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# Application of PoC on Yields in Eggplant Varieties (*Salanum melongena* L)

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A B S T R A C T

This study aimed to evaluate the effect of liquid organic fertilizer (LOF) derived from rabbit urine on the growth and yield of several eggplant (*Solanum melongena* L.) varieties. The experiment was conducted at the Greenhouse of the Faculty of Agriculture, Warmadewa University, from March to November 2025, using a factorial randomized block design with treatments consisting of LOF doses (50–200 ml) and eggplant varieties. Observed parameters included plant height, number of leaves, number of flowers, number of fruits, as well as fresh and dry fruit weight. The results showed that LOF application significantly affected all variables, with the 50 ml + 6 g salt treatment on the green eggplant variety producing the highest growth and yield. These findings highlight the potential of rabbit urine-based LOF as an eco-friendly alternative to improve eggplant productivity.

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## INTRODUCTION

Eggplant (*Solanum melongena* L) is one of the most widely cultivated vegetable crops in Indonesia. It is recognized for its high nutritional content, including bioactive compounds such as proteins, vitamins, minerals, carbohydrates, phenolics, and dry matter. Additionally, eggplant produces secondary metabolites that are beneficial to human health, including glycoalkaloids, antioxidants, and vitamins (Gürbüz et al., 2018). Despite the increase in eggplant production between 2017 and 2018, the supply still does not fully meet market demand. One of the main constraints limiting eggplant yield is the suboptimal cultivation techniques applied by farmers (Mashanda & Tarigan, 2024). Applying liquid organic fertilizer (LOF) at appropriate concentrations is considered an alternative to enhance productivity.

The use of superior varieties is also a key approach to improving eggplant productivity. Improved varieties typically exhibit advantages in terms of adaptability to environmental conditions, resistance to pests and diseases, and higher yield potential (Chapman, 2020; Oladosu et al., 2021). For instance, Ratih Ungu is known for high fruit production and crisp taste, Gelatik is more resistant to bacterial wilt (Setiyabudi et al., 2023), while Mustang is valued for its rapid growth and uniform harvest.

Fertilization is a crucial factor in crop cultivation since it plays a central role in plant growth and development, ultimately determining productivity. Liquid organic fertilizer (LOF) is an innovative approach in sustainable agriculture, containing essential nutrients, natural growth hormones, and beneficial microorganisms that enhance soil fertility and promote plant growth (Li et al., 2022; Gamage et al., 2023). Typically, LOF provides nitrogen (N), phosphorus (P), and potassium (K) as the primary macronutrients, along with calcium (Ca), magnesium (Mg), iron (Fe), and zinc (Zn) as micronutrients that are vital for plant metabolism (Mangera & Ekowati, 2022; Dhaliwal et al., 2024). Moreover, LOF also contains bioactive compounds such as humic acid, fulvic acid, and phytohormones (auxins, cytokinins, and gibberellins), which stimulate root growth, improve nutrient absorption, and accelerate flowering and fruiting. The presence of phosphate-solubilizing and nitrogen-fixing microbes further contributes to enhancing nutrient availability in the soil (Allan, 2024).

Several studies have reported the effectiveness of LOF in improving crop growth and yield. However, its effectiveness may vary depending on plant species and variety. Therefore, further studies are needed to evaluate the effect of LOF application on different eggplant varieties to determine which variety responds optimally. This study aims to investigate the effect of LOF application on the growth and yield of several eggplant varieties and to determine the most responsive variety. The findings are expected to provide a reference for farmers to adopt more efficient, environmentally friendly, and sustainable fertilization strategies to increase eggplant productivity.

## LITERATURE REVIEW

### *Eggplant as a Horticultural Commodity*

Eggplant (Solanum melongena L.) is an important horticultural crop with high nutritional value and bioactive compounds that provide health benefits, including antioxidants and glycoalkaloids (Gürbüz et al., 2018). Its production has increased globally, but challenges such as pest susceptibility and suboptimal cultivation techniques still limit yields (Mashanda & Tarigan, 2024).

### *Role of Superior Varieties*

The use of improved varieties is a key strategy for enhancing productivity and resilience. Superior eggplant varieties exhibit strong adaptability to diverse environments and resistance to major diseases such as bacterial wilt (Oladosu et al., 2021). For example, Ratih Ungu offers high yield and good fruit quality, Gelatik demonstrates greater tolerance to bacterial wilt (Setiyabudi et al., 2023), while Mustang is known for uniform harvests and rapid growth (Chapman, 2020). The choice of variety, therefore, has a significant influence on production outcomes.

### *Importance of Fertilization*

Fertilization plays a central role in crop cultivation, as it directly affects plant growth, biomass, and yield. In sustainable agriculture, liquid organic fertilizer (LOF) has gained increasing attention due to its ability to combine essential nutrients, beneficial microorganisms, and natural growth regulators (Li et al., 2022). Previous studies have demonstrated that LOF can enhance soil fertility, improve nutrient uptake, and support higher productivity across different crops (Gamage et al., 2023).

### *Nutrient Content and Microbial Activity in LOF*

LOF typically contains macronutrients such as nitrogen (N), phosphorus (P), and potassium (K), as well as micronutrients including calcium (Ca), magnesium (Mg), iron (Fe), and zinc (Zn), all of which are critical for plant metabolism (Mangera & Ekowati, 2022). In addition, the presence of humic and fulvic acids, along with phytohormones such as auxins, cytokinins, and gibberellins, stimulates root growth, nutrient absorption, and reproductive development (Dhaliwal et al., 2024). Microbial activity, particularly from phosphate-solubilizing and nitrogen-fixing bacteria, further enhances soil nutrient availability and improves plant performance (Allan, 2024).

### *Previous Findings on LOF in Eggplant Cultivation*

Several studies have confirmed the potential of LOF in supporting eggplant productivity. For example, Abd El-Mageed et al. (2021) demonstrated that organic amendments such as poultry litter biochar could enhance soil quality and increase eggplant yields under different irrigation regimes. Similarly, recent research highlighted that integrating LOF into farming systems reduces reliance on synthetic fertilizers, promotes soil health, and supports long-term sustainability (Haryanta & Widya, 2024). However, responses vary depending

on plant species and variety, underlining the need for targeted studies to identify optimal combinations of LOF doses and eggplant cultivars.

## METODHOLOGY

### *Research Time and Location*

The study was conducted over eight months, from March to November 2025, at the experimental station Greenhouse of the Faculty of Agriculture, Warmadewa University, located on Terompong No. 24, Denpasar, Tanjung Bungkak, Sumerta Village, East Denpasar District, Denpasar City, at an altitude of approximately 20 meters above sea level.

### *Experimental Design and Implementation*

A factorial randomized block design (RBD) was employed, consisting of two factors. The first factor was the concentration of liquid organic fertilizer (LOF), with four treatment levels:

U1 = 50 ml
U2 = 100 ml
U3 = 150 ml
U4 = 200 ml

The second factor was eggplant (Solanum melongena L.) variety, with three treatment levels:

T1 = White eggplant
T2 = Green eggplant
T3 = Purple eggplant

This resulted in 12 treatment combinations, each replicated three times, yielding a total of 36 polybags as experimental units.

1. Observed Variables
   Maximum plant height (cm): Measured from the soil surface to the plant's growing point, starting at 14 days after planting (DAP) until maximum height was reached.
2. Number of fruits per plant (unit): Determined by counting the total fruits produced per plant.
3. Fruit weight per plant (g): Fresh fruit weight recorded at harvest.
4. Dry fruit weight per plant (g): Fruits were oven-dried at 60 °C for 24 hours before weighing.
5. Dry biomass weight (g): Plant biomass was oven-dried at 60 °C for 24 hours before weighing.

### *Data Analysis*

Data obtained were analyzed using analysis of variance (ANOVA) based on the randomized block design. Significant differences among treatments at $p < 0.05$ and $p < 0.01$ were further tested using the Least Significant Difference (LSD) test at the 5% level. When significant interactions between factors were detected, means were compared using Duncan's Multiple Range Test (DMRT).

## RESEARCH RESULTS

### *Plant Height (cm)*

The highest plant height was obtained from treatment U1 (50 ml rabbit urine + 6 g salt on White Eggplant) with an average of 67.8 cm, followed by U3 (15 ml rabbit urine + 6 g salt on White Eggplant) at 67.6 cm, and U2 at 58.5 cm. The lowest result was observed in U4 (20 ml rabbit urine + 6 g salt on White Eggplant), which recorded 56.3 cm. In the Green Eggplant variety, the highest plant height was recorded in U5 (50 ml rabbit urine) at 66.0 cm, whereas the lowest was in U8 (20 ml rabbit urine) at 54.7 cm.

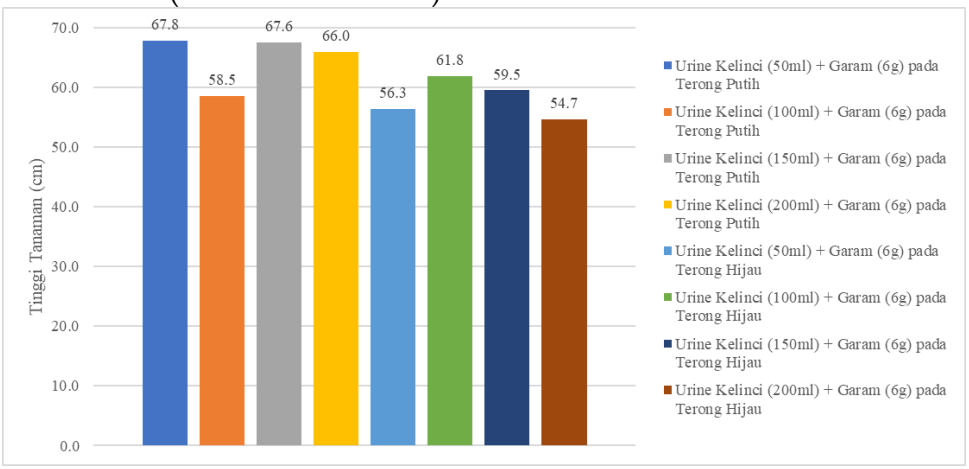


**Figure 1. Interaction Effect of Rabbit Urine + Salt Treatments and Eggplant Varieties on Plant Height**

### *Number of Leaves*

Treatment U1 produced the highest number of leaves (13.67), followed by U3 (13.00). The lowest number of leaves was found in U4 (10.20). On average, the number of leaves in T1 (White Eggplant) and T2 (Green Eggplant) varieties was the same, i.e., 12.58.

**Table 1. Effect of U × T Treatments on the Number of Leaves**

| Treatment | Number of Leaves |
|---|---|
| Treatment U | |
| U1 | 13.67a |
| U2 | 11.67b |
| U3 | 13.00ab |
| U4 | 12.00b |
| LSD 0,05 | 1.05 |
| Treatment T | |
| T1 | 12.58a |
| T2 | 12.58a |
| LSD 0,05 | 0.74 |

***Number of Flowers per Plant***

Treatment U1 produced the highest number of leaves (13.67), followed by U3 (13.00). The lowest number of leaves was found in U4 (10.20). On average, the number of leaves in T1 (White Eggplant) and T2 (Green Eggplant) varieties was the same, i.e., 12.58.

**Tabel 2. Effect of U × T Treatments on the Number of Flowers Per Plant**

| Treatment | Number of Flowers |
|---|---|
| Treatment U | |
| U1 | 26.67a |
| U2 | 25.00a |
| U3 | 23.17a |
| U4 | 23.17a |
| LSD 0,05 | 3.29 |
| Treatment T | |
| T1 | 14.92b |
| T2 | 34.08a |
| LSD 0,05 | 2.32 |

***Number of Fruits Per Plant***

The number of fruits per plant showed that treatment U5 (50 ml rabbit urine + 6 g salt on Green Eggplant) produced the highest fruit number (25 fruits), followed by U7 (24.7 fruits). The lowest results were found in U4 (5.7 fruits) and in U1 and U3 (7.7 fruits). On average, T2 (Green Eggplant) produced more fruits (17 fruits) compared to T1 (White Eggplant) with only 8 fruits.

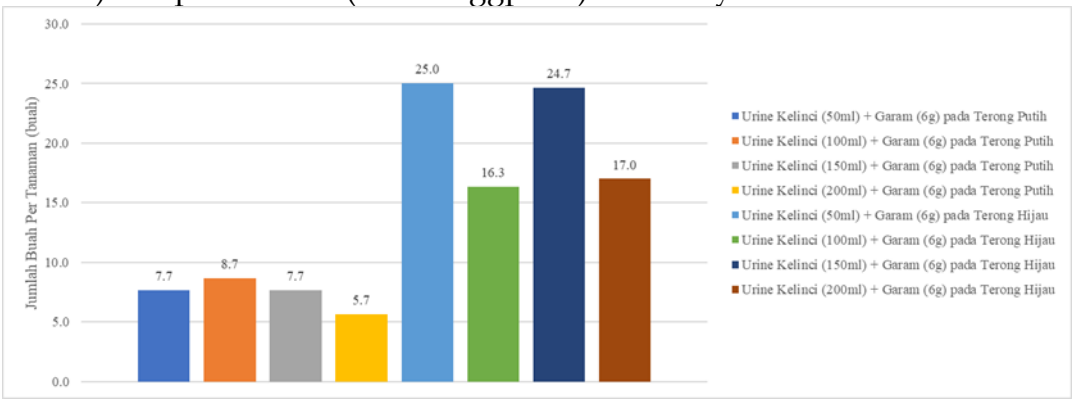


**Figure 2. Interaction Effect of Rabbit Urine + Salt Treatments and Eggplant Varieties on the Number of Fruits Per Plant**

***Fresh Fruit Weight (g)***

The highest fresh fruit weight was obtained from U3 (278.77 g), followed by U1 (273.18 g). The lowest fruit weight was observed in U4 (204.72 g). In terms of variety, T2 (Green Eggplant) produced significantly higher fresh fruit weight (330.87 g) compared to T1 (White Eggplant) with 161.91 g.

**Table 3. Effect of U × T Treatments on Fresh Fruit Weight**

| Treatment | Fresh Fruit Weight (g) |
|---|---|
| Treatment U | |
| U1 | 273.18a |
| U2 | 228.88a |
| U3 | 278.77a |
| U4 | 204.72a |
| LSD 0,05 | 78.85 |
| Treatment T | |
| T1 | 161.91b |
| T2 | 330.87a |
| LSD 0,05 | 96.58 |

## DISCUSSION

The results of this study demonstrated that the application of rabbit urine-based liquid organic fertilizer (LOF) combined with table salt had a significant effect on the growth and yield of eggplant, both in white and green varieties. Treatments U1 and U5 consistently produced the highest results across several parameters, indicating that the combination of 50 ml rabbit urine + 6 g salt was optimal for promoting plant growth and productivity. Increases in plant height and leaf number under these treatments may be attributed to the nitrogen content and beneficial microorganisms in rabbit urine, which enhance plant metabolic activity. This finding aligns with Widiastuti et al. (2021), who reported that urine-based LOF significantly improved plant height and biomass accumulation, and with Leghari et al. (2016), who emphasized the essential role of nitrogen in supporting vegetative growth.

The higher number of flowers and fruits observed in the green eggplant variety compared to the white variety indicates an interaction between variety and LOF treatment. The green variety appeared more responsive to the nutrients and microbial activity provided by LOF. The availability of phosphorus and potassium in rabbit urine also supports flower and fruit formation, as previously reported by Setiyabudi et al. (2023) and Dhaliwal et al. (2024). Furthermore, Abd El-Mageed et al. (2021) found that organic amendments improved soil quality and significantly increased eggplant yield under various irrigation regimes, supporting the present findings that organic inputs are crucial for reproductive development.

Interestingly, the highest fresh fruit weight was recorded in treatment U3, which used a lower dose (15 ml rabbit urine + 6 g salt), suggesting that moderate doses may also yield optimal results in white eggplant. This result is consistent with studies by Haryanta and Widya (2024), who observed that LOF at moderate concentrations could enhance crop productivity without excessive nutrient input.

Overall, the green eggplant variety consistently outperformed the white variety in terms of fruit number and fresh weight, highlighting its greater potential for cultivation under LOF technology. The LSD test confirmed that treatments had a significant effect on all measured variables, reinforcing the effectiveness of rabbit urine-based LOF in enhancing eggplant yield. These findings underscore the importance of selecting the appropriate variety and fertilizer dosage for maximizing productivity in sustainable farming systems (Gamage et al., 2023; Li et al., 2022).

## CONCLUSION AND RECOMMENDATIONS

This study demonstrated that the application of rabbit urine-based liquid organic fertilizer (LOF) significantly enhanced the growth and yield of eggplant (Solanum melongena L.), particularly in the green variety. The combination of 50 ml rabbit urine + 6 g salt (U1 and U5) consistently produced superior results across parameters such as plant height, number of leaves, flowers, and fruits, as well as fresh fruit weight. These findings confirm the role of organic fertilizers as sustainable alternatives to chemical fertilizers, aligning with previous research emphasizing their contribution to soil fertility, nutrient cycling, and crop productivity. The green eggplant variety showed higher responsiveness to LOF compared to the white variety, suggesting that varietal selection is an important factor when applying organic inputs. This highlights the need for farmers to integrate superior varieties with optimized LOF dosages to achieve maximum productivity while maintaining environmental sustainability. Based on these results, it is recommended that farmers adopt rabbit urine-based LOF at an optimal dosage of around 50 ml combined with 6 g of salt for improved eggplant cultivation. Further studies should be conducted to evaluate LOF application under field conditions, with a focus on long-term soil health, microbial activity, and economic feasibility. Such research would strengthen the role of organic fertilizers in supporting eco-friendly and climate-smart agricultural systems.

## ADVANCED RESEARCH

The medium-term research plan through 2027 will focus on the sustainable development of liquid organic fertilizer (LOF) applications on different eggplant (Solanum melongena L.) varieties. In the first year (2023), preliminary trials were conducted to evaluate the effect of LOF dosages on the early growth of eggplant. The study was carried out using a factorial experimental method with a randomized block design (RBD). The main objective of this initial stage was to determine the optimal dosage that supports the best early growth performance in selected varieties.

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