e-ISSN 2581-0405
Asian Journal of Applied Research for Community Development and Empowerment

Journal home page: http://ajarcde-safe-network.org ISSN 2581-0405

Quality Testing and Effectiveness Test of Organic Fertilizer at Simantri Ternak Sekar Pasti Wangi

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ARTICLE INFO

Article History:
Received: 14 September, 2025
Final Revision: 07 November 2025
Accepted: 09 November 2025
Online Publication: 15 November 2025

KEYWORDS

organic fertilizer, dedication, effectiveness, quality

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A B S T R A C T

The Community Partnership Program (PKM) is implemented as a form of community service to enhance the quality and effectiveness of organic fertilizer production by the Simantri Ternak Sekar Pasti Wangi group. This activity focuses on two main aspects: quality testing and effectiveness testing of solid and liquid organic fertilisers produced from livestock waste. Cows. The activity began with socialisation and discussions among members of the livestock farming group regarding the importance of standardising the quality of organic fertilisers. Next, fertiliser samples were taken for laboratory testing to determine the macro- and micronutrient content of the organic liquid fertilisers. In addition to quality testing, field effectiveness tests were also conducted by applying the fertilizer to plants. The test results showed that the organic fertilizer produced by the group has considerable potential in enhancing plant growth. However, several aspects require improvement, such as the levels of specific nutrients. The targets achieved in this activity are that partners understand and master the technique of making POC from 20% to 85%, partners are also expected to be able to apply POC to plants directly from the initial ability of 40% to 80%, partners can increase income by at least 25% by producing POC and reduce the use of chemical fertilizers by replacing it with urine sap POC. This activity can reduce environmental pollution by 95% through the processing of cow urine waste into an organic liquid fertilizer.

Contribution to Sustainable Development Goals (SDGs):
SDG 2 – Zero Hunger
SDG 3 – Good Health and Well-Being
SDG 6 – Clean Water and Sanitation
SDG 13 – Climate Action
SDG 15 –Life on Land

1. INTRODUCTION

1.1. Background

Petiga Village is a village in Marga District, located approximately 17 km north of Tabanan City Center. It covers an area of 282 hectares, bordered by Tua Village to the north, Perean and Kuwun Village to the east, Geluntung Village to the south, and Payangan Village to the west.

Petiga Village comprises three administrative hamlets: Banjar Dinas Petiga Kangin, Banjar Dinas Belamban, and Banjar Dinas Sumingan. As of 2016, the population of Petiga Village was 1,792 people, comprising 877 men and 915 women. Judging from the geographical conditions of the Petiga Village area, it is situated on a plateau with an altitude of approximately 500 meters above sea level. The air temperature ranges from 30°C, with an average rainfall of 2000 mm/year [1]. The agricultural potential of Petiga Village is primarily designated as rice fields, with some areas classified as hilly plains and designated as community plantation land.

Since 2009, the Bali Provincial Government has developed the Simantri (Integrated Agricultural System) program, a breakthrough effort to accelerate the adoption of agricultural technology. It is a pilot model designed to accelerate the adoption of technology in rural communities. Simantri targets include livestock population, fisheries, product quality, year-round availability of quality animal feed, organic fertilisers and pesticides, and biogas [2]. The integration of plants and livestock, based on food crop agriculture, livestock, plantations, fisheries, and forestry, will gradually increase crop production. Additionally, waste processing efforts will be converted into fertiliser and biogas, providing an additional income source for poor groups and communities in the surrounding area [3]. Simantri aims to alleviate poverty, reduce unemployment rates and improve the welfare of farmers and rural communities.

The Simantri livestock farming group, Sekar Pasti Wangi, is located in Petiga Village, Banjar Semingan. Founded in 2016, the group has 20 members and raises 20 head of cattle. The Simantri cattle farmers in the Sekar Pasti Wangi livestock farming group produce cow urine that can be used as liquid fertiliser. The cow dung produced consists of faeces and urine, which can be used as solid and liquid fertilisers. Processing cow dung into fertiliser is beneficial for improving soil fertility, increasing agricultural production, and reducing environmental pollution.

In the previous activity, the Unwar PKM team provided training on making compost (solid). Therefore, in this activity, the PKM team will provide training on making liquid organic fertiliser from cow urine. Liquid waste from cattle farms, in the form of urine that is not utilised correctly, can pollute the environment [4]. The large amount of urine waste produced by livestock farming, if not properly managed, can harm human life. If livestock waste is left untreated, it will continue to cause a decline in environmental quality through environmental pollution that can harm human health [5]. The nutrient content in cow urine is nitrogen (N) 1.00%, phosphorus (P) 0.50% and potassium (K) 1.50% [6]. Liquid organic fertiliser offers several advantages over inorganic fertilisers, including enhanced nutrient absorption for plants, as well as providing a complete range of macro- and micro-nutrients needed for optimal plant growth. Its use has a sustainable and environmentally friendly impact, because it comes from natural sources such as plant or animal waste. Overall, the use of liquid organic fertilisers on the soil is a critical way to encourage healthy plant growth and improve soil health in a sustainable and environmentally friendly way compared to the use of inorganic fertilisers and chemicals.

In addition to the practice of making liquid organic fertiliser, the PKM team will also conduct quality tests on liquid organic fertilisers and test the effectiveness of compost and liquid organic fertilisers on rice plants in Banjar Semingan, Marga. One effort to optimise the growth and productivity of rice plants is by providing organic fertilisers. Providing organic fertilisers to rice plants can improve soil granulation, aeration, and drainage, increase the soil's ability to retain water, enhance the chemical and biological properties of the soil, and does not cause soil and water pollution [7]. The use of organic fertilisers not only adds nutrients but can also maintain soil function, enabling plants to grow well.

Figure 1. Simantri livestock group

1.2. *Objective*

This activity focuses on two main aspects: quality testing and effectiveness testing of solid and liquid organic fertilisers produced from livestock waste.

2. IMPLEMENTATION METHOD

The method for implementing PKM activities will be carried out in several stages using the following methods:

1. Conduct surveys, interviews, and discussions at potential partner locations to assess the partner's situation and identify their specific needs and challenges.
2. Establishing partner locations and creating proposals
3. Face-to-face methods and direct counselling are provided so that partners can know, understand, and master the process of making liquid organic fertiliser, fertiliser quality testing, and testing the effectiveness of organic fertiliser on rice plants.
4. Direct practice guided by instructors who are competent in their fields, so that partners can directly apply the methods provided to livestock.

 https://doi.org/10.29165/ajarcde.v9i3.790

The procedures for PKM activities that will be implemented are:

1. Approaching partners, selecting a location and selecting participants, who will hereinafter be referred to as training participants.
2. Interviews and Q&A sessions regarding the problems faced by partners, as well as planning activities that outline the solution steps to address the encountered issues.
3. Partners will first be provided with materials prepared by the team in the form of modules (leaflets) on the quality of liquid organic fertiliser. The event will continue with the presentation of several tools to support and streamline the production of liquid organic fertiliser.
4. Conduct laboratory testing of liquid organic fertiliser produced by partners.
5. Provide periodic assistance and monitoring during the activity process, as well as evaluate the results.

3. RESULTS AND DISCUSSION

The Warmadewa University Community Partnership Program in Petiga Village, Marga District, facilitated the transfer of appropriate technology for processing livestock waste, including cattle manure and urine. The activity was carried out on June 6, 2025. The livestock group raised 20 cattle with 19 group members. This activity was attended by the group leader, Mr Pasek, and the members were very enthusiastic and satisfied due to the clear presentation of the material, which was accompanied by direct practice in making liquid organic fertiliser from cow urine. The livestock group was trained on how to produce high-quality liquid organic fertiliser from cow urine and received instruction on applying this liquid organic fertiliser directly to plants. Additionally, the Unwar PKM team donated tools and materials to facilitate the activity.

Poultry urine biodiesel is produced through fermentation, utilising microorganisms like bacteria and fungi to accelerate the process, and has been shown to enhance the quality of poultices. Fermentation is the process by which microorganisms break down organic compounds into simpler compounds. Fermentation is all kinds of metabolic processes (enzymes, microorganisms, through oxidation, reduction, hydrolysis, or other chemical reactions) that carry out chemical changes in an organic substrate by producing end products [8]. Fermentation is the anaerobic breakdown of carbohydrates and amino acids, that is, without the need for oxygen. Carbohydrates are initially broken down into glucose units by the amylase and β-glucosidase enzymes. The presence of these enzymes enables starch to be degraded into glucose immediately. Subsequently, the glucose is converted into alcohol by yeast [9].

The fermentation process is typically carried out anaerobically, with the addition of energy sources, such as molasses, to accelerate microbial growth. Optimal fermentation increases the nutrient content of N, P, and K in the POC, thereby stimulating plant growth, stimulating flower and grain formation, and maintaining plant health and freshness. The addition of effective microbes (such as EM4) and energy sources also has a positive effect on cow urine fermentation and improves the quality of the resulting fertiliser [10][11][12].

Liquid organic fertiliser (POC) from cow urine contains various macro and micro nutrients that are essential for plant growth. Cow urine contains approximately 0.098% - 1.4-2.2% nitrogen (N), approximately 0.1% - 0.6-0.7% phosphorus (P), and approximately 0.2% - 1.6-2.1% potassium (K). It also contains approximately 1.1% - 1.46% organic carbon, approximately 166.52 ppm calcium (Ca), 104.61 ppm magnesium (Mg), and several micronutrients such as cobalt (Co), aluminum (Al), iron (Fe), sodium (Na), nickel (Ni), zinc (Zn), and boron (B) in ppm amounts. Cow urine also contains plant hormones, such as auxin (8.61 ppm), cytokinin (5.16 ppm), and gibberellin (2.54 ppm), as well as microorganisms, including phosphate-solubilising bacteria, Lactobacillus, Actinomycetes, and photosynthetic bacteria. The water content of cow urine is around 92% [13][14].

The targets achieved in this activity are

a. Partners understand and master POC creation techniques from 20% to 85%.
b. Partners are also expected to be able to apply POC directly to plants, increasing initial capacity from 40% to 80%.
c. Partners can increase their income by at least 25% by producing POC and reducing the use of chemical fertilisers by replacing them with cow urine POC.
d. This activity can reduce environmental pollution by 95% through the processing of cow urine waste into an organic liquid fertiliser.

Figure 2. Activity Documentation

4. CONCLUSION

This PKM program has been successfully implemented with the primary objective of increasing the community's understanding and skills in processing livestock waste into quality organic fertiliser, as well as testing its effectiveness on plant growth. The targets achieved in this activity are that partners understand and master the technique of making POC from 20% to 85%, partners are also expected to be able to apply POC to plants directly from the initial ability of 40% to 80%, partners can increase income by at least 25% by producing POC and reduce the use of chemical fertilizers by replacing them with POC urine sap. This activity can reduce environmental pollution by 95% from cow urine waste that has been processed into organic liquid fertilizer..

REFERENCE

[1] Bahan pusat statistik kabupaten tabanan 2017. Statistik kesejahteraan rakyat kabupaten tabanan. https: tabanan kab. Bps. Go.id. diakses 16 desember 2018.

[2] Dinas pertanian dan tanaman pangan provinsi bali. 2014. Tentang simantri : Sumber :http ://distamprovinsi bali.com/tentang-simantri. Diakses tanggal : 4 januari 2016.

[3] Anugrah, I.W, S. Sarwoprosodjo, K. Suradisastra, dan N. Purnaningsih. 2014. Sistem pertanian terintegrasi simantri : konsep pelaksanaan dan peranannya dalam program pembangunan di Propinsi. Bali.

[4] Nuraini, Y., dan R. E. Asgianingrum. 2017. Peningkatan Kualitas Biourin Sapi dengan Penambahan Pupuk Hayati dan Molase Serta Pengaruh terhadap Pertumbuhan dan Produksi Pakchoy. J.Hort Indonesia, 8 (3) : 183-19

[5] Rasyid, W. 2017. Kandungan Fosfor (P) Pupuk Organik Cair (POC) Asal Urin Sapi dengan Penambahan Akar Serai (Cymbopogon citratus) Melalui Fermentasi. Skripsi, Universitas Islam Negeri Alauddin Makassar

[6] Yuliarti, Nurheni. 2010. 1001 Cara Menghasilkan Pupuk Organik. Andi Offset. Yogyakarta.

[7] Musnamar, E. I. 2003. Pupuk Organik Padat: Pembuatan dan Aplikasinya. Jakarta: Penebar Swadaya.

[8] Huda, M. K. 2013 Pembuatan Pupuk Organik Cair dari Urin Sapi dengan Aditif Tetes Tebu (Molasses) Metode Fermentasi. Skripsi. Jurusan Kimia Fakultas Matematika Dan Ilmu Pengetahuan Alam Universitas Negeri Semarang.

[9] Affandi. 2008. Pemanfaatan Urine Sapi Yang Difermentasi Sebagai Nutrisi Tanaman. Andi Offset. Yogyakarta

[10] Ilhamiyah, I., A.J. Kirnadi, A. Yanto dan A. Gazali. 2021. Pemanfaatan limbah urine sapi sebagai pupuk orga nik cair (Biourine). Jurnal Pengabdian Al-Ikhlas, 7(1). https://doi.org/10.31602/jpaiuniska.v7i1.5482

[11] Kamaliyah, S.N. dan R.D. Wahyuni. 2023. Effect of EM4 and molase levels on the quality of organic liquid fertiliser of cow urine-based. Jurnal Ilmiah Peternakan Terpadu, 11(3): 190. https://doi.org/10.23960/jipt. v11i3.p190-200

[12] Kamaliyah, S.N. dan R.D. Wahyuni. 2023. Effect of EM4 and molase levels on quality of organic liquid ferti lizer of cow urine based. Jurnal Ilmiah Peternakan Terpadu, 11(3): 190. https://doi.org/10.23960/jipt. v11i3.p190-200

[13] Mustikarini, N., A. Ikaromah, A. Supriyadi, T. A. Nugraha dan N.A. Ma'ruf. 2022. Pengaruh variasi komposisi dekomposer EM4 dan molase pada pembuatan pu puk organik cair dari limbah budidaya lele. Jurnal Pengendalian Pencemaran Lingkungan (JPPL). 4(1): 47-52.

[14] Putra, G. J. K., Y. Setiyo dan I. N. Sucipta. 2022. Penga ruh penambahan bakteri nitrifikasi pada fermentasi urine sapi terhadap kualitas pupuk organik Cair. Jurnal BETA (Biosistem dan Teknik Pertanian). 10(1): 11