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Effectiveness of Liquid Organic Fertilizer Application of Lamtoro Leaves and Quail Manure Fertilizer on Melon Plants (*Cucumis melo* L) Growth and Production

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Abstract

The melon crop commodity has great potential to meet public demand. One way to improve melon quality is using organic fertilizer, which enhances soil properties and provides plant nutrients. This study utilized a factorial Randomized Block Design with two factors. The first factor was the POC of Lamtoro leaves (L) with 4 levels: 0 ml/1L water/plot, 200 ml/1L water/plot, and 400 ml/1L water/plot. The second factor was quail manure with 4 levels: 0 kg/plot, 1 kg/plot, 2 kg/plot, and 3 kg/plot. Parameters measured included plant height, number of leaves, flowering time, stem diameter, fruit diameter per sample, fruit weight per sample plant, and fruit weight per plot. The results showed that applying POC fertilizer from Lamtoro leaves and quail manure had no significant effect on plant height, number of leaves, flowering time, and stem diameter. However, it had a significant effect on fruit weight per sample plant, a very significant effect on fruit diameter per sample, and fruit weight per plot.

Keywords: Lamtoro Leaf POC, Melon, Organic Fertilizer, Quail droppings

1. Introduction

Melon (*Cucumis melo* L) is a horticultural plant originating from the Mediterranean region, specifically the border of Europe, Africa, and West Asia. Melon plants belong to the same family as watermelon, cantaloupe, and cucumber. Melon cultivation has the potential for development to meet the community's demands.

According to the Badan Pusat Statistik (2021), melon production in North Sumatra experienced a significant decline from 2018 to 2020, with 4,700 tons in 2018, 2,604 tons in 2019, and 1,259 tons in 2020. The decrease in *Cucumis melo* L plant production in North Sumatra is attributed to the excessive use of inorganic fertilizers, leading to soil compaction and nutrient depletion. The community is shifting towards sustainable practices to address environmental concerns and ensure food security without harming natural resources (Amiroh, 2017).

Improving the quality of melon fruit can be achieved by using organic fertilizers, which enhance soil properties and provide essential nutrients to plants (Agussalim, 2016). Organic fertilizers ensure even nutrient distribution, preventing nutrient imbalances that can lead to deficiencies or toxicities (Priangga et al., 2013). Potential organic fertilizers for melon cultivation include POC Lamtoro leaves and quail manure fertilizer.

Organic materials in organic fertilizers contain compounds broken down by microorganisms, helping to bind soil particles into aggregates. This process makes the soil porous, loose, and able to store and allow air and water flow. Organic matter plays a crucial role in enhancing soil fertility physically, chemically, and biologically (Ramli et al., 2016).

Lamtoro leaves are commonly used in the production of organic fertilizers. This legume plant, known as Petai Cina or Lamtoro, is chosen for its ease of decomposition and ability to provide nutrients that promote plant growth. Lamtoro has a higher content of nitrogen (N), phosphorus (P), and potassium (K) compared to other plants, making it a valuable source of nutrients for soil enrichment (Aulia et al., 2020).

Lamtoro leaf-based organic fertilizers enhance the soil's physical, chemical, and biological properties while

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increasing nutrient availability. The organic matter present in Lamtoro leaves contributes significantly to improving agricultural productivity in terms of quality and quantity, reducing environmental pollution, and promoting sustainable land quality (Septirosya et al., 2019).

The advantage of using Lamtoro leaf POC is its high nutrient content, particularly nitrogen, and quick decomposition, which speeds up nutrient release. Lamtoro plants can enhance soil fertility by binding nitrogen and providing organic material. The leaves of Lamtoro plants are rich in crude protein, making them a valuable source of organic material for organic farming. They contain protein, carbohydrates, tannin, mimosine, calcium, phosphorus, beta-carotene, and energy.

Quail manure organic fertilizer is nutrient-rich, easily decomposable, and readily absorbed by plants, promoting growth. It contains nitrogen, phosphorus, and potassium, essential for plant development. Bird droppings, especially quail droppings, are beneficial for vegetables and ornamental plants due to their nutrient composition. They contain macronutrients and micronutrients necessary for plant growth and can enhance root volume and tuber weight. This study aims to assess the impact of Lamtoro leaf POC and quail manure fertilizer on the growth and yield of melon plants (*Cucumis melo* L.).

2. Material and Methods

The study occurred in Bandar Setia Village, Percut Sei Tuan District, Deli Serdang Regency, North Sumatra Province, 9 meters above sea level, from November 2023 to January 2024. Coordinate Point: Latitude 3 degrees 39 minutes 36.000 seconds North, Longitude 98 degrees 45 minutes 46.800 seconds East/3.66000000 degrees North, 98.76300000 degrees East. The materials and tools utilized in the present study included melon seeds of the Pertiwi Anvi variety, Lamtoro leaf POC, quail manure fertilizer, molasses, EM4 (Effective Microorganisms 4), water, camera, caliper, hoe, machete, rake, knife, scissors, mulch, polybag, plastic rope, watering can, nameplate, meter, measuring cup, scales, stationery, bamboo, sprayer, calculator, and other apparatus that facilitated the research process. This study employed a factorial Randomized Block Design (RAK) with 2 factors as its experimental design. The first factor was Lamtoro leaf POC (L) consisting of 4 levels: L 0 = 0 ml / 1L water/plot, L 1 = 200 ml / 1L water/plot, and L 2 = 400 ml / 1L water/plot. Factor 2 quail manure fertilizer (P) consists of 4 levels: P 0 = 0 kg/plot, P 1 = 1 kg/plot, P 2 = 2 kg/plot, and P 3 = 3 kg / plot. Data were analyzed using Analysis of Variance (ANOVA) to test the effect of treatment and its interaction for data processing and analysis using Excel.

2.1. Making Organic Fertilizer C Water Lamtoro leaves

There are three main stages involved in creating POC Lamtoro leaves. The first stage involves preparing the necessary ingredients and tools. The ingredients required include 10 kg of pounded or blended Lamtoro leaves, 1 liter of EM 4, 1 kg of brown sugar, and 20 liters of water. The tools needed for this process include plastic storage barrels, stirring sticks, Carter knives, scales, and beaker glasses.

In the second stage, making POC Lamtoro leaves begins by creating an EM 4 solution in a storage barrel. This is done by mixing 20 liters of water, 1 kg of finely sliced brown sugar, and 1 liter of EM4. The mixture is then stirred until it is evenly distributed. Next, the pounded or blended Lamtoro leaves are added to the storage barrel and stirred until evenly distributed. The barrel is then closed and left to ferment for approximately 2 weeks.

The third stage involves the fermentation process of the Lamtoro leaf POC. During fermentation, the storage barrel is opened every 4 days, and the POC solution is stirred again to ensure even distribution. This step is crucial for the fermentation process to occur uniformly. After stirring, the storage barrel is closed once again.

2.2. Making Quail Manure Fertilizer

The production of quail manure fertilizer yields approximately 78 kg. The collected quail manure undergoes an air-drying process lasting two weeks.

2.3. Land Preparation

Before the commencement of land processing, it is essential to clear the area of any plant debris, stones, and unwanted vegetation, commonly called weeds. Following this preparatory step, the land is cultivated using a hoe, after which trial plots are established following the designated treatments. Any residual plant material and soil are removed from the planting zone. The primary objective of this land-clearing process is to mitigate the risk of pest infestations and diseases and diminish competition from weeds for nutrient uptake.

2.4. Plot Making

The plot was made with a size of 150 x 150 cm, with a distance between plots of 50 cm and a distance between replications of 100 cm. Plots were made of as many as 36 pieces, and the plots were made by forming a land map and loosening the soil in the plot section. So that sunlight is evenly distributed, the plots were made in a North-South direction.

2.5. Giving Quail Manure Fertilizer

Two weeks before planting, quail manure fertilizer is applied at varying treatment levels per plot, specifically K 0 at 0 Kg/plot, K 1 at 1 Kg/plot, K 2 at 2 Kg/plot, and K 3 at 3 Kg/plot. The application of this quail manure occurs once in the morning. Apply quail manure onto the designated area and mix it thoroughly with a hoe.

2.6. Seed Sowing

Following the germination process, the seeds are placed sequentially into individual baby seedling bags, with a hole depth of 2 cm. The material utilized is topsoil. To

plant the seeds, they should be positioned in a dormant state with the root tip oriented downwards, followed by covering the seeds with a thin layer of soil and watering them in the morning and evening using a watering can.

2.7. Mulch Installation

After applying quail manure fertilizer, mulch is applied to prevent the evaporation of the fertilizer, followed by tidying up the bed and watering it adequately until the soil is sufficiently moist. Mulch application is typically carried out in warm and sunny conditions. Before applying the mulch, bamboo clamps are readied, with dimensions of 200 cm x 120 cm. The bamboo pieces are shaped into a "U" formation, serving as a clamp to secure the mulch on the ground. The mulch is stretched over the bed with bamboo clamps securing both ends. After the mulch installation, the bed is left covered with mulch for 3 days before the planting hole is made. The objective is for the primary fertilizer administered to be rapidly accessible for plant absorption.

2.8. Installation of Stakes/Posts

The stakes are installed one week before planting, positioned 30-35 cm from the edge of the bed and surrounding the planting hole. These stakes, constructed from bamboo, measure 200 cm long, with a width of 3-4 cm and a thickness of 1-1.5 cm. Following this, girders are installed, connecting adjacent stakes in a row or reinforcing at the junction of two opposing stakes. The girders are longer yet narrower than the stakes, with their length tailored to match the bed's dimensions (200 cm), a width of 2.5-3.0 cm, and a thickness of 1 cm. A raffia rope is then secured to the girder, linking it to the fruit stalk and enabling the girder to support the melon fruit.

2.9. Planting

Seedlings are planted by creating holes in the mulch using repurposed milk cans equipped with handles to facilitate the ease of the hole-making process. Seeds may be transplanted after one week of being sown, and the recommended planting distance is 50 by 50 centimeters. Before planting, the soil on the surface of the nursery bag is moistened and compressed. Subsequently, the nursery bag is carefully torn and removed, allowing for the insertion of seedlings into the planting hole in an upright position. The soil surrounding the hole is then compacted around the seedlings to eliminate any hollowness, then watering the newly planted seedlings.

2.10. Administration of Lamtoro Leaf POC

The Lamtoro leaf POC is fertilized every week. Fertilization adheres to the specified concentration and is evenly distributed on the soil surrounding the planting hole as per the prescribed treatment.

2.11. Determination of Sample Plants

The selection of sample plants was determined by randomly selecting five plants from each of the nine plots. The plants were then marked with standard stakes fabricated for this purpose.

2.12. Observed Parameters

Plant Height (cm)

The vertical growth of the plants in each plot was assessed by employing raffia rope to measure the distance from the base to the apex of the plant stem. The raffia rope was measured using a meter roll at 7, 14, and 21 days after applying Lamtoro leaf POC.

Number of leaves (blades)

The leaves counted have opened perfectly and are not damaged or attacked by pests.

Flowering Time (days)

Observation of flowering age is carried out by calculating the day the plants produce flowers simultaneously or perfect flowers (75% of the plot has flowered).

Stem Diameter (cm)

The average stem diameter of each plot was measured using a caliper from the lowest base of the plant ± 1 cm above the soil surface at 2 weeks after planting (MST) to 4 weeks after planting (MST). The observation time interval was carried out once a week.

Fruit Diameter per Sample (cm)

The fruit diameter is measured using a vernier caliper by circling the fruit to obtain the circumference value of the fruit.

Fruit Weight per Sample Plant (kg)

The sample plant fruit was weighed using a digital scale at harvest time. Harvesting was carried out twice, and then the results were averaged.

Fruit Weight per Plot (kg)

Weighing of all fruits produced from each plot is done using a digital scale at harvest time. Harvesting is done twice, and then the results are added up.

2.13. Plant Maintenance

Watering

Watering Watering is done around the root area, done every morning at 07.30 and afternoon at 16.30, which is adjusted to the weather in the field, if it rains then watering is no longer done. Watering is done using a watering can carefully so that the soil does not erode and the plants do not break or fall.

Insertion

Insertion is done after the seedlings are planted for 7-10 days; at that age, the seedlings have begun to adapt, and there are inevitably unhealthy or dead seedlings; pest and disease attacks or physical disorders can cause this. Plant materials used for insertion are taken from the reserve plot.

Plant Binding

Plant tying is intended to allow plants to propagate on stakes that have been installed. Plant stems begin to be tied to stakes with raffia rope at the age of three weeks after planting (3 MST). Tying is done every 2 days by following

the length of the plant.

Pruning

Pruning is done to remove potential detrimental branches, especially shoots that appear in the leaf axils. Branch pruning starts from the 1st to the sixth segment, while branches on the 7th to the 10th are maintained as a place for potential fruits to grow. This pruning is done using scissors carefully to avoid injuring other branches.

Fruit Selection and Fruit Stalk Binding

The fruit candidates will usually appear at 1-2 weeks after pollination. These fruit candidates need to be selected again to get quality fruit, then other fruit candidates are removed using scissors and only maintain one fruit on each plant.

The fruit stalk is tied when the fruit is the size of an adult's fist; the part that is tied is the branch where the fruit grows in a horizontal position. The binding is done carefully with raffia rope so as not to injure the plant branch. Then, the other end of the rope is tied to a stake in a horizontal position.

Pest and Disease Control

Control of grasshoppers and cricket pests is done manually by directly collecting pests when the plants are 1-7 HST. Whitefly pests, caterpillars (Plutella xylostella), aphids, leaf spots, and curly diseases on the top of the plant when the plants are 2-6 MST are controlled by spraying with botanical pesticides. This is applied according to the attack conditions in the research area. Pest and disease attacks during the research were still below the economic threshold, so pesticide application was only carried out according to needs.

Harvesting

Harvesting is done in the morning and evening, and this harvest is done in stages, prioritizing fruit that is truly ready to be harvested, namely at the first harvest age of 71 days after planting (dap), by cutting the fruit stalk by forming the letter "T" which aims to prevent the fruit from rotting easily and remains fresh. Melons are harvested when they meet the harvest criteria: cracks in the fruit stalk, the net has formed perfectly, the skin color changes to dark green, and the fruit has a fragrant aroma.

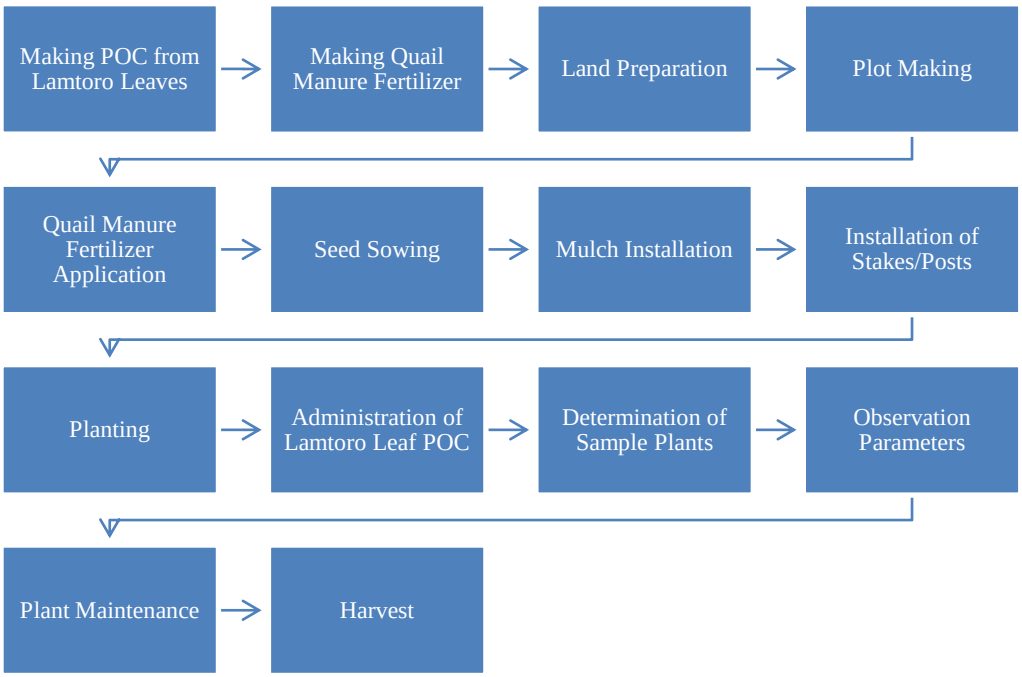

Figure 1. Research flow diagram

3. Results and Discussion

3.1. Plant Height (cm)

The plant height observation data results show that the provision of Lamtoro leaf POC and quail manure fertilizer had no significant effect on the ages of 7 HST, 14 HST, and 21 HST. The results can be seen in Table 1.

The data presented in Table 1 indicates that applying Lamtoro leaf POC treatment does not result in a statistically significant impact on plant height. The tallest plant height was achieved at a watering level of L 2 = 400 ml/1L water/plot, measuring 49.96 cm. This measurement did not show a significant difference compared to the heights obtained at L 1 = 200 ml/1L water/plot, which measured 49.84 cm, and L 0 = 0 ml/1L water/plot, which measured 49.47 cm. Applying quail manure fertilizer does not result in a statistically significant increase in plant height. The greatest height of the plant was achieved with P 3 = 3 kg/plot, measuring at 49.93 cm, showing no significant variance from P 2 = 2 kg/plot, measuring at 49.80 cm, P 1 = 1 kg/plot, measuring at 49.79 cm, and P 0 = 0 kg/plot, measuring at 49.51 cm.

Table 1. Average Plant Height (cm) of Melon Due to Lamtoro Leaf POC and Quail Manure Fertilizer at 7 HST, 14, and 21 HST.

	(L) POC Lamtoro Leaves	(P) Quail Manure Fertilizer				Average
		(P_0) 0 kg/plot	(P_1) 1 kg/plot	(P_2) 2 kg/plot	(P_3) 3 kg/plot	
2 MST	(L0) 0 ml/1L water/plot	9.09 ± 0.16	9.47 ± 0.59	9.62 ± 0.12	9,862 ± 0.12	9.51 ± 0.40 a
	(L_1) 200 ml/1L water/plot	9.67 ± 1.16	10 ± 0.62	9.99 ± 0.47	9.91 ± 0.49	9.89 ± 0.73 a
	(L_2) 400 ml/1L water/plot	10.15 ± 0.83	9.86 ± 1.16	9.91 ± 0.21	9.82 ± 0.77	9.93 ± 0.71 a
	Average	9.63 ± 0.85 a	9.78 ± 0.76 a	9.84 ± 0.31 a	9.86 ± 0.46 a	
3 MST	(L0) 0 ml/1L water/plot	18.56 ± 0.62	18.99 ± 1.01	19.13 ± 0.49	19.27 ± 0.36	18.98 ± 0.63
	(L_1) 200 ml/1L water/plot	19.00 ± 1.31	19.49 ± 1.04	19.48 ± 0.70	19.36 ± 0.75	19.33 ± 1.03
	(L2) 400 ml/1L water/plot	19.53 ± 1.05	19.39 ± 1.59	19.29 ± 0.23	19.44 ± 0.82	19.41 ± 0.89
	Average	19.03 ± 0.99 a	19.29 ± 1.10 a	19.3 ± 0.47 a	19.36 ± 0.59 a	
4 MST	(L0) 0 ml/1L water/plot	49.04 ± 0.28	49.46 ± 0.88	49.62 ± 0.47	49.77 ± 0.31	49.47 ± 0.54 a
	(L_1) 200 ml/1L water/plot	49.50 ± 1.27	50.01 ± 0.93	50.00 ± 0.59	49.86 ± 0.66	49.84 ± 0.97 a
	(L_2) 400 ml/1L water/plot	49.99 ± 1.07	49.89 ± 1.51	49.79 ± 0.15	50.17 ± 0.55	49.96 ± 0.84 a
		49.51 ± 0.94 a	49.79 ± 1.02 a	49.80 ± 0.42 a	49.93 ± 0.49 a	

Description: Numbers followed by the same letter in the column indicate no significant difference at the 5% level (lowercase letters) based on the Duncan Range Test (DMRT).

The greatest dosage led to the most significant increase in plant height compared to the other experimental treatments. A study conducted by Ainiya et al. (2019) also yielded comparable findings, demonstrating an enhancement in plant growth due to utilizing Lamtoro leaf fertilizer. The leaves of the Lamtoro plant boast a significant nitrogen content, which enables them to supply the necessary nutrients for plant growth.

It is believed that the nutrients present in the quail manure fertilizer are currently insufficient to effectively supply nutrients to the soil, particularly nitrogen, resulting in suboptimal vegetative plant growth (Sannah, 2018).

Nitrogen is essential for plants, so supporting their growth and development processes is very important. Therefore, if the soil's nitrogen is insufficient for plant nutrient needs, additional nutrients are needed to increase availability. If nitrogen needs are unmet, plant growth and development can be disrupted (Asri et al ., 2020).

3.2. Number of leaves (blades)

The analysis of observation data on the number of leaves shows that the administration of Lamtoro leaf POC and quail manure fertilizer had no significant effect at the ages of 7 HST, 14, and 21 HST. The results can be seen in Table 2.

Table 2 can be explained that the treatment of giving Lamtoro leaf POC has no significant effect on the number of leaves. The largest number of leaves was obtained at L 2 = 400 ml / 1L water / plot, namely 18.90 strands, not significantly different from L 1 = 200 ml / 1L water / plot, namely 18.52 strands and L 0 = 0 ml / 1L water / plot 18.40 strands. The provision of quail manure fertilizer has no significant effect on the number of leaves. The largest number of leaves was obtained at P 3 = 3 kg / plot, namely 18.87 strands, not significantly different from P 2 = 2 kg / plot, namely 18.76 strands, P 1 = 1 kg / plot, namely 18.51 strands, and P 0 = 0 kg / plot 18.29 strands.

Table 2. Average Number of Melon Leaves (strands) Due to Lamtoro Leaf POC and Quail Manure Fertilizer at 7 HST, 14 and 21 HST.

	(L) POC Lamtoro Leaves	(P) Quail Manure Fertilizer				Average
		(P_0) 0 kg/plot	(P_1) 1 kg/plot	(P_2) 2 kg/plot	(P_3) 3 kg/plot	
2 MST	(L0) 0 ml/1L water/plot	4.40 ± 0.20	4.53 ± 0.81	5.13 ± 0.61	4.47 ± 1.01	4.63 ± 0.69 a
	(L_1) 200 ml/1L water/plot	4.47 ± 0.58	4.40 ± 0.35	4.60 ± 0.87	5.13 ± 0.90	4.65 ± 0.80 a
	(L2) 400 ml/1L water/plot	4.73 ± 0.61	5.27 ± 0.31	4.80 ± 0.20	5.47 ± 0.31	5.07 ± 0.46 a
	Average	4.53 ± 0.46 a	4.73± 0.62 a	4.84 ± 0.59 a	5.02 ± 0.82 a	
3 MST	(L0) 0 ml/1L water/plot	9.00 ± 0.20	9.47 ± 0.76	10.13 ± 0.61	9.40 ± 0.92	9.50 ± 0.72 a
	(L_1) 200 ml/1L water/plot	9.40 ± 0.53	9.33 ± 0.42	9.53 ± 0.81	10.07 ± 0.81	9.58 ± 0.74 a
	(L2) 400 ml/1L water/plot	9.80 ± 0.53	10.20 ± 0.20	9.73 ± 0.12	10.20 ± 0.20	9.98 ± 0.35 a
	Average	9.40 ± 0.52 a	9.67 ± 0.60 a	9.80 ± 0.57 a	9.89 ± 0.72 a	
4 MST	(L0) 0 ml/1L water/plot	17.73 ± 0.31	18.40 ± 0.69	19.13 ± 0.61	18.33 ± 1.03	18.40 ± 0.80 a
	(L_1) 200 ml/1L water/plot	18.33 ± 0.64	18.20 ± 0.60	18.47 ± 0.76	19.07 ± 0.81	18.52 ± 0.77 a
	(L2) 400 ml/1L water/plot	18.80 ± 0.53	18.93 ± 0.50	18.67 ± 0.12	19.20 ± 0.20	18.90 ± 0.39 a
		18.29 ± 0.64 a	18.51 ± 0.62 a	18.76 ± 0.57 a	18.87 ± 0.77 a	

Description: Numbers followed by the same letter in the same column indicate no significant difference at the 5% level (lowercase letters) based on the Duncan Range Test (DMRT).

The lack of nutrients in an absorbable form for plants leads to inconsequential outcomes. One of the determinants influencing plant growth is the presence of accessible nutrients that plants can assimilate, leading to an increase in

cell expansion and subsequently impacting the diameter of the plant shoot. Nitrogen elements are crucial for plant growth, as nitrogen is involved in various biochemical processes.

Nutrient N promotes chlorophyll synthesis, resulting in enhanced photosynthetic activity and the proliferation of leaves in terms of quantity and surface area. This pertains to the capacity of organic matter to enhance the characteristics (specifically, texture and structure) of soil and its biological composition in order to create a more conducive environment for the growth of plant roots (Made et al ., 2018).

3.3. Flowering Time (Days)

Based on the analysis of observation data on flowering time, it was shown that the administration of Lamtoro leaf POC and quail manure fertilizer had no significant effect. The results can be seen in Table 3.

Table 3. Average Flowering Time (days) of Melon Due to Lamtoro Leaf POC and Quail Manure Fertilizer.

(L) POC Lamtoro Leaves	(P) Quail Manure Fertilizer				Average
	(P_0) 0 kg/plot	(P_1) 1 kg/plot	(P_2) 2 kg/plot	(P_3) 3 kg/plot	
(L0) 0 ml/1L water/plot	26.60 ± 0.40	25.20 ± 1.20	25.53 ±1.01	25.93 ± 1.17	25.82 ± 1.01 a
(L_1) 200 ml/1L water/plot	25.60 ± 1.31	26.93 ±0.31	24.40 ± 0.40	25.07 ± 1.10	25.50 ± 1.20 a
(L2) 400 ml/1L water/plot	25.67 ± 1.70	25.40 ± 1.83	25.73 ± 0.95	24.27 ± 0.50	25.27 ± 0.08 a
Average	25.96 ± 0.07 a	25.84 ± 1.38 a	25.22 ± 0.95 a	25.09 ± 1.11 a	

Description: Numbers followed by the same letter in the column indicate no significant difference at the 5% level (lowercase letters) based on the Duncan Range Test (DMRT).

Table 3 explains that the treatment of Lamtoro leaf POC has no significant effect on flowering time. The fastest flowering time was obtained at L 2 = 400 ml/1L water/plot, which is 25.27 days, not significantly different from L 1 = 200 ml/1L water/plot, which is 25.50 days, and L 0 = 0 ml/1L water/plot 25.82 days. The provision of quail manure fertilizer has no significant effect on flowering time. The fastest flowering time was obtained at P 3 = 3 kg/plot, which is 25.09 days, not significantly different from P 2 = 2 kg/plot, which is 25.22 days, P 1 = 1 kg/plot, which is 25.84 days and P 0 = 0 kg/plot 25.96 days.

The plants that did not receive any treatment exhibited a prolonged flowering period compared to those that were provided with fertilizer. It is believed that the reason behind this phenomenon is the lower concentration of nutrients such as nitrogen, phosphorus, and potassium in plants not supplemented with fertilizer. The quantity and accessibility of nutrients, particularly phosphorus, have been found to expedite the flowering process (Saidani, 2020).

The flowering process represents a pivotal shift from the vegetative to the generative phase of plant development, characterized by the appearance of flower buds. During this phase, the presence and accessibility of phosphorus (P) and potassium (K) elements play a crucial role in supporting plant transition and successful flowering. Phosphorus plays a significant role in promoting root growth, particularly in young plants, and in enhancing the transformation of young plants into mature ones. Additionally, phosphorus aids in assimilation and respiration, expedites the flowering process and enhances the ratio of flowers to fruit in plants (Agustin, 2021).

3.4. Stem Diameter (cm)

The analysis of the observation data on stem diameter shows that the administration of Lamtoro leaf POC and quail manure fertilizer has no significant effect. The results can be seen in Table 4.

Table 4. Average Stem Diameter (cm) of Melon Due to Lamtoro Leaf POC and Quail Manure Fertilizer.

	(L) POC Lamtoro Leaves	(P) Quail Manure Fertilizer				Average
		(P_0) 0 kg/plot	(P_1) 1 kg/plot	(P_2) 2 kg/plot	(P_3) 3 kg/plot	
2 MST	(L0) 0 ml/1L water/plot	0.48 ± 0.02	0.52 ± 0.05	0.52 ± 0.03	0.54 ± 0.04	0.51 ± 0.04 a
	(L_1) 200 ml/1L water/plot	0.53 ± 0.02	0.52 ± 0.05	0.56 ± 0.04	0.48 ±0.02	0.52 ± 0.04 a
	(L2) 400 ml/1L water/plot	0.46 ± 0.13	0.54 ± 0.06	0.52 ± 0.01	0.59 ± 0.04	0.53 ± 0.08 a
	Average	0.49 ± 0.07 a	0.53 ± 0.05 a	0.53 ± 0.03 a	0.54 ± 0.06 a	
3 MST	(L0) 0 ml/1L water/plot	0.56 ± 0.01	0.60 ± 0.05	0.61 ± 0.04	0.62 ± 0.04	0.60 ± 0.04
	(L_1) 200 ml/1L water/plot	0.62 ± 0.02	0.61 ± 0.05	0.64 ± 0.04	0.56 ± 0.03	0.61± 0.04
	(L2) 400 ml/1L water/plot	0.55 ± 0.13	0.63 ± 0.06	0.61 ± 0.01	0.69 ± 0.03	0.62 ± 0.08
	Average	0.58 ± 0.07 a	0.61 ± 0.05 a	0.62 ± 0.03 a	0.62 ± 0.06 a	
4 MST	(L0) 0 ml/1L water/plot	0.67 ± 0.01	0.72 ± 0.05	0.72 ± 0.04	0.74 ± 0.04	0.71 ± 0.04 a
	(L_1) 200 ml/1L water/plot	0.73 ± 0.03	0.72 ± 0.04	0.75 ± 0.05	0.68 ± 0.04	0.72 ± 0.04 a
	(L2) 400 ml/1L water/plot	0.66 ± 0.14	0.74 ± 0.07	0.72 ± 0.01	0.80 ± 0.03	0.73 ± 0.08 a
		0.69 ± 0.08 a	0.73 ± 0.05 a	0.73 ± 0.03 a	0.74 ± 0.06 a	

Description: Numbers followed by the same letter in the same column indicate no significant difference at the 5% level (lowercase letters) based on the Duncan Range Test (DMRT).

Table 4 explains that the treatment of Lamtoro leaf POC has no significant effect on stem diameter. The widest stem diameter was obtained at L 2 = 400 ml/1L water/plot, which is 0.73 cm, which is not significantly different from

L 1 = 200 ml/1L water/plot, which is 0.72 cm and L 0 = 0 ml/1L water/plot 0.71 cm. The provision of quail manure fertilizer has no significant effect on stem diameter. The widest stem diameter was obtained at P 3 = 3 kg/plot, which is 0.74 cm, which is not significantly different from P 2 = 2 kg/plot, which is 0.73 cm, P 1 = 1 kg/plot, which is 0.73 cm and P 0 = 0 kg/plot 0.69 cm.

It is hypothesized that applying POC Lamtoro leaf fertilizer and quail manure fertilizer has not been sufficient to fulfill the nutritional requirements necessary to develop melon stem diameter. The increase in stem diameter is affected by the nutrient composition of the substrate in which the plant is cultivated.

The elements Nitrogen (N), Phosphorus (P), and Potassium (K) are involved in the synthesis of amino acids, proteins, nucleic acids, and carbohydrates. According to Sari et al. (2019), the carbohydrates synthesized through photosynthesis are used in respiration to generate ATP and create lipids, nucleic acids, and proteins. These compounds are subsequently employed to form new plant organs such as stems, leaves, roots, and tissues.

3.5. Fruit Diameter Per Sample (cm)

The analysis of observation data on fruit diameter per sample shows that the administration of Lamtoro leaf POC and quail manure fertilizer has a very significant effect. The results can be seen in Table 5.

Table 5. Average Fruit Diameter (cm) of Melon Due to Lamtoro Leaf POC and Quail Manure Fertilizer.

(L) POC Lamtoro Leaves	(P) Quail Manure Fertilizer				Average
	(P_0) 0 kg/plot	(P_1) 1 kg/plot	(P_2) 2 kg/plot	(P_3) 3 kg/plot	
(L0) 0 ml/1L water/plot	10.68 ± 0.24	11.54 ± 0.19	12.09 ± 0.19	11.81 ± 0.19	8.49 ± 1.11 b
(L_1) 200 ml/1L water/plot	10.98 ±0.22	11.81± 0.22	11.35 ± 0.29	12.02 ± 0.13	8.86 ± 1.09 b
(L2) 400 ml/1L water/plot	11.63 ± 0.96	12.11 ± 0.55	12.11 ± 0.59	12.44 ± 0.23	9.88 ± 1.20 a
Average	7.86 ± 0.74 b	9.18 ± 1.48 a	9.34 ± 0.75 a	9.93 ± 1.44 a	

Description: Numbers followed by the same letter in the same column indicate no significant difference at the 5% level (lowercase letters) based on the Duncan Range Test (DMRT).

Table 5 can be explained that the treatment of giving Lamtoro leaf POC has a very significant effect on the fruit diameter per sample. The widest fruit diameter per sample was obtained at L 2 = 400 ml / 1L water / plot, which is 12.07 cm, not significantly different from L 1 = 200 ml / 1L water / plot, which is 11.54 cm and L 0 = 0 ml / 1L water/plot 11.53 cm. The provision of quail manure fertilizer has a very significant effect on the fruit diameter per sample. The widest fruit diameter per sample was obtained at P 3 = 3 kg/plot, which is 12.09 cm, not significantly different from P 2 = 2 kg/plot, which is 11.85 cm, P 1 = 1 kg/plot, which is 11.82 cm and P 0 = 0 kg/plot 11.09 cm.

The diameter of the fruit of the plant has a contributing relationship with the weight of the fruit per plant. The larger the diameter of the fruit, the higher the weight of the fruit per plant. The diameter of the fruit is positively correlated with productivity. This means that the larger the diameter of the fruit, the greater the productivity.

The results of the regression analysis of the administration of Lamtoro leaf POC on the fruit diameter parameter per sample showed a linear relationship, as presented in Figure 2.

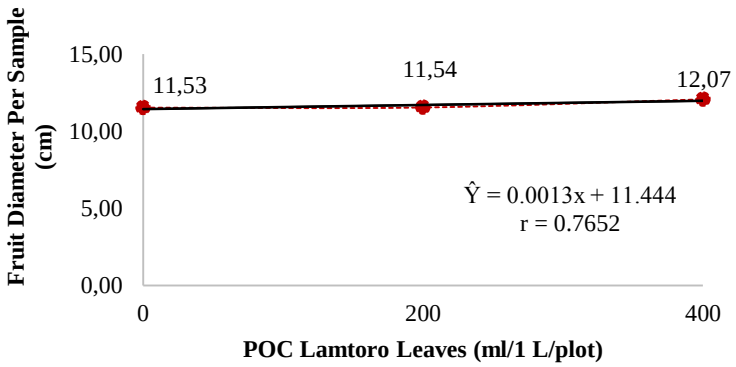

Figure 2. Relationship between Provision of Lamtoro Leaf POC and Fruit Diameter Per Sample (cm).

A clear linear relationship is observed in Figure 2 between the administration of Lamtoro leaf POC at various doses and the fruit diameter parameter per sample.

The equation $\hat{Y} = 0.0013x + 11.444$, with a correlation coefficient of r = 0.7652, indicates a positive relationship between the fruit diameter per sample and the variable x.

The application of liquid organic fertilizer derived from Lamtoro leaves has been shown to positively impact plant growth through the enhanced supply of essential macronutrients. Nuryani et al. (2019) state that providing fertilizer according to the recommended dosage and the plants' specific needs can increase yields. Conversely,

excessive application of fertilizer has been observed to decrease plant yields. According to Afrendi et al. (2024), the provision of POC has been demonstrated to enhance plant growth. Different treatment doses have an impact on the measured parameters.

The regression analysis of the application of quail droppings on fruit diameter per sample indicated a linear relationship, as depicted in Figure 3.

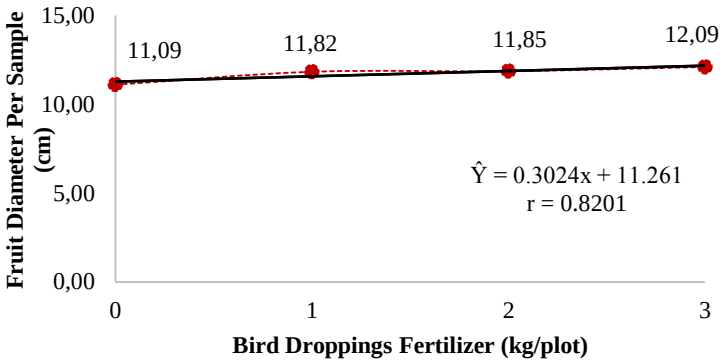

Figure 3. Relationship between Quail Manure Fertilizer Application and Fruit Diameter Per Sample (cm).

Figure 3 shows that the provision of quail droppings with different doses on the fruit diameter parameter per sample shows a linear relationship with the equation $\hat{Y}$ = 3.024 x + 112.61 with a value of r = 0.8201, indicating that the fruit diameter per sample increased.

The higher the dose of quail manure fertilizer given, the higher the growth and production of plants. The greater amount of quail manure is suspected to provide maximum results because the plants can optimally absorb the nutrients contained. The amount of nutrient requirement is related to the plant's need to grow well. If the availability of nutrients is lacking, plant growth will be inhibited; conversely, if nutrients are excessive, it can poison the plants so that plant growth will be inhibited (Arsita, 2023).

3.6. Sample Fruit Weight (kg)

The analysis of observation data on the weight of the fruit of the sample plants shows that the provision of Lamtoro leaf POC and quail manure fertilizer has a very significant effect. The results can be seen in Table 6.

Table 6. Average Fruit Weight of Sample Plants (kg) of Melon Due to Lamtoro Leaf POC and Quail Manure Fertilizer.

(L) POC Lamtoro Leaves	(P) Quail Manure Fertilizer				Average
	(P_0) 0 kg/plot	(P_1) 1 kg/plot	(P_2) 2 kg/plot	(P_3) 3 kg/plot	
(L0) 0 ml/1L water/plot	0.77 ± 0.08	1.00 ± 0.13	0.98 ± 0.14	1.02 ± 0.09	0.94 ± 0.14 b
(L_1) 200 ml/1L water/plot	0.83 ± 0.10	0.93 ± 0.18	1.04 ± 0.01	1.08 ± 0.12	0.97 ± 0.12 b
(L2) 400 ml/1L water/plot	0.93 ± 0.12	1.06 ± 0.09	1.41 ± 0.63	1.36 ± 0.07	1.19 ± 0.35 a
Average	0.85 ± 0.11 b	1.00 ± 0.13 a	1.14 ± 0.38 a	1.16 ± 0.18 a	

Description: Numbers followed by the same letter in the same column indicate no significant difference at the 5% level (lowercase letters) based on the Duncan Range Test (DMRT).

Table 6 can be explained that the treatment of giving Lamtoro leaf POC has a significant effect on the weight of the fruit of the sample plant. The highest weight of the fruit of the sample plant was obtained at L 2 = 400 ml / 1L water/plot, which is 1.19 kg, significantly different from L 1 = 200 ml / 1L water/plot, which is 0.97 kg and L 0 = 0 ml / 1L water/plot 0.94 kg. The provision of quail manure fertilizer significantly affects the weight of the fruit of the sample plant. The highest weight of the fruit of the sample plant was obtained at P 3 = 3 kg/plot, which is 1.16 kg, not significantly different from P 2 = 2 kg/plot, which is 1.14 kg, P 1 = 1 kg/plot, which is 1.00 kg and P 0 = 0 kg/plot 0.85 kg.

The increase in crop production is due to the liquid organic fertilizer of Lamtoro leaves containing relatively high nutrients, especially nitrogen, phosphorus, and potassium, so providing nutrients for plants is faster. The size and quality of the fruit in the generative phase are influenced by the availability of P and K elements, which play an important role in the formation of fruit and flowers (Tiara et al., 2019).

The regression analysis results of the Lamtoro leaf POC administration on the fruit weight parameters of the sample plants showed a linear relationship, as presented in Figure 4.

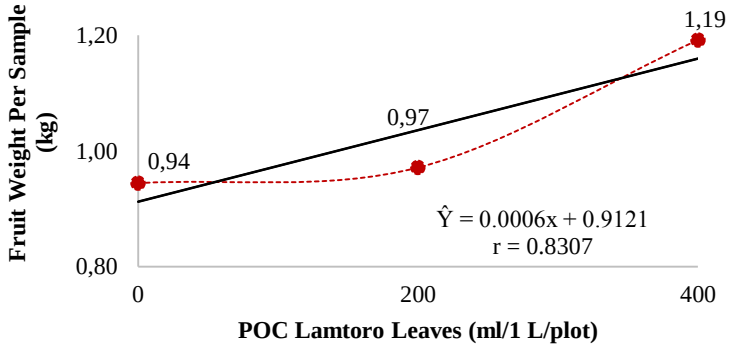

Figure 4. Relationship between Lamtoro Leaf POC Provision and Sample Plants' Fruit Weight (kg).

Figure 4 shows that the administration of Lamtoro leaf POC at different doses on the fruit weight parameters of the sample plants shows a linear relationship.

The equation $\hat{Y} = 0.0006x + 0.9121$ with a value of r = 0.8307 indicates that the weight of the fruit from the sample plants increased.

The results of the regression analysis of the provision of quail droppings on the fruit weight parameters of the sample plantations showed a linear relationship, as presented in Figure 5.

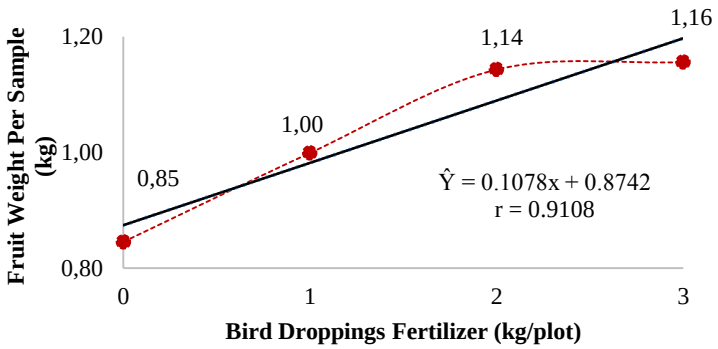

Figure 5. Relationship between Quail Manure Fertilizer Application and Fruit Weight of Sample Plants (kg).

Figure 5 shows that the provision of quail droppings with different doses on the fruit weight parameters of the sample plants shows a linear relationship with the equation $\hat{Y} = 0.1078x + 0.8742$ with a value of r = 0.9108 indicating that the fruit weight of the sample plants increased.

Quail droppings contain K nutrients that can increase the K element in the soil. The higher the K element in the soil that plants will absorb, the more carbohydrates will be produced so that plant growth will increase. The K element also facilitates photosynthesis and catalyzes the transformation of carbohydrates, proteins, and fats into energy sources for plant growth (Ritonga, 2019).

3.7. Fruit Weight Per Plot (kg)

The analysis of observation data on fruit weight per plot shows that the provision of Lamtoro leaf POC and quail manure fertilizer has a very significant effect. The results can be seen in Table 7.

Table 7. Average Fruit Weight Per Plot (kg) of Melon Due to Lamtoro Leaf POC and Quail Manure Fertilizer.

(L) POC Lamtoro Leaves	(P) Quail Manure Fertilizer				Average
	(P_0) 0 kg/plot	(P_1) 1 kg/plot	(P_2) 2 kg/plot	(P_3) 3 kg/plot	
(L0) 0 ml/1L water/plot	7.86 ± 1.22	9.30 ± 1.74	8.78 ± 0.73	8.13 ± 0.05	8.49 ± 1.11 b
(L_1) 200 ml/1L water/plot	7.41 ± 0.23	8.21 ± 1.70	9.39 ± 0.10	10.44 ± 0.32	8.86 ± 1.09 b
(L2) 400 ml/1L water/plot	8.31 ± 0.23	10.14 ± 0.23	9.86 ± 0.92	11.22 ± 0.69	9.88 ± 1.20 a
Average	7.86 ± 0.74 b	9.18 ± 1.48 a	9.34 ± 0.75 a	9.93 ± 1.44 a	

Description: Numbers followed by the same letter in the same column indicate no significant difference at the 5% level (lowercase letters) based on the Duncan Range Test (DMRT).

Table 7 can be explained that the treatment of giving Lamtoro leaf POC has a very significant effect on the weight of fruit per plot. The highest fruit weight per plot was obtained at L 2 = 400 ml / 1L water / plot, which is 9.88 kg, significantly different from L 1 = 200 ml / 1L water / plot, which is 8.86 kg, very significantly different from L 0 = 0 ml / 1L water / plot 8.49 kg. The provision of quail manure fertilizer has a very significant effect on the weight of fruit per plot. The highest fruit weight per plot was obtained at P 3 = 3 kg / plot, which is 9.93 kg, not

significantly different from P 2 = 2 kg / plot, which is 9.34 kg, P 1 = 1 kg / plot, which is 9.18 kg but very significantly different from P 0 = 0 kg / plot 7.89 kg.

The nitrogen (N) and potassium (K) content in POC plays an important role in the photosynthesis process. Nitrogen (N) in plants forms chlorophyll, which is very important for photosynthesis and synthesizing proteins, fats, and other organic compounds (Salman et al., 2024) .

The K element contained in the fertilizer affects melon plants' growth phase and yield. Where the K element has an important role in increasing the diameter of the plant tubers. The K element in the soil affects the enlargement of the fruit circle, if the K element deficiency can inhibit the process of forming the fruit circle, so that it will affect the weight of the plant (Kurniati et al ., 2017).

The regression analysis results of the Lamtoro leaf POC administration on the fruit weight parameter per plot showed a linear relationship, as presented in Figure 6.

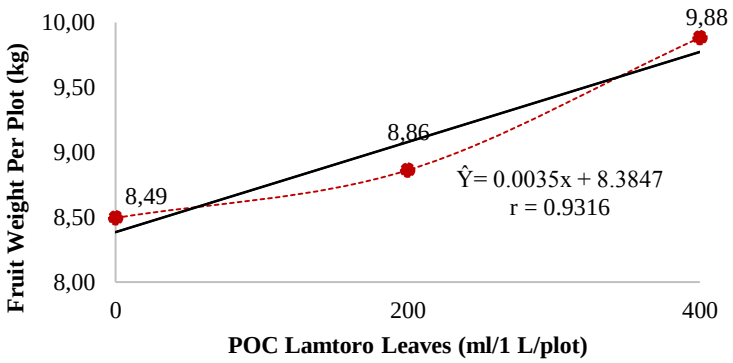

Figure 6. Relationship between Provision of Lamtoro Leaf POC and Plot Fruit Weight (kg).

Figure 6 shows that the administration of Lamtoro leaf POC with different doses on the fruit weight parameter per plot shows a linear relationship with the equation $\hat{Y}$ = 0.0035x + 8.3847 with an r value = 0.9316, indicating that the fruit weight per plot increased.

Fruit development and fruit ripening must be supported by fairly balanced nutrients at the right time. Nutrients that need to be considered are Phosphorus, Potassium, Nitrogen, and Calcium (Ca). Liquid organic fertilizer from Lamtoro leaves contains relatively high nutrients, especially nitrogen, phosphorus, and potassium. The size and quality of fruit in the generative phase are influenced by the availability of P and K elements, which play an important role in the formation of fruit and flowers (Santos et al ., 2017).

The regression analysis of quail droppings on the fruit weight parameter per plot showed a linear relationship, as presented in Figure 7.

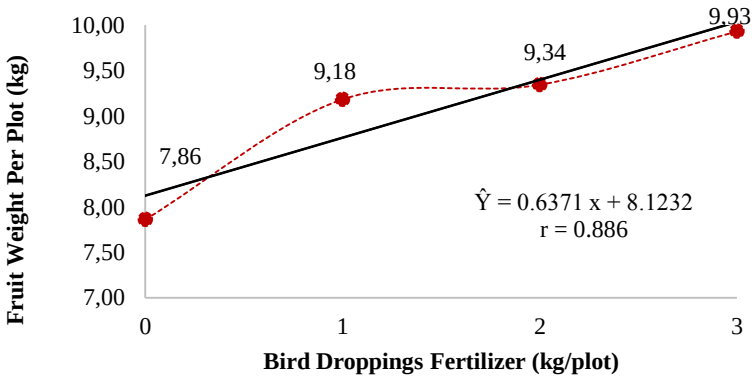

Figure 7. Relationship between Quail Manure Fertilizer Application and Fruit Weight Per Plot (kg).

Figure 7 shows that the provision of quail droppings with different doses on the fruit weight parameters of the sample plants shows a linear relationship with the equation $\hat{Y}$ = 0.6371 x + 8.1232 with a value of r = 0.886, indicating that the fruit weight per plot increased.

Fruit formation necessitates the presence of potassium in optimal amounts, as potassium plays a pivotal role in the transportation of the outcomes of photosynthesis (assimilates) from the leaves through the phloem to the reproductive organ tissue (fruit, seeds, and tubers). This process enhances the quality attributes of the fruit, including its color, taste, and size (Tarjiyo & Elfis, 2023).

4. Conclusion

The administration of Lamtoro leaf POC and quail manure fertilizer has been demonstrated to exert a substantial effect on the generative phase of melon plants. The optimal dosage of Lamtoro leaf POC is determined to

be 400 milliliters per liter of water per plot, whereas the optimal dosage of quail manure fertilizer is 3 kilograms per plot.

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