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The Effect of Poultry Manure Organic Fertilizer Types and Doses to the Growth and Production of Shallot (*Allium ascalonium* L.)

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ABSTRACT

The demand for shallots, which has been increasing over time, has not been met by increased production. The usage or provision of organic fertilizer based on poultry manure is one of the efforts that may boost shallot production both in terms of quality and quantity. The study aimed to see how the type and dose of organic poultry manure affected shallot development and yield (*Allium ascalonicum* L.). The study utilized a factorial randomized block design (RBD) with two factors: the type of organic poultry manure (Chicken, Duck, and Quail), and the dose of manure, (10 t ha^{-1}, 15 t ha^{-1}, and 20 t ha^{-1}). Repeated each treatment four times for a total of 36 experimental plots. The results revealed plant height parameters at 42 days after planting (DAP), number of leaves at 28 and 42 days after planting (DAP), number of tubers, and fresh weight of shallots per clump. The new importance of shallots per plot, dry weight per clump, and dry weight per hectare were all affected by the type and dose of organic poultry manure. The combination of treatment with 10 t ha^{-1} of organic chicken fertilizer had the best effect on all observation metrics. The research contribution and innovation in the use of types and doses of microorganisms fermented poultry manure is expected to improve soil quality, provide easily available nutrients for shallot plants, reduce environmental pollution, reduce production costs of inorganic fertilizers, sustainable and eco-friendly agriculture. In the future, more research can be conducted to determine the specific types of microorganisms involved in the fermentation process, which can help increase the effectiveness of organic fertilizers. The effect of different environments on the effectiveness of organic fertilizers can be tested in order to assist farmers in selecting the type and dosage of organic fertilizer that is best suited to their environmental conditions. Furthermore, soil health research can be conducted, specifically how organic fertilizers can improve soil quality and increase agricultural productivity. This research does not explain in detail the organic fertilizer fermentation process which requires a long time, so it requires careful planning and preparation. Climatic influences, such as temperature and humidity, can affect the effectiveness of microorganisms fermented poultry manure organic fertilizer. The use of microorganisms fermented poultry manure organic fertilizer depends on the availability of raw materials, such as poultry manure. Microorganisms fermented poultry manure organic fertilizer may only be suitable for certain crops. The use of poultry manure organic fertilizer at a dose of 10 ^{t} ha^{-1} can increase the dry weight yield of shallots by 9,81 t ha^{-1} when compared to other treatments.

1. INTRODUCTION

Shallots (*Allium ascalonicum* L.) are a precious horticultural plant. Furthermore, as people become more concerned about the health effects of chemical residues, national and international market demand for organic products with no chemical residues is increasing [1-3]. The community uses this item as a kitchen spice, medication, and for various other purposes [4]. As the world's population and spending power grow, so does the demand for shallots. However, many hurdles, such as variable output, are frequently encountered in the quest to meet the demand for onions. Current shallot output is often insufficient to meet market demand, and shallot consumption, which continues to rise from time to time, has not been matched by an increase in supply [5]. The usage or use of fertilizers is one of the efforts to increase shallot yield [6]. Farmers typically employ chemical or inorganic fertilizers to suit the nutrient needs of shallots. Chemical fertilizers, on the one hand, can swiftly offer available nutrients. Still, inorganic fertilizers, on the other hand, can harm the soil, the environment, and human health [7]. According to Blanco-Canqui and Schlegel [8], continuous application of inorganic fertilizers might impair the stability of soil aggregates and lead the soil to contract.

Organic fertilizers are one way to meet the nutrient needs of shallots without damaging the environment. Organic fertilizers contain carbon and one or more elements other than hydrogen and oxygen required for plant growth [9]. Organic fertilizers can offer macro and micronutrients, boost soil cation exchange capacity (CEC), and build complex compounds with

harmful metal ions such as Al and Fe, according to Hartatik et al. [10]. Many local resources, such as chicken, duck, and quail excrement, can be used as fundamental ingredients for organic fertilizers. Chicken dung has a significant nitrogen content, according to Sahetapy et al. [11]. Then, according to Yulianingsih and Wardoyo [12], duck excrement provides all of the essential elements (N, P, Ca, Mg, S, and micronutrients). Aside from chicken and duck droppings, quail droppings have promoted plant development. Quail droppings contain a lot of organic N and C, according to Indrawan et al. [13].

According to Priyadi et al. [14], creating fermented organic fertilizers, which is the result of fermenting organic matter that can be used to fertilize plants, is one of the efforts to convert organic materials into fertilizers that are effective for plant growth. Increase plant growth and yield by amending the soil. According to various research findings, the application of organic fertilizer, including at a dose of 10-20 t ha-1, promotes good plants. Based on the background information, the study is needed to assess the influence of different types and dosages of organic poultry manure on the growth and yield of shallots. This study aims to see how the type and dose of organic poultry manure interact with the productivity and development of shallots (*Allium ascalonicum* L.).

Shallot (*Allium ascalonicum* L.) is a horticultural crop commodity that has high economic value in Indonesia. However, shallot production in Indonesia is still having some problems caused by several factors, such as low soil fertility and a lack of proper use of fertilizers. Therefore, to increase shallot production, efforts to improve soil quality and the use of appropriate fertilizers are needed.

Poultry manure organic fertilizer is an alternative organic fertilizer that can be used to increase soil fertility and plant productivity. However, different types and doses of poultry manure organic fertilizers can have different effects on the growth and yield of shallot plants.

Therefore, this study was conducted with the aim to evaluate the effect of poultry manure organic fertilizer types and dosages on the growth and yield of shallot plants. It is hoped that the results of this study can provide useful information for farmers to choose the right type and dose of poultry manure organic fertilizer to increase the productivity of shallot plants.

This study provides an important contribution in evaluating the effect of the type and dose of poultry manure organic fertilizer on the growth and yield of shallot plants. The findings of this study can be a reference for academics to conduct further research in optimizing the use of poultry manure organic fertilizer in various other types of plants.

In addition, the results of this study can provide benefits for farmers to increase the productivity of shallot plants by using the right poultry manure organic fertilizer. This can contribute to reducing the excessive use of chemical fertilizers and help maintain the balance of the ecosystem.

This research can also attract the interest of scientists and researchers to carry out further research in developing environmentally friendly and sustainable agricultural technologies. Thus, this research can contribute to increasing the understanding and development of science in agriculture and the environment.

2. MATERIAL AND METHODS

From June to September 2021, we conducted this research in the experimental field of the Faculty of Agriculture, Universitas Siliwangi (Figure 1), Tasikmalaya (350 m asl). Geographical Coordinates at Latitude: -7.380108 and Longitude: 108.251304. Utilized the factorial randomized block design with two factors, repeated four times. The first factor is the type of organic poultry manure (J), which has three levels (J1 chicken, J2 duck, and J3 quail). Factor 2 is the organic poultry manure dose (D), divided into three groups (d1 10 t ha^{-1}, d2 15 t ha^{-1}, and d3 20 t ha^{-1}). In general, in the 36 study plots, the results of the research variables were consistent. Some of the influencing factors have been anticipated such as selecting the right and akin shallot plant varieties, determining the degree of acidity and soil analysis, applying mulch, watering for each treatment. Evaluate the degree of significance of the F test; the findings of the study were processed using statistical analysis ANOVA. If there is a significant effect, then the data is continued with Duncan's Multiple Distance Test at an error rate of 5% using the following formula:

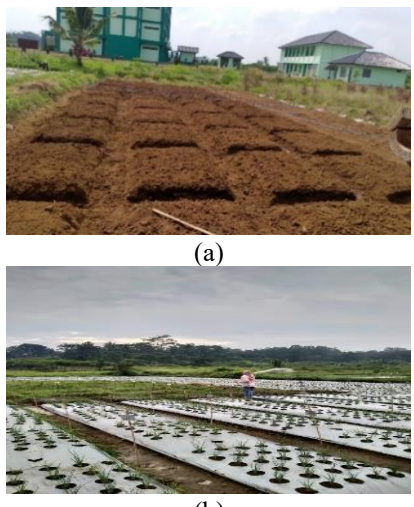
$$LSR = SSR \times (\alpha.dbg.p) \times Sx$$

Information:
LSR: Least Significant Range
SSR: Studentized Significant Range
α: Level 5%
Dbg: Degrees of error-free
p: Range
Sx: Standard error of a treatment mean

If there is an interaction, Sx is obtained by the following formula:

$$Sx = \sqrt{((KT\ Error)/r)}$$
$$SSR\ (.dbg.p\ )$$
$$LSR = SSR.S_{\chi}$$

Information:
Sx:Average standard error (standard error)
SSR: Studentized Significant Range
Dbg: Degrees of error-free
LSR: Least Significant Range
Sources: (Gomez & Gomez, 1984) [15].



(a)

(b)

Figure 1. Experimental Areal: (a) Experimental plot before planting; and (b) Experimental plot after planting

Parameters observed before harvest included plant height and the number of leaves. Parameters observed at harvest time were the number of bulbs, fresh weight of shallots per cluster, and fresh weight of shallots per plot. In contrast, dry bulb weight per cluster and dry bulb weight per plot were observed after the harvested shallots were dried for seven days at a temperature of 28℃ and 82% moisture. The surface of the mounds is covered with black silver plastic mulch or soil to maintain temperature and soil fertility and protect against erosion due to rain. Watering is done every morning and evening using well water at a dose of 100 mL per plant, but if the soil is still moist due to rainwater, watering is not carried out. In total, there were 36 research plots, where each plot measuring 1 m x 1.5 m, with a height of 30 cm with a distance between plots of 50 cm and a distance between replications of 50 cm, per plot of 27 plants with a spacing of 20 cm x 20 cm.

3. RESULTS AND DISCUSSION

3.1 Supporting observations

Supporting observations are observations whose data are not analyzed statistically and aim to determine the existence of other influences from outside the treatment. These observations include:

3.1.1 Soil analysis

Soil analysis was carried out before the experimental land was treated. This observation will be carried out in the soil chemistry laboratory, Faculty of Agriculture, Universitas Siliwangi. The elements analyzed were pH, C-Organic, N-Total, C/N, P_2O_5, and K_2O (Table 1).

Table 1. Soil chemical analysis results

Parameters	Unit	Results	Criteria
pH: H_2O	-	7.4	Neutral
C-Organic	%	2	Low
N-Total	%	0.75	High
C/N	-	2.66	Very low
P_2O_5	%	9.00	Medium
K_2O	%	18.00	Low

3.1.2 Organic fertilizer analysis

Analysis of chicken manure, duck manure and quail manure were carried out after going through the fermentation process. The elements analyzed are the elements pH, C-Organic, N-Total, C/N, P_2O_5, and K_2O (Table 2).

Table 2. Results of chemical analysis of organic fertilizer (chicken, duck, and quail manure)

Parameters	Organic Fertilizer			Unit
	Chicken	Duck	Quali	
pH: H_2O	6.8	8	7.5	-
C-Organik	6.2	6.3	6.1	%
N-Total	0.75	0.5	0.5	%
C/N	8.2	12.6	12.2	-
P_2O_5	60	58	58	%
K_2O	11	10	11	%

3.2 Height of plants

Plant height measurements were carried out starting from the soil surface to the highest tip by straightening all the leaves on each sample plant. Observations were made every two weeks, namely when the plants were 14, 28 and 42 days after planting (DAP). According to statistical analysis, there was an interaction between the kind and dose of organic poultry manure on shallot plant height at 42 days after planting (DAP) (Table 3).

Table 3. The effect of the type and dose of poultry fertilizer on the height of shallot plants (cm)

Observation Time (DAP)	Type of poultry	Fertilizer dosage			Average
		10 t ha^{-1}	15 t ha^{-1}	20 t ha^{-1}	
14	Chicken	21.98 a	21.63 a	20.32 a	21.31 a
	Duck	22.28 a	21.20 a	22.86 a	22.11 a
	Quail	21.89 a	21.40 a	20.58 a	21.29 a
	Average	22.05 A	21.41 A	21.25 A	
28	Chicken	33.57 a	31.20 a	30.56 a	31.78 a
	Duck	31.68 a	31.77 a	33.00 a	32.15 a
	Quail	31.66 a	31.67 a	30.76 a	31.36 a
	Average	32.30 A	31.54 A	31.44 A	
42	Chicken	47.09 b B	44.08 a A	43.56 a A	44.91 b
	Duck	41.23 a B	42.33 a A	44.65 a A	42.74 a
	Quail	43.45 a A	41.82 a A	42.67 a A	42.65 a
	Average	43.92 A	42.74 A	43.62 A	

Note: According to Duncan's Multiple Distance Test at a 5% significance level, the numbers followed by the same uppercase letters horizontally and the same lowercase letters vertically show that they are not substantially different.

According to statistical analysis, there was an interaction between the kind and dose of organic poultry manure on shallot plant height at 42 days after planting (DAP) (Table 1). Meanwhile, at 42 DAP, poultry manure organic fertilizer treatment had a substantial impact on plant height. The treatment of quail organic fertilizer was not substantially different from the dose of organic fertilizer at 42 DAP. Treatment doses of up to 15 t ha^{-1} and 20 t ha^{-1} of organic fertilizers were not significantly different from the types of organic fertilizers. Compared to other treatments, the organic fertilizer type and dose of up to 10 t ha^{-1} resulted in the maximum shallot plant height in the chicken treatment (Table 3). The ideal amount is 10 t ha^{-1}, which is supplied by the nutrient content of organic chicken fertilizer, which is higher in nutrients than other types of organic fertilizer. Can determine soil's physical, chemical, and biological properties with a high organic matter concentration. According to Widawati et al. [16], adding organic matter to the soil improves soil structure, allowing better aeration and drainage.

The availability of nutrients in the soil has a significant impact on plant height growth, and the amount of development relies on the type and dose of fertilizer used. According to

laboratory testing, organic chicken fertilizer has a more significant nitrogen concentration than duck and quail organic fertilizer. This amount causes the plant to replicate cells more quickly, allowing it to grow taller. Nitrogen is a fundamental macro element that is a critical component of various chemicals found in plants. The effect of N in increasing the pace of plant growth is linked to the increased development of shallots. According to Napitupulu and Winarto [17], N fertilizer application significantly impacts plant height increase. Plants require elements of N, P, and K, according to Puspadewi et al. [18], notably in encouraging plant height growth. When the onion plants were 42 DAP, the treatment of organic chicken fertilizer was significantly different from the other treatments (Figure 2).

Figure 2. Height measurement of sample

3.3 Number of leaves

Counting the number of leaves (strands) is done by counting the total number of leaves that appear on the sample plants. Observations were made every two weeks, namely when the plants were 14, 28 and 42 days after planting (DAP). According to statistical analysis, there was an interaction between the kind and dose of organic poultry manure on the number of leaves of shallot plants at the ages of 28 and 42 DAP (Table 4).

According to statistical analysis, there was an interaction between the kind and dose of organic poultry manure on the number of leaves of shallot plants at the ages of 28 and 42 DAP (Table 4). Meanwhile, the number of plant leaves at 42 DAP was considerably different from poultry manure organic fertilizer treatment. The number of plant leaves at 35 DAP was markedly different depending on the treatment dose of organic poultry manure.

The treatment of organic fertilizer types was considerably different from the dose of organic fertilizer at 28 DAP. The organic fertilizer treatment dose of 15 t ha^{-1} did not differ significantly from the treatment of organic fertilizer. Compared to other treatments, the organic fertilizer type and amount of up to 10 t ha^{-1} resulted in the maximum shallot leaves in the chicken treatment (Table 4). It is due to the increased N nutritional content of organic chicken fertilizer compared to other organic fertilizers, which promotes the growth of new shoots. The presence or absence of nutrition input to the plant influences the increase in the leaves on shallot plants. Plants require the nutrient N for protein formation, leaf growth, and metabolism, according to Firmansyah et al. [19]. Then, in line with the desired shallot plant to produce the most significant number of leaves, a quantity of organic fertilizer of up to 10 t ha^{-1} is used.

Table 4. The effect of poultry fertilizer type and dose on the number of leaves on shallot plants (pieces)

Observation Time (DAP)	Type of poultry	Fertilizer dosage			Average
		10 t ha^{-1}	15 t ha^{-1}	20 t ha^{-1}	
14	Chicken	17.69 a	17.25 a	17.86 a	17.60 a
	Duck	17.86 a	16.72 a	18.28 a	17.62 a
	Quail	18.92 a	16.78 a	16.61 a	17.44 a
	Average	18.16 A	16.92 A	17.58 A	
28	Chicken	35.81 b B	31.20 a A	32.08 ab A	33.03 a
	Duck	31.06 a B	29.81 a A	34.34 b A	31.73 a
	Quail	32.86 a B	29.14 a A	30.95 a AB	30.98 a
	Average	33.24 B	30.05 A	32.45 B	
42	Chicken	55.17 c B	48.14 a A	48.50 a A	50.60 b
	Duck	49.95 b AB	51.8 a B	46.36 a A	49.30 ab
	Quail	45.22 a A	49.50 a B	47.86 a AB	47.53 a
	Average	50.11 A	49.74 A	47.57 A	

Note: According to Duncan's Multiple Distance Test at a 5% significance level, the numbers followed by the same uppercase letters horizontally and the same lowercase letters vertically show that they are not substantially different.

The treatment of the type of organic fertilizer was significantly different from the dose of organic fertilizer at 42 DAP (Figure 3). Treatment doses of up to 15 t ha^{-1} and 20 t ha^{-1} of organic fertilizers were not substantially different from the types of organic fertilizers. Compared to other treatments, the organic fertilizer type and dose of up to 10 t ha^{-1} resulted in the maximum shallot leaves in the chicken treatment (Table 4). These findings support the findings of Budianto et al. [20], who found that applying up to 10 t ha^{-1} of chicken manure increased the number of shallot plant leaves. Shallot plants require a lot of nutrients, especially N, P, and K, in a short amount of time for the vegetative process, which includes the formation of roots, stems, and leaves. Thus these elements must constantly be present in the soil.

When the onion plants were 42 DAP, the treatment with organic chicken fertilizer produced the maximum number of leaves. The gradual release or slow release of organic chicken fertilizer is assumed to be the significant effect of therapy at this age. Slow-release fertilizer provides nutrients delivered gradually over a lengthy period, preventing them from being washed away [21]. Organic chicken fertilizer, despite its slowness, includes macro and micronutrients that plants require [22]. Furthermore, these findings are consistent with the height characteristics at 42 DAP, which were considerably different. At 28, DAP, a dose of organic fertilizer of up to 10 t ha^{-1}, generated the most significant number of leaves. It is the most effective dose for onion leaf growth. According to Budianto et al. [20], using a fertilizer dose that corresponds to

the onion plant's needs will optimize growth.

Figure 3. Number of leave measurement of sample

3.4 Number of bulbs

Based on the statistical analysis results, there is an interaction between the type and dose of organic fertilizer of poultry manure on the number of shallot bulbs (Table 5).

Table 5. The effect of type and dose of poultry fertilizer on the number of shallot bulbs

Type of poultry	Fertilizer dosage			Average
	10 t ha^{-1}	15 t ha^{-1}	20 t ha^{-1}	
Chicken	16.20 b B	15.33 a AB	12.28 a A	14.60 a
Duck	11.97 a A	15.50 a B	16.95 b B	14.81 a
Quail	11.95 a A	16.72 a B	10.00 a A	12.89 a
Average	13.37 A	15.85 B	13.07 A	

Note: According to Duncan's Multiple Distance Test at a 5% significance level, the numbers followed by the same uppercase letters horizontally and the same lowercase letters vertically show that they are not substantially different.

Based on the statistical analysis results, there is an interaction between the type and dose of organic fertilizer of poultry manure on the number of shallot bulbs (Table 5). Meanwhile, the dose treatment of organic poultry manure was significantly different from the number of shallot bulbs. The treatment of types of organic fertilizers was substantially different from the dose of organic fertilizers. In the antidote to the kind of organic fertilizer, ducks and a dose of 20 t ha^{-1} produced the highest shallot bulbs compared to other treatments (Table 5) due to the organic C content and better C/N ratio compared to different types of organic fertilizers combined with a dose of 20 t ha^{-1}, which is the ideal dose for onion bulb growth. According to Farrasati et al. [23], C-organic soil can maintain soil quality to support plant growth. Then according to Smith et al. [24], C-organic acts as an indicator of soil fertility improves soil physical properties and maintains the survival of soil microorganisms.

Shallot bulbs are formed from enlarged and fused layers of leaves. This formation process is inseparable from the mechanism of action of N nutrients. Elemental N is the essential ingredient for the formation of nucleic acids that play a role in the cell nucleus for the cell division process to form leaf layers which then develop into tubers [25]. According to Sumiati and Gunawan. [26], the yield of shallot bulbs will decrease if the plant is deficient in N. The number of bulbs produced by shallots is influenced by soil nutrient content and genetic factors. The variety significantly affects the yield of shallot bulbs [27]. According to Azmi and Wiguna [28], forming shallots requires a more extended number of days. The onion bulbs will continue growing and developing new tillers when the minimum day length limit is reached. Independently, the dose treatment of organic fertilizer as much as 15 t ha^{-1} produced the highest number of tubers compared to other treatments (Figure 4). Giving organic fertilizer to the soil causes the soil to become loose, making it easier for plants to form more tubers.

Figure 4. Number of tubers measurement of sample

3.5 Fresh weight of shallots per clump

The fresh weight of onion bulbs per clump was obtained by weighing the bulbs harvested from each clump using a digital scale. Before weighing, the bulbs are cleaned first of the soil attached to the bulbs. According to statistical analysis, there was an interaction between the type and dose of organic poultry manure on the fresh weight of shallots per clump (Table 6).

Table 6. The effect of poultry fertilizer type and dose on the fresh weight of shallots per clump (grams)

Type of poultry	Fertilizer dosage			Average
	10 t ha^{-1}	15 t ha^{-1}	20 t ha^{-1}	
Chicken	94.45 b B	88.94 a B	55.95 a A	79.78 b
Duck	54.95 a A	77.56 a B	89.92 b C	74.14 b
Quail	62.47 a A	78.61 a B	55.67 a A	65.58 a
Average	70.62 A	81.70 B	67.18 A	

Note: According to Duncan's Multiple Distance Test at a 5% significance level, the numbers followed by the same uppercase letters horizontally and the same lowercase letters vertically show that they are not substantially different.

According to statistical analysis, there was an interaction between the type and dose of organic poultry manure on the fresh weight of shallots per clump (Table 6). Meanwhile, the new importance of shallots per clump differed from treating various types and doses of organic poultry manure. Treatment with up to 15 t ha^{-1} of fertilizer did not differ significantly from treatment with organic fertilizers. The number of organic fertilizers was substantially different from the treatment of various organic fertilizers. Compared to other treatments, the fresh weight of shallots per clump was the heaviest in the treatment using chicken organic fertilizer type and a dose of organic fertilizer as high as 10 t ha^{-1} (Table 6). It is due to the higher nutrient content of organic chicken fertilizer, particularly nitrogen, compared to other types of organic

fertilizer and a dose of 10 t ha^{-1}, which is the optimal amount for shallot plant growth and development. A continual cell division and enlargement process are necessary to support this growth. A high N concentration is required as an essential ingredient for protein synthesis in this process.

Furthermore, organic chicken fertilizer has more P and K than duck or quail organic fertilizer. P and K are vital in metabolic activities because P is a component of ATP, and K is involved in several enzymatic reactions. K nutrients are required for tuber development, expansion, and elongation, according to Ispandi [29]. High doses of N and K fertilizers can improve the fresh weight of shallots, according to Napitulu and Winarto [17].

Compared to ducks and quails, the treatment with chicken-type organic fertilizer resulted in the most significant fresh weight of shallots per clump. A dose of organic fertilizer of up to 15 t ha^{-1} is optimum for the new importance of shallots per clump. The plant experienced a nutritional deficit at 10 t ha^{-1}, while the plant experienced an overabundance of nutrients at a dose of 20 t ha^{-1} (Figure 5). Unsuitable fertilization will be ineffective since the plant will not absorb the provided element. These nutrients can be harmful to humans or plants. According to Laude and Tambing [30], Fertilization must be done correctly to get maximum growth and yields.

Figure 5. Fresh weight of shallots per clump measurement

3.6 Pounds of fresh shallots per plot

Fresh weight of shallots per plot was carried out at the end of the study by weighing the bulbs harvested from each plot of plants. Before weighing, the tubers are cleaned of soil attached to the bulbs. According to statistical analysis, there was an interaction between the kind and dose of organic poultry manure on the fresh weight of shallot bulbs per plot (Table 7).

Table 7. The effect of poultry fertilizer type and dose on the fresh weight of shallots per plot (kg)

Type of poultry	Fertilizer dosage			Average
	10 t ha^{-1}	15 t ha^{-1}	20 t ha^{-1}	
Chicken	2.130 b B	1.594 a A	1.307 a A	1.677 b
Duck	1.297 a A	1.446 a A	1.976 b B	1.573 b
Quail	1.369 a A	1.378 a A	1.207 a A	1.318 a
Average	1.599 A	1.473 A	1.497 A	

Note: According to Duncan's Multiple Distance Test at a 5% significance level, the numbers followed by the same uppercase letters horizontally and the same lowercase letters vertically show that they are not substantially different.

According to statistical analysis, there was an interaction between the kind and dose of organic poultry manure on the fresh weight of shallot bulbs per plot (Table 7). Meanwhile, the new importance of shallot bulbs per plot differed greatly depending on poultry manure organic fertilizer. The quail organic fertilizer treatment did not differ significantly from the dose of organic fertilizer. Treatment doses of up to 15 t ha^{-1} of organic fertilizer were not substantially different from the type of organic fertilizer. Compared to other treatments, the organic fertilizer type and amount of 10 t ha^{-1} resulted in the heaviest fresh weight of shallots per plot in the chicken treatment (Table 7). It is owing to the higher N content of organic chicken fertilizer compared to other types of organic fertilizer and the fact that it is applied at the correct amount of 10 t ha^{-1}. The use of high N fertilizer doses caused the plants to become more succulent (high water content), resulting in an increase in fresh weight per clump. It is in line with Napitupulu and Winarto [17] findings, which found that applying N fertilizer to shallot bulbs can enhance their moist weight. Compared to ducks and quails, the organic fertilizer treatment of chicken species resulted in the highest dry weight of shallots per clump (Figure 6). More nutrients are absorbed because of the higher nutrient content of N, P, and K in organic chicken fertilizer.

Figure 6. Pounds of fresh shallots per plot of measurement

3.7 Dry weight of shallots per clump

The dry bulbs weight per clump was obtained by weighing the tubers harvested from the sample plants in each clump after drying in the sun for seven days. According to statistical analysis, there is a relationship between the kind and dose of poultry manure organic fertilizer and the dry weight of shallot bulbs (Table 8).

Table 8. The effect of the kind and dose of poultry fertilizer on the dry weight per clump of shallots (grams)

Type of poultry	Fertilizer dosage			Average
	10 t ha^{-1}	15 t ha^{-1}	20 t ha^{-1}	
Chicken	76.41 b B	72.92 b B	44.28 a A	64.53 b
Duck	42.86 a A	60.83 a B	73.72 b C	59.14 b
Quail	49.00 a A	62.42 ab B	44.08 a A	51.83 a
Average	56.09 A	65.39 B	54.03 A	

Note: According to Duncan's Multiple Distance Test at a 5% significance level, the numbers followed by the same uppercase letters horizontally and the same lowercase letters vertically show that they are not substantially different.

According to statistical analysis, there is a relationship between the kind and dose of poultry manure organic fertilizer and the dry weight of shallot bulbs (Table 8). Meanwhile, the dry weight of shallot bulbs was considerably different from the treatment of various types and doses of organic poultry manure. The number of organic fertilizers was significantly different from the treatment of different organic fertilizers. The type of organic fertilizer had a considerable impact on the treatment dose of organic fertilizer. Compared to other treatments, the organic fertilizer type and amount of up to 10 t ha^{-1} resulted in the heaviest red bottom dry weight per clump in the treatment of chickens (Table 8). It is owing to the higher levels of N, P, and K in chicken organic fertilizer compared to other types of organic fertilizer, as well as a dose of 10 t ha^{-1}, which is the optimal dose for boosting the dry weight shallot bulbs.

Plant dry weight is the total amount of carbohydrates available for growth throughout a plant's life [31]. Can use the dry weight of organic fertilizer to estimate how much is absorbed by plants in the form of minerals. Compared to ducks and quails, the organic fertilizer treatment of chicken species resulted in the highest dry weight of shallots per clump. Organic chicken fertilizer has a higher nutrient content of N, P, and K than ducks and quails, absorbing more nutrients. On the dry weight of shallots per plant, a dose of organic fertilizer of up to 15 t ha^{-1} is optimum (Figure 7). The plant can develop optimally at this dose, resulting in maximum dry weight.

Figure 7. Dry weight of shallots per clump of measurement

3.8 Dry weight of shallots per hectare

The dry weight of shallots per hectare was obtained by weighing the tubers harvested in each clump after drying in the sun for seven days, then converted into per hectare, with the formula: According to statistical research, there is an interaction between the type and dose of organic poultry manure and the dry weight of shallots per hectare (Table 9).

Table 9. The effect of poultry fertilizer type and dose on the dry weight of shallots per hectare (tons)

Type of poultry	Fertilizer dosage			Average
	10 t ha^{-1}	15 t ha^{-1}	20 t ha^{-1}	
Chicken	9.81 b B	7.21 a A	5.65 a A	7.56 b
Duck	5.35 a A	6.34 a A	9.01 b B	6.90 b
Quail	5.84 a A	5.94 a A	5.06 a A	5.61 a
Average	7.00 A	6.50 A	6.57 A	

Note: According to Duncan's Multiple Distance Test at a 5% significance level, the numbers followed by the same uppercase letters horizontally and the same lowercase letters vertically show that they are not substantially different.

According to statistical research, there is an interaction between the type and dose of organic poultry manure and the dry weight of shallots per hectare (Table 9). Meanwhile, the dry weight of shallots per acre was significantly different from poultry dung organic fertilizer treatment (Figure 8). The quail organic fertilizer treatment did not differ considerably from the dose of organic fertilizer. Treatment doses of up to 15 t ha^{-1} of organic fertilizer were not substantially different from the type of organic fertilizer. Organic fertilizers can stimulate a variety of soil organisms, allowing them to release phytohormones and encourage plant development [32]. Compared to other treatments, the organic fertilizer type and dose of 10 t ha^{-1} resulted in the heaviest dry weight of shallots per plot in the chicken treatment (Table 9). It is because chicken organic fertilizers include more N, P, and K than other organic fertilizers. According to Napitupulu and Winarto [17], the combination of N and K causes shallots to have a high dry weight. Potassium aids the photosynthetic process, namely the creation of organic molecules stored in storage organs, such as tubers, according to Tränkner et al. [33]. When the correct amount of organic fertilizer is applied to shallot bulbs, production rises [34].

Figure 8. Dry weight of shallots per hectare of measurement

4. CONCLUSIONS

There are three-point of conclusions in this research: i) on the parameters of plant height at 42 DAP, number of leaves at 28 and 42 DAP, number of bulbs, fresh weight of shallots per clump, fresh weight of shallots per plot, and dry weight of shallots per hectare, there was an interaction between the type of organic fertilizer and the dose of organic fertilizer; ii) height at 42 DAP, number of leaves at 42 DAP, fresh weight of shallots per clump, fresh weight of shallots per plot, dry weight of shallots per clump, and dry weight of shallots per hectare were all affected by the type of organic fertilizer used. Meanwhile, the number of leaves at 28 DAP, the number of bulbs, and the fresh weight of shallots per clump. The dried weight of shallots per clump was all affected by the dose of organic fertilizer. For all observation parameters, the combination of chicken organic fertilizer application at a dose of 10 t ha^{-1} produced the most outstanding results. Further research could include comparing the use of organic fertilizers with inorganic fertilizers to determine the benefits and drawbacks of each type of fertilizer, as well as analyzing the effect of using organic poultry manure on the quality and freshness of the red onions produced. Compared the effect of

using fermented poultry manure organic fertilizer with raw poultry manure organic fertilizer. Make economic calculations to compare production costs using organic poultry manure with production costs using inorganic fertilizers, and determine the inhibiting and supporting factors in the commercial scale, such as raw material accessibility, government support, and farmers' skills in using organic fertilizers.

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