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Effectiveness of Applying Photosynthetic Eco Farming Fertilizers and Various Animal Manures on The Growth and Production of Shallot Plants (Allium *Ascolonicum* L)

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***Abstract*—The purpose of this study is to find out the effectiveness of photosynthetic eco farming fertilizer on the growth and production of shallot plants (*Allium ascolonicum)* L). To determine the effectiveness of the application of various animal manure fertilizers and the interaction between the application of photosynthetic eco farming fertilizers and various animal manure fertilizers on the growth and production of onion plants (*Allium ascolonicum* L). This research was carried out from April 2025 to June 2025 on Jalan Makmur Dusun IV, Banyu Mas Village, Stabat. Langkat Regency with an altitude of ± 25 meters above sea level. North Sumatra Province.. The study used the Factorial Group Random Design (RAK) method with the first factor of giving Eco Farming Photosynthesis with the symbol "E" consisting of 4 levels, namely: E0 = 0 (control), E1 = 100 ml/ l water/ plot, E2 = 200 ml/ l water/ plot, E3 = 300 ml/ l water/ plot, The second factor of giving several animal manure fertilizers with the symbol "K" consisted of 4 types, namely: K0 = No treatment (0 kg/plot), K1 = chicken manure (2 kg/ plot), K2 = goat manure (2 kg/ plot), K3 = cow manure (2 kg/ plot) The research parameters include; plant height (cm), number of leaves (strands), number of bulbs per sample (fruit), number of bulbs per plot (fruit), [production er sample (g), production per plot (g), The results of the study show that . The effectiveness of applying photosynthetic eco farming fertilizers and various animal manure on the growth and production of onion plants (*Allium ascolonicum* L) has a significant effect on plant height, number of leaves, number of bulbs per sample, number of bulbs per plot, production per sample and production per plot. The interaction between the application of photosynthetic eco farming fertilizer and animal manure fertilizer did not affect all observed parameters.**

Keywords— onion; eco farming; autosynthesis; effectiveness; animal; red; livestock;

I. INTRODUCTION

Shallots are one of the main vegetable commodities in Indonesia and have many benefits. Onions are included in the group of non-substituted spices that function as seasonings for food flavoring and traditional medicinal ingredients. Based on data from the National Nutrient Database, shallots contain carbohydrates, sugars, fatty acids, proteins and other minerals needed by the human body (Waluyo and Sinaga, 2015)

Shallots are one of the horticultural crop commodities that are widely consumed by humans as a mixture of cooking spices after chili. Apart from being a mixture of cooking spices, shallots are also sold in processed forms such as onion extract, powder, essential oil, fried onions and even as a medicinal ingredient to lower cholesterol levels, blood sugar, prevent blood clots, lower blood pressure and improve blood flow. As a horticultural commodity that is widely consumed by the public, the potential for the development of shallots is still wide open not only for domestic but also foreign needs (Suriana, 2015).

Shallots are one of the strategic commodities in Indonesia, because changes in the price of shallots can affect inflation. The cause of high inflation can be caused by an increase in the price of shallots. In addition, shallots are also one of the *high-value commodities* so many farmers cultivate them. The total amount of shallot production in Indonesia in 2015 reached 1.30 million tons and increased in 2019 by 1.51 million tons or by 5.11 percent (Central Statistics Agency, 2019)

In general, the main distribution patterns of the shallot trade in North Sumatra Province are as follows: The demand for shallots continues to increase all the time while the production of shallots is seasonal. This condition causes turmoil between supply and demand so that it can cause price fluctuations between times. The demand for shallots continues to increase in line with the increase in population and the consumption needs of the community (Dewi, 2014).

One of the farmers' efforts to increase the production and quality of shallot tubers is by intensifying fertilization, for example by increasing the availability of nutrients through the fertilizers provided. However, these efforts often do not provide the expected increase in yields, due to several factors, including the fertilization provided is not in accordance with the needs of the plants and the fertility conditions of the land (Wulandari, 2014).

The use of organic fertilizers can be a solution in reducing the excessive use of inorganic fertilizers. The use of organic fertilizers is increasing in line with the development of organic agriculture. This is because there is an awareness that the continuous use of inorganic fertilizers will cause a decrease in soil fertility, for example, element K in inorganic fertilizers (N, P, K) is one of the nutrients that is easy to wash, so that the soil will lack element K which can reduce soil fertility (Glio, 2015).

One of the steps that can be taken is by applying photosynthetic eco farming organic fertilizer, the decomposition of photosynthetic eco farming fertilizer can

increase soil pH and improve the physical, chemical and biological properties of the soil and restore the fertility of the soil which causes the availability of nutrients N, P and K for plants, eco farming fertilizer contains Organic C 51.06%, Nitrogen 3.35%, C/N 15.24, P 4.84%, K, 1.47% and pH 7 (Gunawan *et al.*, 2022).

According to Gunawan *et al* (2022), photosynthetic eco farming is a super active organic fertilizer or nutrient that already contains complete nutrients according to plant needs and is equipped with positive bacteria that will be a biocatalyst in the process of improving physical, chemical and biological properties in restoring soil fertility.

Eco farming photosynthesis is an environmentally friendly organic fertilizer that aims to produce agricultural products optimally without damaging the environment. Be it physically, biologically, chemically, or ecologically. Photosynthetic eco farming organic fertilizer that is able to meet 13 nutrients, of course, will be the best solution that is very superior for farmers to provide sufficient and balanced nutrition for their crops (Budiman and Nurjaya, 2020).

Efforts to increase the production and productivity of shallot plants can use organic fertilizers, one of which is the use of livestock manure fertilizers such as goat manure fertilizer, chicken manure fertilizer, cow manure fertilizer and other livestock manure fertilizers. Fertilizer solid and liquid manure from livestock, both ruminant livestock and poultry. Actually, the advantage of manure does not lie in the nutrient content because actually livestock manure has a low nutrient content. The advantage is that livestock manure fertilizer can increase humus, improve soil structure, and increase the life of decomposer microorganisms (Ali and Syarifudin, 2014).

Livestock manure fertilizer is very beneficial for increasing agricultural production in both quality and quantity, reducing environmental pollution, and improving land quality in a sustainable manner. The long-term use of organic fertilizers from animal manure can increase land productivity and can prevent land degradation. The application of fertilizer for livestock manure can also improve the physical properties of the soil, namely increasing the capacity of the soil to hold water, reducing the density of soil mass, increasing total porosity, improving the stability of soil aggregates, and increasing the humus content of the soil. Soil fertility biologically can be interpreted as the availability of microorganisms in the soil that are able to decompose organic matter in the soil that was previously unavailable to plants. Improving the physical, chemical, and biological quality of the soil will increase plant growth and production, both directly and indirectly (Kusuma, 2014).

II. LITERATURE REVIEW

A. Botany of Shallot Plants

1. Root

   Fibrous shallot roots consist of primary roots that function as *adventitious roots* and root feathers that function to support the plant's standing and absorb water and nutrients from the soil. The roots can grow up to a depth of 30 cm, white in color (Annisava and Solfan, 2014).

2. Trunk

   Shallots have pseudo-stems or called "discus" which are shaped like discs, thin, and short as a place for the roots and buds to be attached. The upper part of the discus forms a pseudo-stem composed of leaf fronds. The pseudo-stems that are in the soil will change shape and function into layer bulbs, between the layers of bulbous petals there are buds that can form new plants in ordinary shallot species (Wulandari, 2014).

3. Leaf

   Shallots have relatively short stems, light green to dark green in color, cylindrical shaped like an elongated and hollow pipe, and tapered tips, measuring more than 45 cm long. In newly sprouted leaves, there are usually no cavities. This cavity is clearly visible as the leaves grow into large. Once the leaves turn yellow, they are no longer as upright as the young leaves, and eventually dry starting from the bottom of the plant. The leaves are relatively soft, if squeezed, they will smell specific like the smell of shallots (Wulandari, 2014).

4. Flower

   Shallot flowers are perfect flowers, having a tangent and pistils. Each flower consists of six white flower leaves, six yellowish-green stamens, and a pistil, sometimes among the shallot florets are found flowers that have very small and short pistils or rudimentary, which are thought to be sterile flowers. Although the number of florets is large, the flowers that succeed in holding a contest are relatively few (Estu *et al*, 2015).

5. Fruit/ Tuber

   The fruit is round in shape with a blunt tip wrapping the seeds in the amount of 2 – 3 seeds. The shape of the seeds is somewhat flattened, when young it is clear or white, but after age it becomes black. Shallot seeds can be used as a material for plant propagation generatively. The layer tubers of shallots vary greatly. The shape is round, round, to flat, while the size of the bulb includes large, medium, and small. The color of the tuber skin is white, yellow, pink to dark red. Shallot tubers are commonly used as plant propagation materials (Wulandari, 2014).

6. Seed

   The fruit of the shallot is round in shape with a blunt tip wrapping the seeds in the amount of 2-3 seeds. The shape of the seeds is flat, when young it is clear or white, but after age it becomes black. Red seeds can be used as a generative propagation material (Estu *et al*., 2015)

B. Requirements for Growing Coffee Plants

1. Climate

   In Indonesia, shallots can be grown in lowlands up to an altitude of 1000 m above sea level. The optimal place altitude for the growth and development of shallots is 0-450m above sea level (Rubatzky and Yamaguchi., 2015). Rainfall 300-2500 mm/year, air humidity 80-90%, open places without shade with ± 70% lighting, full sun intensity more than 14 hours/dayBecause shallots are plants that require long enough sunlight, gentle wind blows have a good effect on plants on the rate of photosynthesis and tuber formation (Suriana, 2015).

   The optimal temperature for onion plant growth ranges from 60-70°F (15-20°C) and 70-80°F (20-27°C) for tuber growth and development. Although shallot plants can form bulbs when planted in an area with an average air temperature of 22ºC, the bulb yield will not be optimal as if planted in an area with a warmer air temperature. Shallots will form larger bulbs when planted in an area with more than 12 hours (12-13 hours) of irradiation.

Below 22ºC, shallot plants do not have bulbs (Baswarsiati, 2015).

2. Soil

Shallot plants grow better in loose, fertile, and abundant organic soil. The soil that is suitable for the growth of shallots is for example dusty clay or sandy clay, the most important thing is that the groundwater condition does not stagnate. On land that is often flooded, good drainage must be made. The degree of acidity of the soil (pH) is between 5.5 – 6.5 (Baswarsiati, 2015).

3. Photosynthetic Eco Farming Fertilizer

Organic fertilizer is the result of the decomposition of organic materials that are broken down (overhauled) by microbes, which can ultimately provide the nutrients that plants need for growth and development. Organic fertilizers are very important for the world of agriculture, namely as a buffer for the physical, chemical and biological properties of the soil so that it can increase fertilizer efficiency and soil productivity (Andyana, 2017).

Eco farming photosynthesis is a super active organic fertilizer or nutrient that contains complete nutrients according to the needs of plants and is also complemented by positive bacteria in the process of improving the physical, biological and chemical properties of the soil, eco farming contains 51.06% organic C, 3.35% total nitrogen, C/N 15.24%, phosphorus 4.84%, and potassium 1.47%, the application of eco farming fertilizer can increase plant growth and production (Gunawan *et al*., 2022).

Photosynthetic eco farming fertilizers have several benefits, including fertilizing the soil or loosening it, making nutrients that are not yet available in the soil available by various decomposition processes, activating microorganisms in the soil so that the soil is fertile, neutralizing the pH or acidity of the soil, and increasing the availability of nutrients in the soil (Nutriani, 2018).

Photosynthetic eco farming fertilizer is an organic fertilizer produced with the aim of increasing plant productivity by improving the texture of agricultural soil. In addition to meeting the nutrient needs of plants, this fertilizer helps the domain in repairing its damaged texture, including in terms of pest control (Gunawan *et al.,* 2022).

Photosynthetic Eco Farming Fertilizer is a fertilizer based on D.I. Grow ingredients such as rice husks, azola (moss), to beans, manure and MA-11 where MA-11 is able to change organic matter in a very fast time. Eco Farming can improve soil texture, accelerate the harvest period, plant more resistant to pests, prevent plant pests, increase production yields, improve production quality. It can be used on horticultural, food and plantation crops. This Eco Farming Fertilizer contains macro, micro and secondary nutrients needed by all types of plants for healthy and productive growth (Farikhah, 2017).

4. Animal Manure Fertilizer

Organic fertilizers are fertilizers derived from the remains of plants, animals or humans, such as manure, green manure and compost, both in liquid and solid form. The main benefit of organic fertilizers is to improve the chemical, physical, and biological fertility of the soil, in addition to being a source of nutrients for plants. Organic fertilizers or organic matter are the main source of soil nitrogen, and in the soil organic fertilizer will be overhauled by microorganisms into humus, or soil organic matter (Kesumaningwati. 2015).

Manure manure is solid and liquid manure from livestock, both ruminant and poultry. Actually, the advantage of manure does not lie in the nutrient content because in fact manure has a low nutrient content. The advantage is that manure can increase humus, improve soil structure, and increase the life of decomposer microorganisms (Kusuma, 2014).

Animal manure contains organic matter that can provide nutrients to plants through the decomposition process. This process occurs gradually by releasing organic matter that is simple for plant growth. Animal feces composed of feces, urine and feed residues contain high nitrogen. Animal manure has several beneficial properties, including improving soil structure, increasing the binding capacity of sandy soils, increasing water binding in the soil, improving drainage and air management in the soil, increasing the binding capacity of the soil against nutrients, containing complete nutrients, helping the weathering process of mineral materials, providing the availability of food for microbes (Sukmana and Muljatiningrum, 2014).

Animal manure fertilizer is a fertilizer derived from the manure of livestock, such as cows, horses, goats, chickens, and sheep that have functions, including adding plant nutrients, increasing the content of humus and soil organic matter, improving soil structure and improving soil microorganisms (Sudiarto, 2017).

Animal manure fertilizer consists of a mixture of solid manure, urine, and food (plant) residues. Livestock manure fertilizer has several advantages compared to inorganic fertilizers, namely it can improve soil structure, add nutrients, increase the content of humus and organic matter, and improve the life of microorganisms living in the soil (Djaja, 2015).

5. Cow Manure Fertilizer

Cow manure is waste from cattle farming business which is dense and in the process of disposal is often mixed with urine and gases, such as methane and ammonia. The nutrient content in cow manure varies depending on the state of the production level, type, amount of feed consumption, and the individual livestock themselves (Budiyanto, 2015).

Cow manure is an organic material that specifically plays a role in increasing the availability of phosphorus and microelements, reducing the adverse effects of aluminum, providing carbon dioxide to plant canopies, especially in plants with dense canopies where air circulation is limited. Cow manure contains a lot of nutrients needed by plants such as nitrogen, phosphorus, potassium, calcium, magnesium, sulfur and boron (Huda, 2016). Cow manure contains nutrients N 0.64%, P 0.15%, K 0.30%, Ca. 0.12%, Mg 0.10%, Mn 179 ppm and Zn 70.5 ppm (Andayani and La Sarido, 2014)

6. Chicken Manure Fertilizer

Chicken manure has the advantage of having a higher content of nutrients and organic matter. Chicken manure compared to other manure, has a higher nutrient content, especially N, P and organic matter. In addition, the availability of chicken manure is very large due to the rapid development of livestock in the poultry sector,

especially broilers and laying hens, therefore chicken manure is very suitable to be processed into organic compost (Taufila *et al*., 2017).

Chicken manure is one of the waste produced by both laying hens and broilers which has great potential as an organic fertilizer. The composition of the manure varies greatly depending on the physiological properties of the chickens, the rations eaten, the environment of the pen including temperature and humidity. Chicken manure is one of the organic materials that affects the physical, chemical and growth properties of plants. Chicken manure has a high content of nutrients and organic matter as well as a low water content. Each chicken produces approximately 6.6% of the live weight per day (Ali, and Syarifudin, 2014). Chicken manure contains nutrients N. 1.5%, P. 1.3%, K.0.8%, Ca. 1.57%, Mg. 1.44%, Mn. 2.50 ppm and Zn 315 ppm (Andayani and La Sarido, 2014)

7. Goat Manure Fertilizer

Goat manure contains organic matter that can provide nutrients to plants through the decomposition process. This process occurs gradually by releasing organic matter that is simple for plant growth. Goat feces contain dry matter and nitrogen respectively 40 – 50% and 1.2 – 2.1%. The content depends on the ingredients that make up the ration, the level of feed nitrogen solubility, the biological value of the ration, and the ability of livestock to digest the ration (Andayani and Sadiro, 2014).

Goat manure is highly recommended for agriculture and increasing agricultural yields, because considering that the content of goat/sheep manure has a great influence on plant growth compared to other manure. and is also highly recommended as fertilizer to be given to all kinds of plants such as rice, palawija, cassava, cassava, vegetables, chili, eggplant, tomatoes and many others (Sundari, 2016).

III. Results and Discussion

A. Result

1. Plant Height (cm)

The results of the study after statistical analysis showed that the application of photosynthetic eco farming fertilizer did not affect the age of 2 weeks after planting, but did affect the age of 4 and 6 weeks after planting. The application of some animal manure fertilizer affects the height of the plant at the age of 2, 4 and 6 weeks after planting.

The interaction between the application of photosynthetic eco farming fertilizer and some animal manure fertilizers did not affect plant height at 2, 4 and 6 weeks after planting.

The average yield of plant height at 2, 4 and 6 weeks after planting after the average difference test using the Duncan distance test can be seen in Table 1.

Table 1. Average Plant Height (cm) Due to the Application of Photosynthetic Eco Farming Fertilizer and Some Animal Manure Fertilizers at the Age of 2, 4 and 6 Weeks After Planting.

Treatment	Plant Height (cm)		
	2 MST	4 MST	6 MST
E = Eco Farming Photosynthesis			
E0 = 0 ml/ l water/ plot	20.89 bB	33.20 dC	43.49 dD
E1 = 100 ml/ l water/ plot	21.39 bB	34.94 cB	46.44 cC
E2 = 200 ml/ l water/ plot	22.32 aA	35.51 bA	48.94 bB
E3 = 300 ml/ l water/ plot	22.75 aA	36.11 aA	50.73 aA
K = Some Animal Manure			
K0 = No treatment (control)	21.11 bB	33.60 dC	45.46 dD
K1 = Chicken Manure Fertilizer	21.68 bA	34.56 cB	46.96 cC
K2 = Goat Manure Fertilizer	22.04 aA	35.20 bB	48.03 bB
K3 = Cow Manure Fertilizer	22.48 aA	36.21 aA	49.09 aA

Information: Numbers in the same column followed by the same letter show a difference that is not real at the level of 5% (lowercase) and a very real difference at the level of 1% (uppercase).

Table 1 can be explained that the application of photosynthetic eco farming fertilizer affects the height of plants at the age of 6 weeks after planting, where the highest plants are obtained in the E3 treatment (300 ml/l water/plot) which is 50.73 cm, which is very different from the E2 treatment (200 ml/l water/plot) which is 48.94 cm, the E1 treatment (100 ml/ liter of water) which is 46.44 cm and the E0 treatment (0 ml/ l water/plot) which is 43.49 cm.

The results of the regression analysis of the application of photosynthetic eco farming fertilizer to plant height at 6 weeks after planting showed a linear relationship, as presented in Figure 1.

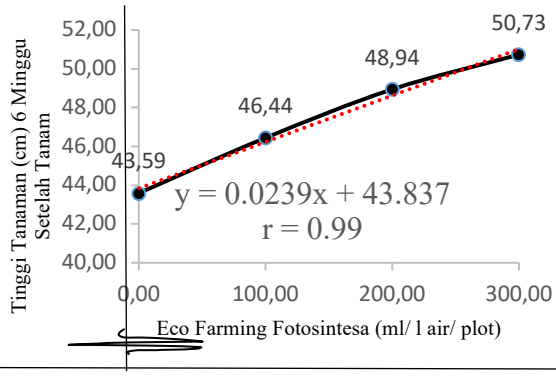

Figure 1. The Relationship Between Photosynthetic Eco Farming Fertilizer Application (ml/l water/plot) and Plant Height (cm) at 6 Weeks Age After planting.

Table 1 can also be explained that the application of several animal manure fertilizers affects the height of plants at the age of 6 weeks after planting, where the highest crop was obtained in the K3 (cow manure) treatment which was 49.09 cm, in contrast to the K2 treatment (goat manure) which was 48.03 cm, the K1 treatment (chicken manure) which was 46.96 cm and the K0 (control) treatment which was 45.46 cm.

The average plant height due to the treatment of several animal manure fertilizers at the age of 6 weeks after planting can be seen in the stem diagram in Figure 2.

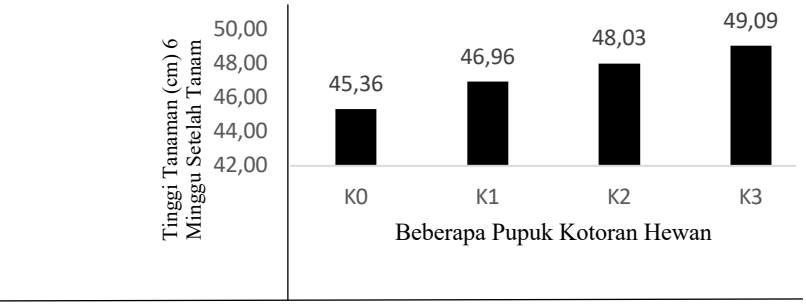

Figure 2. Diagram of the Relationship Relationship of Treatment of Several Animal Manure Fertilizers with Plant Height (cm) at the Age of 6 Weeks After Planting.

2. Number of Leaves (strands)

The results of the study after statistical analysis showed that the application of photosynthetic eco farming fertilizer and some animal manure fertilizers had an effect on the number of leaves at the age of 2, 4 and 6 weeks after planting. The interaction between the application of photosynthetic eco farming fertilizer and some animal manure fertilizers did not affect the number of leaves at 2, 4 and 6 weeks after planting.

The average result of the number of leaves at 2, 4 and 6 weeks after planting after being tested for the difference in the average using the Duncan distance test can be seen in Table 2.

Table 2. Average Number of Leaves (Strands) Due to Photosynthetic Eco Farming Fertilizer and Some Animal Manure Fertilizer at the Age of 2, 4 and 6 Weeks After Planting.

Treatment	Number of Leaves (strands)		
	2 MST	4 MST	6 MST
E = Eco Farming Photosynthesis			
E0 = 0 ml/ l water/ plot	9.84 cC	16.60 cC	23.33 cC
E1 = 100 ml/ l water/ plot	11.44 bB	18.08 bB	25.50 bB
E2 = 200 ml/ l water/ plot	11.84 bA	18.32 bA	26.14 aA
E3 = 300 ml/ l water/ plot	12.53 aA	18.93 aA	26.51 aA
K = Some Animal Manure			
K0 = No treatment (control)	10.94 bB	17.55 bB	24.00 dC
K1 = Chicken Manure Fertilizer	11.23 bA	17.74 bA	25.09 cB
K2 = Goat Manure Fertilizer	11.63 aA	18.23 aA	25.82 bA
K3 = Cow Manure Fertilizer	11.88 aA	18.40 aA	26.46 aA

Information: Numbers in the same column followed by the same letter show a difference that is not real at the level of 5% (lowercase) and a very real difference at the level of 1% (uppercase).

Table 2 can be explained that the application of photosynthetic eco farming fertilizer affects the number of leaves at the age of 6 weeks after planting, where the most leaves are obtained in the E3 treatment (300 ml/l water/plot) which is 26.51 sheets, which is not real from the E2 treatment (200 ml/ l water/plot) which is 26.14 sheets, it is very different from the E1 treatment (100 ml/ liter of water) which is 25.50 sheets and the E0 treatment (0 ml/ l water/plot) which is 23.33 sheets.

The results of the regression analysis of the application of photosynthetic eco farming fertilizer to the number of leaves at the age of 6 weeks after planting showed a linear relationship, as presented in Figure 3.

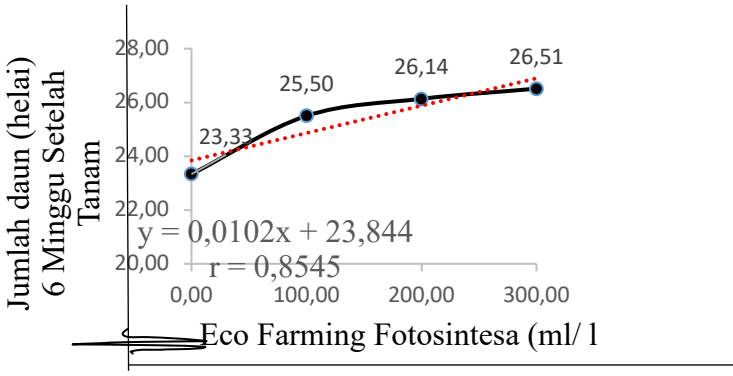

Figure 3. The Relationship Between the Application of Photosynthetic Eco Farming Fertilizer (ml/ l water/ plot) and the Number of Leaves (strands) at the age of 6 weeks after planting.

Table 2 can also be explained that the application of several animal manure fertilizers affects the number of leaves at the age of 6 MST, where the most leaves are obtained in the K3 (cow manure fertilizer) treatment, which is 26.46 pieces, in real contrast to the K2 treatment (goat manure) which is 25.82 pieces, in very real contrast to the K1 (chicken manure) treatment, which is 25.09 pieces and the K0 (control) treatment, which is 24.00 pieces.

The average number of leaves due to the treatment of several animal manure fertilizers at the age of 6 weeks after planting can be seen in the stem diagram in Figure 4.

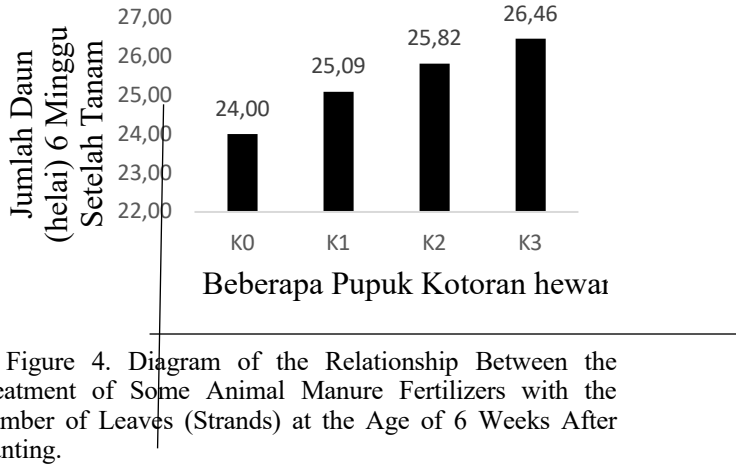

Figure 4. Diagram of the Relationship Between the Treatment of Some Animal Manure Fertilizers with the Number of Leaves (Strands) at the Age of 6 Weeks After Planting.

3. Number of Bulbs per Sample (fruit)

The results of the study after statistical analysis showed that the application of photosynthetic eco farming fertilizers and some animal manure fertilizers had an effect on the number of sampled tubers. The interaction between the application of photosynthetic eco farming fertilizer and some animal manure fertilizers did not affect the number of sampled tubers.

The average results of the number of bulbs sampled after being tested for mean difference using the Duncan distance test can be seen in Table 3.

Table 3. Average Number of Bulbs Sampled (Fruit) Due to the Application of Photosynthetic Eco Farming Fertilizer and Some Animal Manure Fertilizers

Treatment	Number of Sampling Tubers (fruit)
E = Eco Farming Photosynthesis	
E0 = 0 ml/ l water/ plot	2.14 dD
E1 = 100 ml/ l water/ plot	2.70 cC
E2 = 200 ml/ l water/ plot	3.25 bB
E3 = 300 ml/ l water/ plot	3.54 aA
K = Some Animal Manure	
K0 = No treatment (control)	2.29 dC
K1 = Chicken Manure Fertilizer	2.82 cB
K2 = Goat Manure Fertilizer	3.03 bB
K3 = Cow Manure Fertilizer	3.35 aA

Information: Numbers in the same column followed by the same letter show a difference that is not real at the level of 5% (lowercase) and a very real difference at the level of 1% (uppercase).

Table 3 can be explained that the application of photosynthetic eco farming fertilizer has an effect on the number of sampled tubers, where the most tubers are obtained in the E3 treatment (300 ml/l water/plot) which is 3.54 pieces, which is very different from the E2 treatment (200 ml/l water/plot) which is 3.25 pieces, the E1 treatment (100 ml/liter of water) which is 2.70 pieces and the E0 treatment (0 ml/ l water/plot) which is 2.14 pieces.

The results of the regression analysis of the application of photosynthetic eco farming fertilizer to the number of sampled tubers showed a linear relationship, as presented in Figure 5.

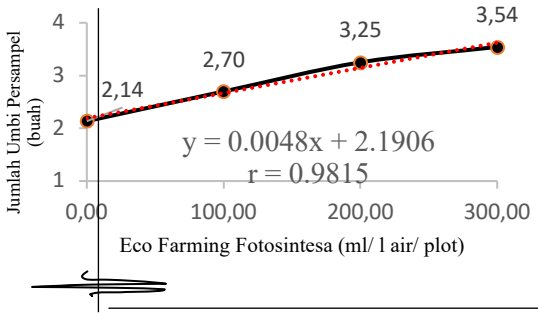

Figure 5. The Relationship Between the Application of Photosynthetic Eco Farming Fertilizer (ml/l water/plot) and the Number of Sampled Tubers (fruit).

Table 3 can also be explained that the application of several animal manure fertilizers affects the number of sampled tubers, where the most tubers are obtained in the K3 (cow manure fertilizer) treatment which is 3.35 pieces, in contrast to the K2 treatment (goat manure) which is 3.03 pieces, the K1 treatment (chicken manure) which is 2.82 pieces and the K0 (control) treatment which is 2.29 pieces.

The average number of sampling tubers due to the treatment of several animal manure fertilizers can be seen in the stem diagram in Figure 6.

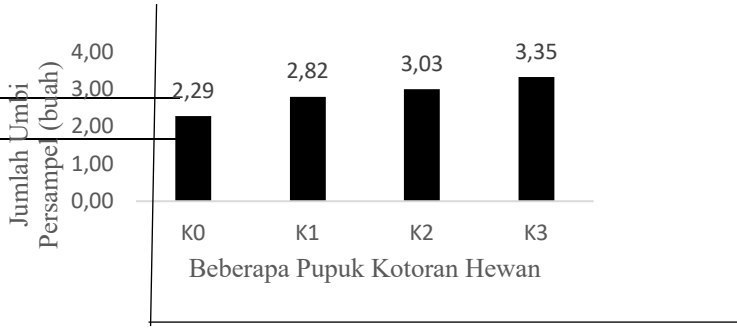

Figure 6. Diagram of the Relationship Between the Treatment of Several Animal Manure Fertilizers and the Number of Sampled Tubers (fruits).

4. Number of Bulbs per Plot (fruit)

Data on the average measurement of the number of perplot tubers (fruits) due to the application of photosynthetic eco farming fertilizers and some animal manure fertilizers is shown in Appendix 19, while the analysis of fingerprints is shown in Appendix 20.

The results of the study after being statistically analyzed showed that the application of photosynthetic eco farming fertilizers and some animal manure fertilizers had an effect on the number of perplot tubers. The interaction between the application of photosynthetic eco farming fertilizers and some animal manure fertilizers did not affect the number of perplot bulbs. The average result of the number of bulbs per plot after being tested for mean difference using the Duncan distance test can be seen in Table 4.

Table 4. Average Number of Tubers Perplot (Fruit) Due to the Application of Eco Farming Fertilizer Photosynthesis and Some Animal Manure Fertilizers

Treatment	Number of Tubers Perplot (fruit)
E = Eco Farming Photosynthesis	
E0 = 0 ml/ l water/ plot	33.67 cC
E1 = 100 ml/ l water/ plot	44.00 bB
E2 = 200 ml/ l water/ plot	53.42 aA
E3 = 300 ml/ l water/ plot	55.27 aA
K = Some Animal Manure	
K0 = No treatment (control)	38.75 cC
K1 = Chicken Manure Fertilizer	46.75 bB
K2 = Goat Manure Fertilizer	48.42aA
K3 = Cow Manure Fertilizer	51.75 aA

Information: Numbers in the same column followed by the same letter show a difference that is not real at the level of 5% (lowercase) and a very real difference at the level of 1% (uppercase). Table 4 can be explained that the application of photosynthetic eco farming fertilizer has an effect on the number of bulbs per plot, where the most bulbs are obtained in the E3 treatment (300 ml/l water/plot) which is 55.27 pieces, which is very different from the E2 treatment (200 ml/l water/plot) which is 53.42 pieces, the E1 treatment (100 ml/liter of water) which is 44.00 pieces and the E0 treatment (0 ml/ l water/plot) which is 33.67 pieces. The results of the regression analysis of the application of photosynthetic eco farming fertilizers to the number of perplot tubers show a linear relationship, as presented in Figure 7.

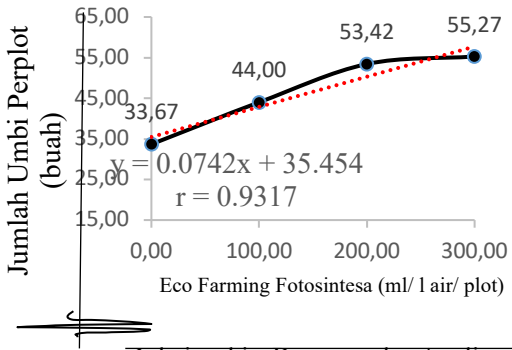

Figure 7. The Relationship Between the Application of Photosynthetic Eco Farming Fertilizer (ml/ l water/ plot) and the Number of Tubers per plot (fruit).

Table 4 can also be explained that the application of several animal manure fertilizers affects the number of tubers per plot, where the most tubers are obtained in the K3 (cow manure fertilizer) treatment, which is 51.75 pieces, different from the K2 treatment (goat manure) which is 48.42 pieces, in contrast to the K1 treatment (chicken manure) which is 46.75 pieces and the K0 (control) treatment which is 38.75 pieces. The average number of perplot tubers due to the treatment of several animal manure fertilizers can be seen in the stem diagram in Figure 8.

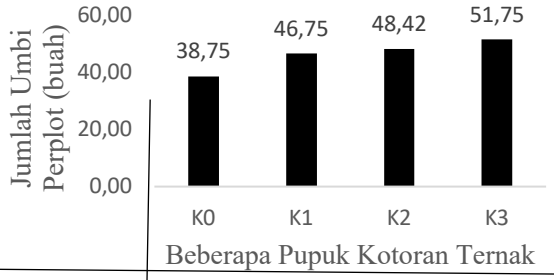

Figure 8. Diagram of the Relationship Between the Treatment of Several Animal Manure Fertilizers and the Number of Tubers Perplot (fruit).

5. Production per Sample (g)

The results of the study after being statistically analyzed showed that the application of photosynthetic eco farming fertilizers and some animal manure fertilizers had an effect on sample production. The interaction between the application of photosynthetic eco farming fertilizer and some animal manure fertilizers. The average results of sampling production after being tested for mean differences using the Duncan Distance Test can be seen in Table 5.

Table 5. Average Sampling Production (g) Due to the Application of Photosynthetic Eco Farming Fertilizer and Some Animal Manure Fertilizers

Treatment	Sampling Production (g)
E = Eco Farming Photosynthesis	
E0 = 0 ml/ l water/ plot	36.87 cC
E1 = 100 ml/ l water/ plot	47.51 bB
E2 = 200 ml/ l water/ plot	56.02 aA
E3 = 300 ml/ l water/ plot	59.94 aA
K = Some Animal Manure	
K0 = No treatment (control)	39.78 dC
K1 = Chicken Manure Fertilizer	48.39 cB
K2 = Goat Manure Fertilizer	52.48 bA
K3 = Cow Manure Fertilizer	57.60 aA

Information: Numbers in the same column followed by the same letter show a difference that is not real at the level of 5% (lowercase) and a very real difference at the level of 1% (uppercase).

Table 5 can be explained that the application of photosynthetic eco farming fertilizer has an effect on sample production, where the highest production is obtained in the E3 treatment (300 ml/l water/plot) of 59.94 g, which is not real from the E2 treatment (200 ml/l water/plot) which is 56.02 g, the difference is very real from the treatment of E1 (100 ml/ liter of water) which is 47.51 g and the treatment of E0 (0 ml/ l water/plot) which is 36.87 g.

The results of the regression analysis of the application of photosynthetic eco farming fertilizers to the sample production showed a linear relationship, as presented in Figure 9.

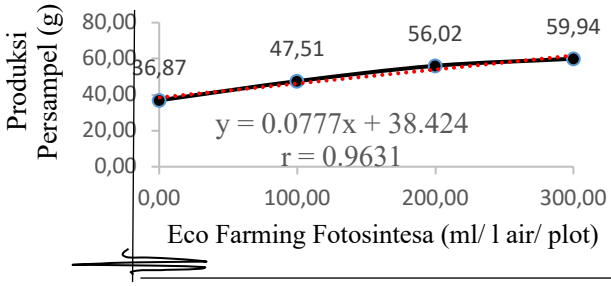

Figure 9. The Relationship Between Photosynthetic Eco Farming Fertilizer Application (ml/l water/plot) and Sampling Production (g).

Table 5 can also be explained that the application of several animal manure fertilizers has an effect on sample production, where the most production is obtained in the K3 (cow manure fertilizer) treatment which is 57.60 g, in real contrast to the K2 treatment (goat manure) which is 52.48 g, in very real contrast to the K1 treatment (chicken manure) which is 48.39 g and the K0 (control) treatment which is 39.78 g. The average sampling production due to the treatment of several animal manure fertilizers can be seen in the bar diagram in Figure 10.

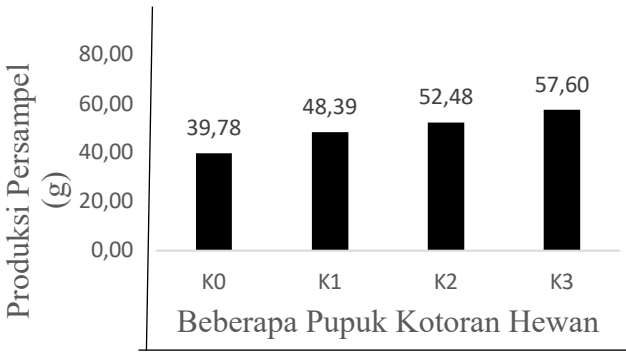

Figure 10. Diagram of the Relationship Between the Treatment of Several Animal Manure Fertilizers with Sample Production (g).

6. Production per Plot (g)

The results of the study after being statistically analyzed showed that the application of photosynthetic eco farming fertilizers and some animal manure fertilizers had an effect on the production of perplot. The interaction between the application of photosynthetic eco farming fertilizers and some animal manure fertilizers did not affect the production of perplots.

The average results of perplot production after being tested for mean differences using the Duncan distance test can be seen in Table 6

Table 6. Average Production of Plots (g) Due to the Application of Photosynthetic Eco Farming Fertilizers and Some Animal Manure Fertilizers

Treatment	Production Perplot (g)
E = Eco Farming Photosynthesis	
E0 = 0 ml/ l water/ plot	627.50 dc
E1 = 100 ml/ l water/ plot	682.92 bB
E2 = 200 ml/ l water/ plot	733.50 aA
E3 = 300 ml/ l water/ plot	752.82 aA
K = Some Animal Manure	
K0 = No treatment (control)	614.75 dC
K1 = Chicken Manure Fertilizer	677.50 cB
K2 = Goat Manure Fertilizer	730.83 bA
K3 = Cow Manure Fertilizer	768.75 aA

Information: Numbers in the same column followed by the same letter show a difference that is not real at the level of 5% (lowercase) and a very real difference at the level of 1% (uppercase).

Table 6 can be explained that the application of photosynthetic eco farming fertilizers has an effect on the production of perplots, where the most production is obtained in the E3 treatment (300 ml/l water/plot) of 752.82 g, which is not real from the treatment of E2 (200 ml/l water/plot) which is 733.50 g, the difference is very real with the treatment of E1 (100 ml/ liter of water) which is 682.92 g and the treatment of E0 (0 ml/ l water/plot) which is 627.50 g.

The results of the regression analysis of the application of photosynthetic eco farming fertilizers to the production of plots show a linear relationship, as presented in Figure 11.

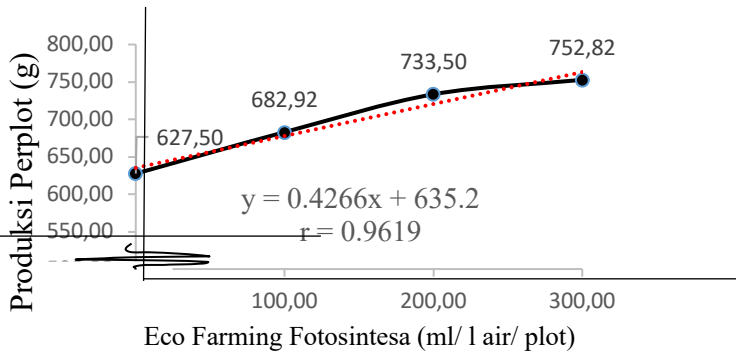

Figure 11. The Relationship Between Photosynthetic Eco Farming Fertilizer Supply (ml/l water/plot) and Perplot Production (g).

Table 6 can also be explained that the application of several animal manure fertilizers has an effect on the production of perplots, where the most production is obtained in the K3 (cow manure fertilizer) treatment, which is 768.75 g, in real contrast to the K2 treatment (goat manure) which is 730.83 g, in very real contrast to the K1 treatment (chicken manure) which is 677.50 g and the K0 (control) treatment which is 614.75 g.

The average production of perplots due to the treatment of several animal manure fertilizers can be seen in the bar diagram in Figure 12.

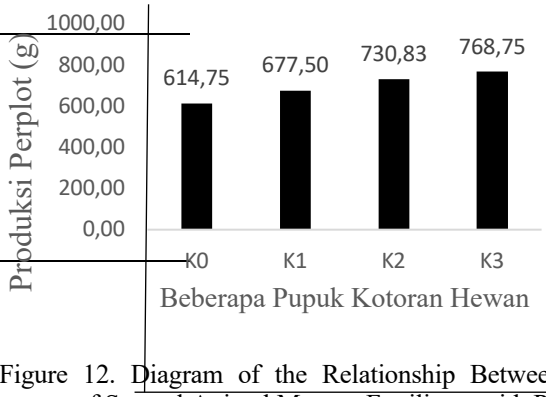

Figure 12. Diagram of the Relationship Between the Treatment of Several Animal Manure Fertilizers with Perplot Production (g).

B. Discussion

1. Effectiveness of Photosynthetic Eco Farming Fertilizer Application on the Growth and Production of Shallot Plants (*Allium ascolonicum* L)

The results of the study after being statistically analyzed showed that the application of photosynthetic eco farming fertilizer had an intangible effect on plant height at the age of 2 weeks after planting, but had a very real effect at the age of 4 and 6 weeks after planting, where the best treatment was obtained in the E3 treatment (300 ml/l water/plot). This is because the nutrients contained in photosynthetic eco farming fertilizer have a great effect on the growth of shallot plants, especially nitrogen nutrients that are needed during the vegetative phase. Nutrients N, P and K are needed in large

quantities by plants which have different and complementary functions for plants. Nitrogen is the main nutrient needed by plants for the growth and formation of plant vegetative organs such as stems, leaves and roots (Lismawati *et al*., 2023).

According to (Jumin 2022), it is stated that nitrogen plays a role in increasing vegetative growth, especially leaves, roots, spurring sprouting and increasing plant height.

The results showed that the application of photosynthetic eco farming fertilizer had a very noticeable effect on the number of leaves at the age of 2 to 6 weeks after planting, where the best treatment was obtained in the E3 treatment (300 ml/l water/plot). The application of photosynthetic eco farming fertilizers showed a significant growth in the number of leaves and that was very significant at each age of observation. This is because the content of nutrients N, P and K in photosynthetic eco farming fertilizers and the dosage level given is assumed to supply nutrients for plant growth and meet nutrient needs during the vegetative period of plants. According to Suparidi *et al.,* (2017) that plants can grow well with the availability of nutrients such as minerals and essentials where nutrients during the growth period of plants in this vegetative phase play a very important role.

The results of the study show that the application of photosynthetic eco farming fertilizer has a very noticeable effect on the number of sampled bulbs, the number of bulbs per plot, sampling production and perplot production, where the best treatment is obtained in the E3 treatment (300 ml/l water/plot). This is due to the ability of plants to absorb nutrients. If the nutrients obtained are higher, optimal photosynthesis results will be obtained to produce the weight of bulbs per plant. In addition, this is also because the content of nutrients P in Eco farming fertilizers is able to meet the needs of plants to stimulate root growth. The more roots formed, the more nutrients and water the plant can absorb. Nutrient K plays a role in the formation of carbohydrates. According to Supariadi *et al*., (2017) the increase in tuber weight is related to the parameters of the number of leaves and the number of permlump tubers. The abundance of leaves will increase the process of photosynthesis and produce many photosynthates which are then translocated to storage organs such as bulbs. The amount of photosynthate stored in the bulb will increase the weight of the bulb.

2. Effectiveness of Applying Various Animal Manure Fertilizers to the Growth and Production of Shallot Plants (*Allium ascolonicum* L)

The results of the study after statistical analysis showed that the treatment of various animal manure fertilizers had a very noticeable effect on plant height at the age of 2 to 6 weeks after planting, where the best treatment was obtained in the K3 treatment (cow manure fertilizer 2 kg/plot). It can be suspected that the application of cow manure fertilizer to shallot plants is able to improve environmental conditions for plant growth. As stated by Sigit and Marsono (2015), the advantages of cow manure or other organic fertilizers are able to change the soil structure to be better for root development, increase soil adhesion and absorption to water, improve the life of organisms in the soil and increase nutrients in the soil.

The application of various animal manure fertilizers has a very noticeable effect on the number of leaves at the age of 2 to 6 weeks after planting, where the best treatment is obtained in the K3 treatment (cow manure, 2 kg/plot). This is because cow manure fertilizer can increase the availability of nitrogen, phosphorus and other elements needed by shallot plants. According to Miftah and Supijatno (2017), that nitrogen is the main nutrient for plant growth and production, Nitrogen plays a prominent role in the vegetative part of plants (foliage and shoots). The use of the right dosage will further optimize the yield of the plant.

Enough nitrogen is available to plants because it is the main nutrient in general because it is able to encourage the growth of vegetative parts of plants such as leaves, stems, and roots. This is in accordance with the statement of Lakitan (2016), that nitrogen is the constituent of many compounds such as amino acids that are necessary in the formation or growth of vegetative parts such as stems, leaves, and roots.

According to Alfian (2015), growth in plants is influenced by nutrients including nitrogen (N) and zinc (Zn). Nitrogen (N) is a macroelement for plants and is found in the soil. Nitrogen functions to stimulate the formation of saplings and leaves and help root formation.

The application of various animal manure fertilizers has a very real effect on the number of sampling tubers, the number of perplot tubers, sampling production and perplot production. Where the best treatment is obtained in K3 treatment (cow manure fertilizer 2kg/plot). Shallot plants will generally grow well in soil with a high content of organic matter. The low content of organic matter is the main obstacle in the production of shallots. Therefore, to get high production of shallots, in addition to the application of inorganic fertilizers, the application of organic fertilizers must also be carried out (Aris, 2016).

If associated with its function and role, cow manure is an organic fertilizer that is indeed very suitable for improving plant growth and yield in general. This is because the organic matter contained in the fertilizer provides nutrient intake that is quite essential for the growth and production or production of plants.

Sutedjo (2014), stated that the use of manure can indeed increase the availability of nutrients for plants. In addition, manure also has a positive influence on soil properties and chemistry and encourages the development of retinal bodies.

3. Interaction Between Photosynthetic Eco Farming Fertilizer Application and Various Animal Manure Fertilizers on the Growth and Production of Shallot Plants (*Allium ascolonicum* L).

The results of the study after being statistically analyzed showed that the interaction between photosynthetic eco farming fertilizers and various animal manure fertilizers had an unreal effect on plant height, number of leaves, number of sampled bulbs, number of perplot bulbs, sampling production and perplot production. According to the opinion of Efendi (2016), it is stated that the high and low growth and yield of crops are influenced by two factors, namely internal factors and external factors. Internal factors are factors that are influenced by genetic traits or hereditary traits such as plant age, plant morphology, yield capacity, food reserve storage capacity, resistance to disease and others. External factors are environmental factors, such as climate, soil and biotic factors. The difference in growth and yield obtained is thought to be caused by one or more of these factors. The quality of life of plants is also highly dependent on the sufficiency of nutrients from the environment.

The impact of plants on the fertilizer given is largely determined by various factors, including the genetic nature of the plant, climate, and soil, where these factors do not stand alone but are interrelated with other factors (Sutedjo, 2014). If one factor has a stronger influence on the other, then the other factor will be closed. Although the effect is statistically unreal, the combination of each treatment has a positive impact on the growth and yield components.

IV. CONCLUSION

A. Conclusion

The results of the study showed that the application of photosynthetic eco farming fertilizer had a very real effect on plant height, number of leaves, number of sampled tubers, number of tubers per plot, sampling production and production of plots. Where the best treatment is obtained in the E3 treatment (300 ml/l water/plot).

The results of the study showed that the application of various animal manure fertilizers had a very real effect on plant height, number of leaves, number of sampling tubers, number of perplot tubers, sampling production and perplot production. Where the best treatment is obtained in K3 treatment (cow manure fertilizer 2 kg/plot).

The interaction between the application of photosynthetic eco farming fertilizer and animal manure fertilizer had an unreal effect on all observed parameters.

B. Suggestion

To get optimal shallot production, it is recommended to use photosynthetic eco farming fertilizer with a dose of 300 ml/l iar/plot and the use of cow manure fertilizer as much as 2 kg/plot.

For further research, it is recommended to conduct further research using different treatments from this study in order to get a more optimal production of shallots.

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