use of organic fertiliser should be implemented gradually by farmers' groups, taking into account soil conditions and crop requirements. The village authorities and farmers' groups can also continue with existing agricultural practices, ensuring that knowledge regarding the production of organic fertiliser does not cease once the activities have concluded. Furthermore, collaboration with parties possessing knowledge or experience in organic fertiliser production can be resumed if necessary, for example through follow up training sessions organised by relevant organisations. In this way, farmers' groups can become more self reliant in utilising available livestock manure and organic waste, and begin to gradually implement the use of organic fertiliser to support more environmentally friendly and sustainable agriculture in Baran Village.

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CONFLICT OF INTERESTS

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