

Interactive Effects of Multi-Source Liquid Organic Fertilizer And Goat Manure Dosage On Growth And Yield of Purple Eggplant (*Solanum melongena* L.)

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Abstract

Background: Declining purple eggplant (*Solanum melongena* L.) production associated with soil degradation from excessive inorganic fertilizer use may be mitigated through organic-waste-derived liquid organic fertilizer (LOF) and goat manure to improve soil fertility and reduce dependence on chemical fertilizers. This study aimed to determine the effects of combining LOF concentration and goat manure dosage on the growth quality of purple eggplant. **Methodology:** A factorial experiment was conducted using a Completely Randomized Design with two factors. The first factor was LOF concentration derived from banana peels, moringa leaves, onion peels, and tofu pulp, consisting of NPK as the control and LOF at 100, 150, and 200 mL L⁻¹. The second factor was goat manure dosage consisting of soil as the control and 700, 900, and 1,100 g plant⁻¹. Data were analyzed using ANOVA, followed by the 5% HSD test. **Findings:** The NPK control produced higher values for several growth and yield parameters. However, the combination of LOF 200 mL L⁻¹ and goat manure 900 g plant⁻¹ significantly increased plant height and leaf number, reaching 79.70 cm and 50.78 leaves, respectively. Among organic treatments, LOF 150 mL L⁻¹ produced the highest fruit number (2.58 fruits plant⁻¹) and total fruit weight (353.67 g plant⁻¹). Goat manure at 900 g plant⁻¹ produced the highest fruit number (4.50 fruits plant⁻¹), whereas 1,100 g plant⁻¹ produced the highest total fruit weight (683.89 g plant⁻¹). The combination of LOF 150 mL L⁻¹ and goat manure 900 g plant⁻¹ produced the best response for fruit sweetness. **Contributions:** The findings support the potential of organic-waste-derived LOF combined with goat manure as an alternative nutrient management strategy for improving purple eggplant quality while reducing reliance on inorganic fertilizers.

Keywords: Banana Peels; Liquid Organic Fertilizer; Moringa Leaves; Onion Peels; Tofu Pulp



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INTRODUCTION

Purple eggplant (*Solanum melongena* L.) is one of the important horticultural commodities in Indonesia with high economic and nutritional value. The fruit contains anthocyanins, dietary fiber, vitamin C, and minerals that are beneficial to human health. As an important vegetable commodity, maintaining stable eggplant production is necessary to support the availability of horticultural products and farmer income. According to [BPS \(2024\)](#), eggplant production in Indonesia decreased from 699,896 tons in 2023 to 676,712 tons in 2024, representing a decrease of 23,184 tons (3.31%). This decline indicates the need for improved cultivation practices, particularly nutrient management, to maintain and increase eggplant productivity ([Purba et al., 2019](#)).

Eggplant productivity is influenced by various factors, including soil fertility, nutrient availability, water management, climate, varieties, and cultivation practices. Among these factors, nutrient management is an important component because continuous and excessive application of inorganic fertilizers may contribute to nutrient imbalance and deterioration of soil quality. Long-term excessive use of inorganic fertilizers can affect soil chemical and biological properties and reduce the efficiency of nutrient utilization ([Halawa et al., 2025](#)). Therefore, the use of organic fertilizers as a complementary nutrient source is increasingly relevant to maintain soil fertility while supplying nutrients required for plant growth ([Yulaikha et al., 2025](#)).

Previous studies [Haryanta & Widya \(2024\)](#), reported that the type and application method of LOF affected eggplant production, with LOF application through watering producing higher fruit number and fruit weight than foliar application. Research using moringa-leaf LOF and goat manure as part of the growing medium also showed significant responses in several growth and yield parameters of eggplant ([Shidqii et al., 2023](#)). In another study, the combination of goat manure and eggshell LOF significantly affected flowering and yield parameters, with 300 g/polybag goat manure combined with 450 ml/L LOF producing the best response ([Suhastyo & Raditya, 2021](#)). More recently ([Pranoto et al., 2025](#)), evaluated goat manure combined with different LOF sources and found that 1,000 g/plant goat manure combined with banana-peel LOF produced the best response among the organic fertilizer combinations, including 11.72 fruits and 1,635.94 g total fruit weight per plant.

Previous studies have demonstrated the potential of LOF and goat manure to improve eggplant growth and yield, however, most studies have evaluated single-source LOF or different combinations of LOF and goat manure with varying application rates. Limited information is available regarding the interaction between a multi-source LOF formulated from banana peels, moringa leaves, onion peels, and tofu pulp and different goat manure doses in purple eggplant. This combination is relevant because goat manure can provide nutrients gradually while improving the physical and biological conditions of the growing medium ([Badar et al., 2021](#)). Whereas LOF can provide supplementary nutrients that are more readily available during crop growth ([I'thisom et al., 2023](#)). However, the effectiveness of this combination depends on the appropriate balance between LOF and goat manure, excessive application may result in inefficient nutrient use or nutrient imbalance, while insufficient application may not adequately meet crop nutrient requirements.

Sustainable agriculture is an agricultural production approach that aims to meet current food needs without compromising the ability of future generations to meet their needs. This approach can improve the productivity and quality of purple eggplant while contributing to environmental conservation and the sustainability of agricultural systems (Gulo et al., 2024). Therefore, the application of goat manure in a sustainable manner is important for maintaining soil fertility and supporting increased crop productivity (Abdulah & Syakur, 2022).

The advantage of the material for making Liquid Organic Fertilizer (LOF) is that household organic waste is easy to find and very abundant availability. These four ingredients contain various macro and micro nutrients that plants need to support growth and production. Moringa leaves contain 0.96% nitrogen nutrients that support the growth of the vegetative phase (Tomia & Pelia, 2021), while tofu pulp is a source of organic nitrogen rich in phosphorus by 5.54% (Jupry & Kurnia, 2020). Banana peels are rich in potassium by 0.88% which plays a role in the formation of flowers and fruits (Suryani et al., 2024), while onion peels contain phosphorus by 1.45% as antioxidant and mineral compounds that support plant health (Ernis et al., 2023).

The combination of these four ingredients has the potential to produce LOF that is not only able to increase the availability of nutrients for plants, but also support the sustainable use of organic waste, thereby reducing dependence on inorganic fertilizers and supporting environmentally friendly agricultural systems. Based on the description above, this study examined the interactive effects of multi-source LOF concentration and goat manure dosage on the growth and yield of purple eggplant plants.

METHOD

Research Methods

This research was conducted from January-March 2026. This research took place on Jl. Ketintang Madya VII, Karah Village, Jambangan District, Surabaya, East Jawa (7°19'12,34" LS dan 112°43'16,69" BT). This land is under the auspices of the Dinas Ketahanan Pangan dan Pertanian (DKPP) Surabaya City. The research location is located at 3-6 meters above sea level which has a temperature between 28°C-32°C and humidity between 62%-80% with rainfall of 177 mm/year. The tools used in this study include hand sprayers, hoes, 40 x 40 cm polybags, scissors, seedling trays, plastic drums, knives, blenders, mixing tools, measuring cups, strainers, meters, name labels, digital scales, analytical scales, calipers, and paper. The materials used include seeds from east west seed Yuvita F1 variety, soil, compost, goat manure, banana peels, moringa leaves, tofu pulp and onion peels, molasses solution of molasses molasses, EM4 solution, NPK Mutiara fertilizer 16-16-16, water, pesticide and fungicide.

This study was conducted using a 4 × 4 factorial experiment arranged in a Completely Randomized Design. The treatment details are presented in Table 1. The combination of these two factors resulted in 16 treatment units that were repeated 3 times to obtain 48 unit and had 3 plant samples so that there were a total of 144 plants.

Table 1. Combination of Liquid Organic Fertilizer (LOF) Concentrate Treatments and Goat Manure Dosages

Concentration of LOF	Goat Manure Dosage
NPK 16:16:16 (Control)	Soil (Control)
LOF 100 ml/L	Goat Manure 700 g/plant
LOF 150 ml/L	Goat Manure 900 g/plant
LOF 200 ml/L	Goat Manure 1.100 g/plant

LOF Analysis

Liquid organic fertilizer (LOF) was tested at the BRMP Aneka Kacang, Malang laboratory with the reading method using spectrophotometry. Liquid organic fertilizer (LOF) content analysis of moringa leaves, banana peels, tofu pulp and onion peels revealed a pH content of 6.4 as a Neutral pH. According to (Siswanto, 2006), the nutrient status of soil and organic fertilizers can be classified based on specific nutrient-content criteria. Based on this classification, C-Organic content is 0.57% (very low), the total nitrogen content (N-Total) reaches 0.45% (moderate), the available phosphorus content (p-available) is 0.03% (very low), while the available potassium content (K-available) reaches 0.96% (high).

Research Procedure

Planting

Purple eggplant is planted in polybags including soil and compost using a 1:1 volume ratio and the addition of goat manure according to the predetermined treatment dose. Sowing of Yuvita F1 seeds is carried out on a seedling tray using soil and compost media 1:1 and placing the seeds in holes with a depth of 0.5 cm. The seedlings have 3-4 leaves, the seedlings are ready to be transplanted into polybags with a depth of 3-4 cm and each polybag contains one purple eggplant seedling.

Preparation for the manufacture of liquid organic fertilizer

The preparation of the ingredients used in the manufacture of LOF begins with preparing 10 kg of moringa leaves and 10 kg of banana peels that have been cut into small pieces than blended until smooth, then preparing 6 kg of tofu pulp, and 4 kg of onion peels. The mixture was placed in a bottle with 30 liters of water, 900 ml of EM4 and 1,320 ml of molasses. All of these ingredients are put into each bottle and fermented for 21 days to ensure the fermentation process is complete and ready to be applied. The mixture was fermented for 21 days in a location protected from direct sunlight. The accumulated gas was released from the container daily during the fermentation process until the LOF was ready for application. The fermentation process yielded 32 liters of liquid organic fertilizer.

Plant Maintenance

Plant maintenance includes watering, weeding weeds, installing of plant supports, fertilizing, weeding and pest and disease control. Watering is carried out in the morning or evening. Weeding is carried out by pulling out weeds that grow in polybags. The installation of the bamboo is carried out at the beginning of transplanting. NPK fertilizer was applied only to the NPK control treatment (P0) by

dissolving it in water before application. The initial application was carried out at 7 days after planting (DAP) at a dose of 7.5 g per plant, followed by subsequent applications at 7-day intervals at a dose of 2.25 g per plant.

LOF was applied to the respective treatment concentrations of 100, 150, and 200 mL/L from 14 to 77 DAP at 7-day intervals. The application volume was adjusted according to plant age to accommodate the increasing water and nutrient requirements of the plants. A volume of 100 mL of LOF solution per plant was applied at 14 and 21 DAP, followed by 200 mL per plant from 28 to 77 DAP. Thus, the LOF concentration remained according to the assigned treatment throughout the experimental period, while the volume of application per plant was increased as the plants developed. Pruning is carried out by regularly pruning branches that grow in the leaf armpits. Pest and disease control is carried out by alternately spraying insecticides and fungicides at a dosage of 1 ml/L, with the addition of an adhesive at 7 day intervals.

Data analysis

Observation parameters in the vegetative phase include plant height (cm) and number of leaves (strands). Parameters in the generative phase include Total number of fruits per plant (fruit) and total weight of fruit per plant (g). The data can be analyzed with ANOVA statistic, if analysis results show a real differences, then the test is continue use the Honestly Significant Difference (HSD) test 5%.

RESULT AND DISCUSSION

Plant Height (cm)

Plant height of purple eggplant is measured with intervals of 1 week. Figure 1 shows the trend of plant height at ages 49 to 77 DAP. Based on figure 1, it shows the combination of LOF concentration with goat fertilizer at the entire observation age. At the age of 77 DAP, the combination of liquid organic fertilizer 200 ml/L and a dose of goat manure 900 g/plant yielded the highest organic value of 79.70 cm. The combination not really different of liquid organic fertilizer 200 ml/L and the dose of goat manure 700 g/plant at 71.80 cm and the dose of goat manure of 1,100 g/plant at 75.98 cm. But, when compared to inorganic fertilizers, the combination of NPK 16:16:16 and goat manure dose of 700 g/plant resulted in the highest plant height among organic treatments of 99.59 cm.

The NPK 16:16:16 control treatment gave the highest overall crop yield. This is in accordance with research ([Hendri et al., 2016](#)), that the application of NPK 16:16:16 fertilizer with the right dose is able to increase the productive capacity of the soil so that it can effect the growth of the vegetative phase. However. in the application of LOF, the LOF concentration 200 ml/L resulted in the highest average plant height compared to the LOF concentration 100 ml/L and the LOF concentration 150 ml/L. The difference in plant height was influenced by various macro and micro nutrient concentrations that varied in LOF ([Putri, 2023](#)). It is suspected that the application of different concentrations of LOF to each plant can have a high growth impact on different plants. Liquid organic fertilizers also provide nutrients quickly available to support early vegetative growth ([Makmur & Karim, 2020](#)).

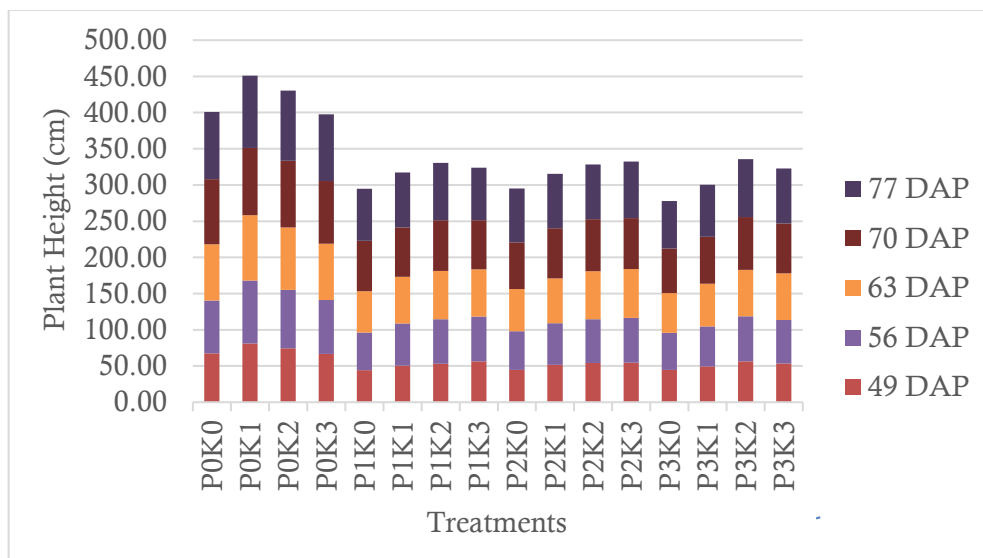


Figure 1. Chart of Purple Eggplant Plant Height

Notes: P₀: NPK 16:16:16 (Control); P₁: LOF Concentration 100 ml/L; P₂: LOF Concentration 150 ml/L; P₃: LOF Concentration 200 ml/L; K₀: Soil (Control); K₁: GMD 700 g/plant; K₂: GMD 900 g/plant; K₃: GMD 1.100 g/plant

The goat manure dosage of 900 g/plant is able to show the best crop yield at the plant height parameters. The dose has the availability of nutrients that are in a balanced and optimal condition to support the high growth of purple eggplant plants. According to [Wahyudi et al., \(2019\)](#), that goat manure provides sustainable nutrition and enhances the physical, chemical, and biological properties of the soil and goat manure has a higher nitrogen and potassium content than other animal manure ([Khumaeroh & Aprilia, 2025](#)). This is supported by research ([Afrina et al., 2023](#)), that nitrogen plays an important role in the synthesis of chlorophyll and the increase of plant photosynthetic activity.

Although organic treatment showed a fairly good increase in plant height, the yield was still lower than that of NPK treatment. This is suspected because the nutrients in organic fertilizers must undergo a decomposition and mineralization process first before they can be absorbed by plants. According to research [Azahra et al, \(2021\)](#), the release of nutrients from organic matter takes place gradually and is greatly influenced by environmental conditions such as soil temperature and humidity. Therefore, the availability of nutrients from organic fertilizers tends to be slower than inorganic fertilizers that can be directly utilized by plants. According to [Ramadhan & Sabli \(2024\)](#), The concentration of LOF 150 ml/L is able to increase the need for nitrogen in plants so that plant growth is better. The elements nitrogen, phosphorus, and potassium present in LOF function important in supporting the vegetative and generative phases of plants. Applying LOF with appropriate concentrations can increase the activity of soil microorganisms and be able to improve the efficiency of nutrient absorption in plants ([Ibrahim & Tanaiyo, 2018](#)).

Table 2. Average Plant Height in the Combination of LOF Concentration and Goat Manure Dosage 49-77 DAP

Age	LOF Concentration (ml/L)	Plant Height (cm)			
		Goat Manure Dosage (g/plant)			
		Control (Soil)	700 g/plant	900 g/plant	1.100 g/plant
49 DAP	Control (NPK)	67.30 ± 2.74 b	80.98 ± 6.83 c	74.37 ± 4.54 bc	66.78 ± 6.89 b
	LOF 100 ml/L	44.41 ± 1.88 a	50.49 ± 5.95 a	53.16 ± 1.42 a	56.38 ± 6.68 ab
	LOF 150 ml/L	44.44 ± 2.70 a	51.48 ± 1.99 a	54.13 ± 4.75 ab	54.54 ± 0.87 ab
	LOF 200 ml/L	44.79 ± 1.18 a	49.24 ± 4.70 a	56.39 ± 4.19 ab	53.61 ± 5.14 ab
	HSD 5%	13.39			
56 DAP	Coefficient of Variance	7.80 %			
	Control (NPK)	73.12±3.02 b	86.99±6.17 c	80.88 ± 3.17 bc	74.20 ± 5.11 b
	LOF 100 ml/L	51.65±3.33 a	58.38±5.11 a	61.59 ± 2.09 ab	61.90 ± 3.19 ab
	LOF 150 ml/L	53.48±2.89 a	57.63±2.81 a	60.66 ± 5.29 a	61.96 ± 2.30 ab
	LOF 200 ml/L	50.96±1.75 a	55.27±3.54 a	62.36 ± 4.78 ab	60.04 ± 5.28 a
63 DAP	HSD 5%	13.39			
	Coefficient of Variance	6.27 %			
	Control (NPK)	77.80 ± 2.88 bc	90.17 ± 3.48 c	86.18 ± 1.48 c	77.94 ± 1.47 bc
	LOF 100 ml/L	57.37 ± 3.24 ab	64.30 ± 6.06 ab	66.59 ± 1.62 ab	65.21 ± 2.64 ab
	LOF 150 ml/L	58.39 ± 2.15 ab	61.74 ± 3.53 ab	66.22 ± 5.95 ab	67.47 ± 2.18 b
70 DAP	LOF 200 ml/L	54.85 ± 2.52 a	59.07 ± 4.88 ab	64.04 ± 6.87 ab	64.18 ± 5.32 ab
	HSD 5%	11.90			
	Coefficient of Variance	5.78 %			
	Control (NPK)	89.79 ± 1.70 c	93.16 ± 3.39 c	91.86 ± 1.05 c	86.46 ± 5.06 c
	LOF 100 ml/L	69.61 ± 0.54 ab	68.30 ± 4.39 ab	70.12 ± 1.74 ab	67.73 ± 2.86 ab
70 DAP	LOF 150 ml/L	64.34 ± 1.66 ab	69.52 ± 3.31 ab	71.65 ± 5.37 b	70.35 ± 0.84 ab
	LOF 200 ml/L	61.53 ± 0.42 a	64.87 ± 4.01 ab	73.08 ± 2.98 b	68.96 ± 5.50 ab
	HSD 5%	9.93			
	Coefficient of Variance	4.42%			

Age	LOF Concentration (ml/L)	Plant Height (cm)			
		Goat Manure Dosage (g/plant)			
		Control (Soil)	700 g/plant	900 g/plant	1.100 g/plant
77 DAP	Control (NPK)	93.02±2.86 c	99.59±2.23 c	97.19±1.20 c	92.07±5.08 c
	LOF 100 ml/L	71.91 ± 1.47 ab	75.92 ± 4.07 ab	79.21 ± 4.05 b	72.80 ± 3.70 ab
	LOF 150 ml/L	74.36 ± 0.96 ab	74.91 ± 2.26 ab	75.76 ± 5.73 ab	78.00 ± 3.51 b
	LOF 200 ml/L	65.86 ± 4.99 ab	71.80 ± 2.92 ab	79.70 ± 4.72 b	75.98 ± 4.55 ab
HSD 5%		11.20			
Coefficient of Variance		4.61 %			

Notes: Numbers followed by the same letter at the same age of observation showed no significant difference in the HSD 5% test.

Number of Leaves (Strands)

Number of leaves purple eggplant is measured with intervals of 1 week by counting the leaves that have opened perfectly. Figure 2 illustrates the development of leaf number from 35 to 77 days after planting. Based on the data presented in Figure 2, different combinations of liquid organic fertilizer concentrations and goat manure doses influenced leaf production throughout the observation period. At 77 DAP, the highest leaf number among the organic treatments was recorded in the combination of LOF at 200 ml/L and goat manure at 900 g/plant, reaching 50.78 leaves. This result was statistically similar to the combinations of LOF at 200 ml/L with goat manure doses of 700 g/plant and 1,100 g/plant, which produced 44.11 and 47.22 leaves, respectively. Nevertheless, the greatest overall leaf number was obtained from the chemical fertilizer treatment, where NPK 16:16:16 combined with 700 g/plant of goat manure produced 66.44 leaves.

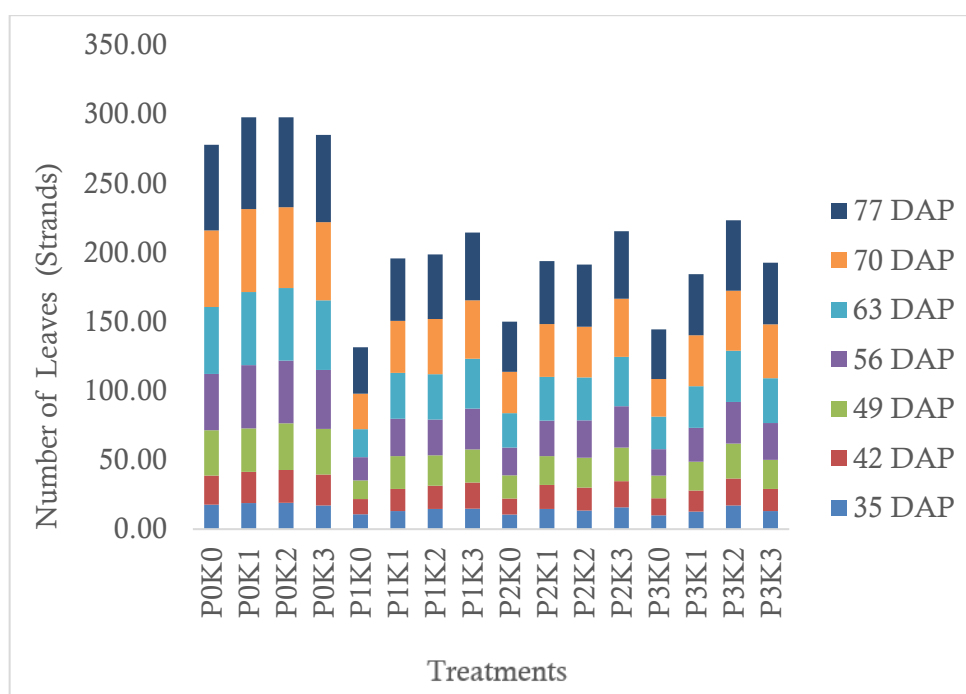


Figure 2. Chart of the number of Purple Eggplant Leaf

Notes: P₀: NPK 16:16:16 (Control); P₁: LOF Concentration 100 ml/L; P₂: LOF Concentration 150 ml/L; P₃: LOF Concentration 200 ml/L; K₀: Soil (Control); K₁: GMD 700 g/plant; K₂: GMD 900 g/plant; K₃: GMD 1.100 g/plant

Table 3. Average Number of Leaves in the Combination of LOF Concentration and Goat Manure Dosage 35-77 DAP

Age	LOF Concentration (ml/L)	Number of Leaves (Strands)			
		Goat Manure Dosage (g/plant)			
		Control (Soil)	700 g/plant	900 g/plant	1.100 g/plant
35 DAP	Control (NPK)	17.67 ± 1.00 b	18.78 ± 1.26 b	19.00 ± 1.53 b	17.22 ± 2.87 b
	LOF 100 ml/L	10.78 ± 1.64 ab	13.11 ± 0.38 ab	14.56 ± 0.84 ab	14.89 ± 0.38 ab
	LOF 150 ml/L	10.56 ± 1.58 a	14.67 ± 1.86 ab	13.56 ± 0.84 ab	15.78 ± 0.96 b
	LOF 200 ml/L	10.00 ± 0.88 a	12.67 ± 0.33 ab	17.22 ± 3.34 b	13.00 ± 2.65 ab
	HSD 5%	5.02			
Coefficient of Variance		11.30 %			
42 DAP	Control (NPK)	21.11 ± 1.39 c	22.56 ± 0.51 c	23.78 ± 0.51 c	22.33 ± 3.21 c
	LOF 100 ml/L	10.89 ± 0.19 a	15.89 ± 0.51 b	16.89 ± 1.07 bc	18.89 ± 0.51 bc
	LOF 150 ml/L	11.56 ± 0.96 ab	17.22 ± 1.50 bc	16.56 ± 1.68 bc	18.89 ± 1.84 bc
	LOF 200 ml/L	11.11 ± 1.19 a	15.22 ± 0.69 ab	19.44 ± 2.04 bc	16.11 ± 3.02 b
	HSD 5%	4.75			
Coefficient of Variance		8.94 %			
49 DAP	Control (NPK)	28.33 ± 2.59 c	31.44 ± 1.92 c	33.67 ± 0.88 c	32.89 ± 2.41 c
	LOF 100 ml/L	15.67 ± 1.02 a	23.78 ± 1.64 bc	21.89 ± 0.51 b	23.89 ± 1.26 bc
	LOF 150 ml/L	16.89 ± 1.07 ab	20.89 ± 2.99 ab	21.44 ± 3.10 ab	24.33 ± 2.52 bc
	LOF 200 ml/L	16.11 ± 0.90 ab	20.78 ± 1.39 ab	25.22 ± 0.69 bc	21.00 ± 3.18 ab
	HSD 5%	5.99			
Coefficient of Variance		8.27 %			
56 DAP	Control (NPK)	40.78 ± 1.64 c	45.78 ± 3.56 c	45.44 ± 3.95 c	42.56 ± 1.50 c
	LOF 100 ml/L	18.89 ± 2.27 a	27.00 ± 2.03 b	25.89 ± 0.38 b	29.56 ± 0.51 b
	LOF 150 ml/L	20.00 ± 0.88 ab	25.67 ± 1.33 ab	25.67 ± 3.75 ab	29.89 ± 3.36 b
	LOF 200 ml/L	19.22 ± 0.96 ab	24.67 ± 1.76 ab	30.11 ± 2.17 b	26.56 ± 2.17 b
	HSD 5%	6.98			
Coefficient of Variance		7.69 %			

Age	LOF Concentration (ml/L)	Number of Leaves (Strands)			
		Goat Manure Dosage (g/plant)			
		Control (Soil)	700 g/plant	900 g/plant	1.100 g/plant
63 DAP	Control (NPK)	48.33 ± 2.00 c	52.78 ± 4.22 c	52.33 ± 3.79 c	50.33 ± 2.91 c
	LOF 100 ml/L	22.33 ± 0.85 a	33.22 ± 1.92 b	36.89 ± 1.64 b	32.44 ± 0.19 b
	LOF 150 ml/L	23.22 ± 1.07 ab	31.56 ± 1.26 b	31.00 ± 3.61 b	35.67 ± 4.48 b
	LOF 200 ml/L	23.44 ± 1.07 ab	30.00 ± 2.65 ab	36.89 ± 2.17 b	32.44 ± 2.83 b
	HSD 5%	7.92			
	Coefficient of Variance	7.29 %			
70 DAP	Control (NPK)	55.33 ± 2.52 c	60.00 ± 3.48 c	58.44 ± 4.35 c	56.67 ± 3.61 c
	LOF 100 ml/L	25.67 ± 0.88 a	37.67 ± 2.85 b	39.89 ± 1.90 b	42.22 ± 0.69 b
	LOF 150 ml/L	28.78 ± 1.65 ab	38.22 ± 0.84 b	36.67 ± 3.79 b	42.11 ± 3.75 b
	LOF 200 ml/L	28.11 ± 0.98 a	36.89 ± 2.79 b	43.56 ± 2.14 b	39.00 ± 3.33 b
	HSD 5%	8.32			
	Coefficient of Variance	6.53 %			
77 DAP	Control (NPK)	61.89 ± 2.17 c	66.44 ± 3.10 c	65.11 ± 4.29 c	62.89 ± 2.79 c
	LOF 100 ml/L	33.44 ± 1.02 a	45.11± 2.37 b	46.78 ± 2.04 b	49.11 ± 0.51 b
	LOF 150 ml/L	36.22 ± 2.80 ab	45.56 ± 0.77 b	43.56 ± 2.93 b	48.78 ± 3.42 b
	LOF 200 ml/L	35.89 ± 0.96 ab	44.11 ± 2.22 b	50.78 ± 1.95 b	47.22 ± 3.54 b
	HSD 5%	11.20			
	Coefficient of Variance	4.61 %			
Notes:	Numbers followed by the same letter at the same age of observation showed no significant difference in the HSD 5% test.				

Table 3 shows that the combination of the 16:16:16 NPK control treatment and the goat manure dose of 700 g/plant yielded the most overall leaf count. This is because the provision of NPK fertilizer and goat manure with sufficient doses for the needs of purple eggplant plants is able to support optimal plant growth in the vegetative phase. This is in line with (Saraswati et al., 2023) and (Fadlilah, 2022), these results indicate that the use of 30 g/plant NPK fertilizer in combination with 700 g/plant goat manure created favorable nutrient conditions, enabling plants to absorb nutrients effectively and fulfill their growth needs of the vegetative phase. Macronutrients have an important function in the process of photosynthesis so that the number of leaves increases (Rajiman, 2019). Inorganic fertilizers are able to provide large amounts of nutrients in a short time. However, the use of inorganic fertilizers is not environmentally friendly if used in the long term (Lestari et al., 2025).

The combination of liquid organic fertilizer (LOF) at a concentration of 200 ml/L and goat manure at a rate of 900 g/plant produced the highest leaf number among the organic-based treatments. This finding indicates that organic fertilization can supply sufficient nutrients to support vegetative growth, although nutrient release generally occurs at a slower rate than that of inorganic fertilizers. According to (Prihatini et al., 2023), organic fertilizers contribute to the improvement of soil physical properties by enhancing soil structure, stimulating microbial activity, and increasing water retention capacity. The preservation of organic matter in soil is favored by a slow rate of decomposition (Karomah, 2022). However, because the decomposition of organic residues is strongly regulated by soil temperature and moisture conditions, nutrient mineralization may occur when crop nutrient requirements are low (Prasetyo & Evizal, 2021). These improvements create favorable conditions for root development and nutrient uptake. However, the effect of organic fertilizers on the productivity of purple eggplant tends to be limited due to their relatively low concentrations of essential macro- and micronutrients. Despite this limitation, organic fertilizers offer environmental benefits and help maintain soil fertility, thereby supporting sustainable plant growth over the long term.

Total Number of Fruits Per Plant (Fruit)

The total fruits produced per plant were obtained by accumulating all harvested fruits from the first until the fifth harvest week. Figure 3 depicts the changes in the total number of fruits per plant during the entire observation period. Based on figure 3, showed that the combination of LOF concentration and goat manure dose showed no real interaction with this parameters. Nonetheless, the two single factors show a very real influence on the parameters of the total number of fruits per plant. The total number of fruits per plant in the liquid organic fertilizer (LOF) concentration 150 ml/L resulted in the highest organic value of 2.58 fruits which did not differ significantly from the concentration of LOF 100 ml/L at 2.53 fruits and the concentration of LOF 200 ml/L at 2.44 fruits. However, the NPK control produced the most overall average number of fruits per plant, which was 7.89 fruits. The total number of fruits per plant in the goat manure dosage of 900 g/plant yielded the highest organic value of 4.50

fruits which differed significantly from the goat manure dose of 700 g/plant at 3.83 fruits.

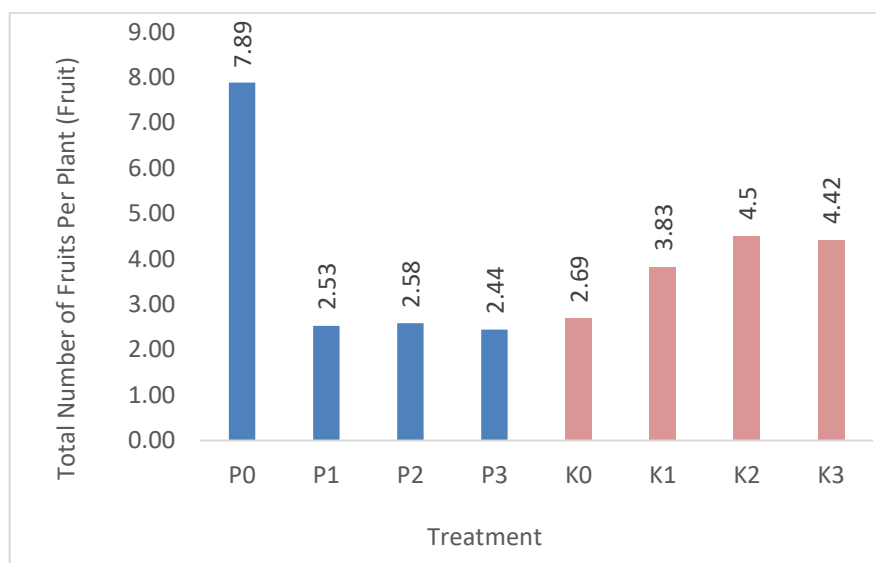


Figure 3. Chart of Total Number of Fruits per Purple Eggplant

Notes: P₀: NPK 16:16:16 (Control); P₁: LOF Concentration 100 ml/L; P₂: LOF Concentration 150 ml/L; P₃: LOF Concentration 200 ml/L; K₀: Soil(Control); K₁: GMD 700 g/plant; K₂: GMD 900 g/plant; K₃: GMD 1.100 g/plant

Table 4. Average Total Number of Fruits per Plant in LOF Concentration and Goat Manure Dosage

Treatment	Total Number of Fruits per Plant (Fruit)
LOF Concentration (ml/L)	
Control (NPK)	7.89 ± 1.01 b
LOF 100 ml/L	2.53 ± 0.77 a
LOF 150 ml/L	2.58 ± 0.84 a
LOF 200 ml/L	2.44 ± 1.04 a
HSD 5%	0.65
Coefficient of Variance	15.25%
Goat Manure Dosage (g/plant)	
Control (Soil)	2.69 ± 2.73 a
700 g/plant	3.83 ± 2.72 b
900 g/plant	4.50 ± 3.16 c
1.100 g/plant	4.42 ± 2.17 bc
HSD 5%	0.65
Coefficient of Variance	15.25%

Notes: Numbers followed by the same letter at the same treatment showed no significant difference in the HSD 5% test.

Table 4 shows that the average total number of fruits per plant yielded the highest overall value in the 16:16:16 NPK control treatment. NPK elements have an important role in supporting the flowering process, fruit formation, and fruit filling. The optimal

availability of nutrients from NPK fertilizer allows the photosynthesis process to take place more efficiently resulting in more photosynthate that can be allocated for fruit formation and development (Fitrianti et al., 2018). Meanwhile, the application of liquid organic fertilizer (LOF) at a concentration of 150 ml/L resulted in the highest fruit number under the organic cultivation system, with an average of 2.58 fruits per plant. According to (Ramadhan & Sabli, 2024), this concentration is capable of supplying sufficient nutrients, particularly N, P, and K, thereby supporting the generative development of plants. However, because the nutrients in organic fertilizers generally require a mineralization process before they can be absorbed by plants, their availability is slower than that of inorganic fertilizers (Prasetyo & Evizal, 2021). This condition causes the nutritional needs during the flowering and fruit formation phases to not be met optimally so that the amount of fruit produced is lower than that of inorganic fertilizers. In addition, when plants get a sufficient supply of nutrients NPK from goat manure in the metabolic process, especially photosynthesis, it will run optimally. The content of these nutrients is able to increase the ability of plants to produce assimilates in large quantities. These conditions support the formation of flowers that develop into fruits so that the number of fruits per plant increases (Fathin et al., 2019).

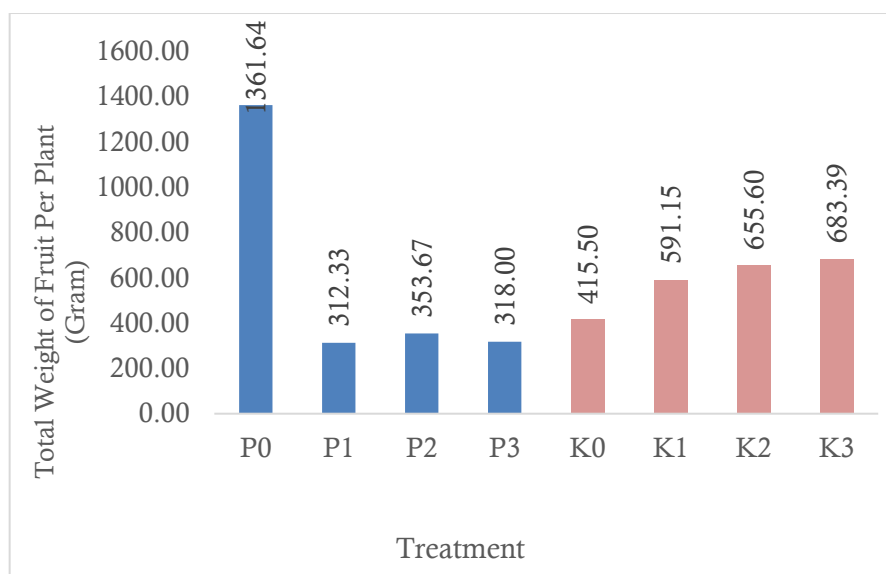


Figure 4. Chart of Total Fruit Weight per Purple Eggplant

Notes: P₀ : NPK 16:16:16 (Control); P₁ : LOF Concentration 100 ml/L; P₂ : LOF Concentration 150 ml/L; P₃ : LOF Concentration 200 ml/L; K₀ : Soil (Control); K₁ : GMD 700 g/plant; K₂ : GMD 900 g/plant; K₃ : GMD 1.100 g/plant

Total Weight of Fruit Per Plant (Gram)

The total fruit weight per plant is obtained by adding up the total total fruit weight per plant from the first week of harvest to the fifth week. Figure 4 shows the trend of total fruit weight per plant across all observations. Based on figure 4, indicates that the combination of LOF concentration and goat manure dosage showed no real interaction with the total fruit weight parameters per plant. Although no significant

interaction was observed, both individual factors exerted a substantial effect on the total fruit weight per plant. The application of liquid organic fertilizer (LOF) at a concentration of 150 ml/L produced the highest total fruit weight among the organic treatments, reaching 353.67 gram. This value was statistically similar to those obtained with LOF concentrations of 100 ml/L and 200 ml/L, which yielded 312.33 gram and 318.00 gram per plant. Nevertheless, the NPK control treatment recorded the greatest overall average total fruit weight per plant, amounting to 1361.64 g. Regarding goat manure application, the highest total fruit weight per plant was achieved at a dose of 1,100 g/plant, with an average value of 683.39 g. This result was significantly higher than that of the soil control treatment, which produced only 415.50 g per plant.

Table 5. Average Total Weight of Fruit Per Plant in LOF Concentration and Goat Manure Dosage

Treatment	Total Weight of Fruit Per Plant
LOF Concentration (ml/L)	(grams)
Control (NPK)	1361.64 ± 107.57 b
LOF 100 ml/L	312.33 ± 131.06 a
LOF 150 ml/L	353.67 ± 136.77 a
LOF 200 ml/L	318.00 ± 136.06 a
HSD 5%	115.84
Coefficient of Variance	17.77 %
Goat Manure Dosage (g/plant)	
Control (Soil)	415.50 ± 538.34 a
700 g/plant	591.15 ± 527. 95 b
900 g/plant	655.60 ± 553.37 b
1.100 g/plant	683.39 ± 683.39 b
HSD 5%	115.84
Coefficient of Variance	17.77 %

Notes: Numbers followed by the same letter at the same treatment showed no significant difference in the HSD 5% test.

Table 5 shows that the total fruit weight per plant at a LOF concentration treatment of 150 ml/L obtained the highest yield in the organic cultivation system. This explains that the administration of LOF is able to provide sufficient nutrients to support the flowering, forming and filling process of fruit. The increase in total fruit weight per plant as a whole was found in the NPK control treatment 16:16:16 which showed the highest result of total fruit weight per plant. This is supported by (Saraswati et al., 2023) that in the generative phase, plants need nutrients NPK to support the fruit formation process. This is in line with research (Panjaitan et al., 2023), that the element potassium plays an important role in maintaining crop quality and reducing weight loss during storage.

A dose of goat manure gave a higher total fruit weight than the control treatment. Goat manure is an organic fertilizer that has many nutrients. especially nitrogen which functions to stimulate plant growth and yield. Goat manure contains 0.55% nitrogen, 0.31% phosphorus, and 0.15% potassium (Firmansyah & Irawati, 2023). The increase in the weight of the fruit shows that the

addition of goat manure is able to improve soil conditions while providing nutrients needed by the plant during fruit growth and formation. The content of organic matter in goat manure can improve the soil's ability to retain water and nutrients and support the development of a better root system. As a result, the absorption of nutrients becomes more efficient so that the formation and filling of fruit takes place more optimally (Fitrianti et al., 2018).

CONCLUSION

The study demonstrated that the combination of LOF at a concentration of 200 ml/L and goat manure at a rate of 900 g/plant significantly enhanced plant height and leaf production, reaching 79.70 cm and 50.78 leaves. However, at the parameter of total number of fruits per plant, the highest value among the organic fertilizer treatments was obtained with the application of LOF at 150 ml/L, producing an average of 2.58 fruits per plant. Likewise, the goat manure treatment at 900 g/plant resulted in the greatest fruit number, with an average of 4.50 fruits per plant. Meanwhile, in the parameters of total fruit weight per plant, the application of LOF at 150 ml/L generated the highest yield among the organic treatments, reaching 353.67 g per plant. In addition, the highest total fruit weight associated with goat manure application was recorded at a dose of 1,100 g/plant, producing 683.39 g per plant. These findings indicate that the appropriate use of organic fertilizers at optimal application rates can effectively support the growth and Productivity of the Yuvita F1 purple eggplant variety. However, the interpretation of these findings is limited to pot-scale trials under specific soil and environmental conditions. Overall, this research contributes to sustainable agriculture by providing an effective fertilization strategy to reduce chemical fertilizer dependency while optimizing organic eggplant production.

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