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The Effect Of Chicken Manure Doses On The Growth And Production Of Land Kale Plants *(Ipomoea Reptans. Poir)*

Deonata Moreira Soares
Program Magister of Agriculture Science University da Paz,Department of Agronomy, Faculty of Agriculture, East Timor Coffee Institute

Julio DJ. Gomes
Program Magister of Agriculture Science University da Paz,Department of Agronomy, Faculty of Agriculture, East Timor Coffee Institute

*Korespondensi penulis: deonatamorreira@gmail.com**

Abstract.*The objective of this research was to determine the effect of the optimum dose of chicken manure on the growth and production of land kale plants. The research was conducted from July to August 2023 in Talimoro Village, Ermera sub-District, Ermera Municipality, at an altitude of 800 m. above the sea level. The experimental design used was a single factor Randomized Block Design (RBD), with 4 treatments repeated 4 times in 4 blocks, the dose of chicken manure with the symbol (A) and the dose/plant was as follows: A0 = No dose of chicken manure (Control) or 0 gr/plant; A1= Dosage of chicken manure 100g/plant; A2 = Dosage of chicken manure 200 g / plant; and A3 = chicken manure dose of 300 gr/plant. Thus, the total plots obtained 16 plot units.The results of the research showed that treatment with a dose of chicken manure of 200 gr/plant provided the best growth in all parameters observed, namely, number of leaves, plant height, stem diameter and leaf area and also the highest production yield, namely 4.51 Kg/plot or 23.00 tons. /ha, and the lowest production results were obtained in the treatment without a dose of manure (Control), namely 1.31 Kg/plot or 6.68 tons/ha and the optimum results were obtained in the treatment with a dose of 100 gr/plant chicken manure with a value of 2.86 kg/plot or 12.55 tons/ha.*

Keywords: *chicken manure and land kale plants.*

INTRODUCTION

Land kale plant (Ipomoea reptans Poir) is a seasonal or annual land kale plant that is an important vegetable variety in the Southeast Asian region. The cultivation of both Land kale plant and water kale (Ipomoea aquatic Forsk) which naturally grows in rice paddies, pools, and water canals, with traditional irrigation systems, is important. Differences between land kale plant and water kale can be seen in their stems, handles, and leaves. Water kale stems are white-grey with a mixture of red, brown, or blond, long handles and unripe/raw stems, while lad kale stems are long and deep with pointed tips, raw and silver handles, and white-grey leaves. Rukmana (1994). Palada and Chang (2003) stated that land kale plants can be harvested once or many times, according to the need. Harvesting once is done carefully, and when harvesting many times, it is done more roughly. However, for swamp cabbage variety, it is placed on the top of the soil, using 5-10 cm between plants, so that plants can develop and their sources of problems can be reduced.

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* Deonata Moreira Soares, deonatamorreira@gmail.com

Land kale plants is a plant that many people enjoy consuming, despite its not expensive price. In addition, water spinach also contains many nutrient substances. According to the Food and Nutrition Center. Rukmana (1994), every 100 grams of fresh land kale plant contains 30 calories, 3.9 grams of protein, 0.6 grams of fat, 4.4 grams of carbohydrates, 1.4 grams of fiber, 71 mg of calcium, 67 mg of phosphorus, 3.2 mg of iron, 49 mg of sodium, 458 mg of potassium, 4,825 SI of vitamin A, 0.09 mg of vitamin B1, 0.24 mg of vitamin B2, and 59 mg of vitamin C.

In Timor-Leste, many farmers already plant dry land kale, but they still don't know how to cultivate the appropriate dose of organic fertilizers such as chicken manure to get good results. Chicken Manure, such as that which can be used as organic fertilizer that can provide macro and micro nutrients to improve the physical, chemical, and biological characteristics of the soil. It contains Nitrogen, Phosphorus, and Potassium within its contents, which are lower compared to other organic fertilizers such as animal manure, which contains Nitrogen 1.30%, Phosphorus 1.21%, and Potassium 1.39% (Pangaribuan et al. 2012). Therefore, manure as an organic fertilizer can be an alternative to increase nutrient efficiency for planting trees and can reduce the use of inorganic fertilizers, and improve crop production. According to the Seed of Life MAPF 2018 Report, the production of water spinach in Timor-Leste is far less than that of other districts in Indonesia such as Palu City, which has a land area of 86.5 hectares and a production of 185.7 kg/ha, compared to 583 kg/ha (BPS, Palu 2020).

METHODS

The research study using experimental design or Randomized Complete Block Design (RCBD) with one (single) factor and four treatments that are repeated four times in block 4, using the older brother fertilizer symbol (A) and dosage for each plant, as follows:

A0 = Control (without fertilizer) A1 = Dosage chicken manure 100 gr per plant; A2 = Dosage chicken manure 200 gr per plant; A3 = Dosage chicken manure 300 gr per plant. Thus, there are a total of plot is 16 units.

Linear/mathematical model Randomized Completely Block Design (RCBD) with a single factor of causality is represented as follows:

$Yij = \mu + \tau i + \beta j + \varepsilon ij$

Observation:

i= 1, 2, ….t and 1, 2, …. r

Yij = Influence of treatment for i and group for j

μ = General average

τi = Influence of treatment for i

βj = Influence of group for j εij = Random influence in treatment for i and group for j. Sastrosupadi, (2000).

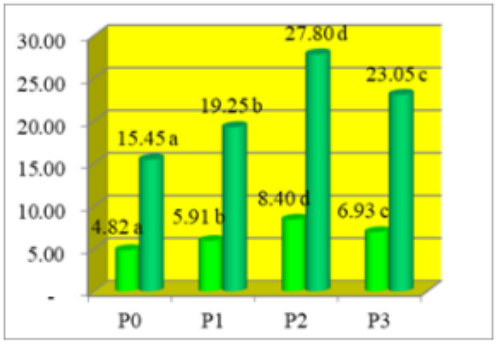
All data collected from the growth and yield variables will be analyzed using Analysis of Variance (ANOVA) with a 5% level. If the treatments have significant differences, a continuation test will be carried out using the Honest Significant Difference (HSD) at a of 5% level. Sastrosupadi A., (2000).

RESULTS AND DISCUSSION

1. Height of pant (cm)

a. Height of Plant

Histogram 1. Influence of manure dosage on the growth of height of plant in observation week 2 and week 4 after planting (cm).



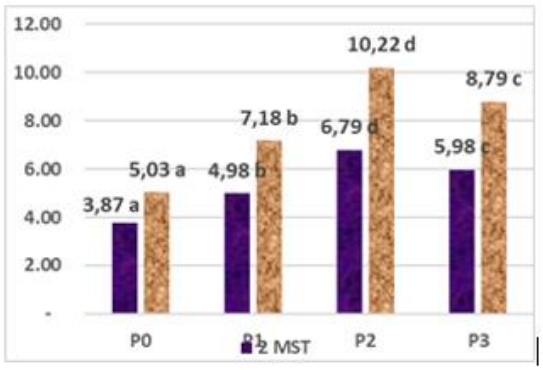
Justification: The small number of letters that do not appear on the histogram above indicates a significant difference in the HSD test of 5% level = 0.31 and 0.66.

Histogram 1. Above it shows that during weeks 2 and 4 after planting, there was a significant difference in the growth of the rice plant's upper part compared to the growth of its roots. During the second week after tasting, the treatment using 200 grams of organic fertilizer (P2) resulted in a significantly higher growth of the plant's upper part with a value of 8.40 cm compared to a growth of 4.82 cm in the control treatment (P0). The same result was observed during week 4 after tasting, where P2 treatment yielded a growth of 27.80 cm compared to 15.45 cm in the control treatment (P0). This happened because 200 grams of organic fertilizer (P2) were used for the rice plant's growth and development, whether it was organic fertilizer for the upper part or for the roots of the rice plant, especially for water spinach that was dried. This led to a good vegetative growth stage and a comparison to other treatments. The growth of the rice plant's upper part is also an indicator of its growth, which is easy to observe. n relation to this, Pangaribuan et al. (2012) stated that organic fertilizer from manure can become

an alternative to increase nutrient efficiency for tree planting, thus reducing the use of inorganic fertilizers and increasing production yields. In addition, the organic manure contains macro and micro nutrients which can improve plant growth and production yields. According to Hakim (2009), solid organic fertilizer from manure has better quality compared to other organic fertilizers because it is easily decomposed and can be absorbed quickly by plants, resulting in good growth and development. Buckman and Brady in Megahwati (2009) stated that organic manure is a low-quality organic material compared to other animal organic fertilizers. The quality of organic material is determined by the content of lignin and polyphenols as well as the C/N ratio which correlates with the speed of decomposition and mineralization of organic material. Based on the chemical analysis results, the C/N ratio category of manure is less than 1.92, which means that the decomposition of manure is faster and can provide the necessary nutrients for plant growth.

b. Stem Diameter (mm)

Histogram 2. Influence of Chicken manure dosage on the growth of stem diameter in observation week 2 and week 4 after planting (mm).



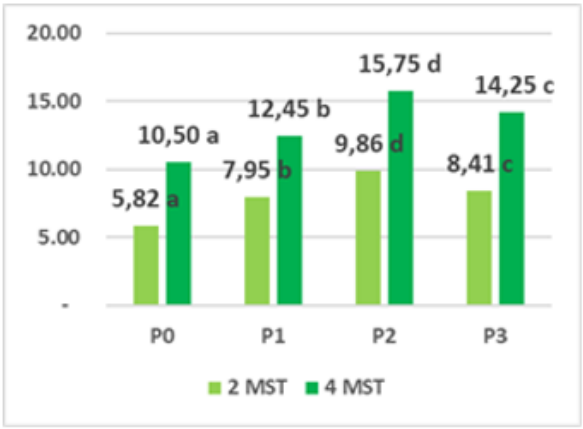
Justification: The numbers followed by small letters that are not similar in the histogram above indicate a significant difference in HSD test of 5% level = 0.14 and 0.39.

The result of the variation analysis shows that there is a significant difference in observation parameters of the stem diameter in weeks 2 and 4 after the stem has been fed. The second histogram above shows that the treatment of 200g manure dosage (P2) results in a larger diameter growth rate with a value of 6.79mm in week 2 and a value of 10.22mm in week 4 after feeding. Meanwhile, the smaller diameter growth rate with a value of 3.87mm in week 2 and a value of 5.03mm in week 4 after planting occurred in the control treatment (P0). The influence of 200g manure treatment on the horse's diameter growth occurred because the manure contains enough nutrient element Potassium (K) which is sufficient for planting so that it can absorb freely to promote good growth and development of the diameter. According to

the Silahooy research (2008), regarding the availability of KCL and SP36 fertilizers, potassium absorption and the resulting growth of groundnuts shows the importance of potassium in increasing the diameter of the plant related to the function of potassium in raising the level of sclerenchyma in the root. Sclerenchyma serves the function of providing thickness and protecting the tissue/cells so that the roots are strong and not easily dropped. By increasing the amount of solid/organic fertilizer, especially manure that contains potassium nutrients, the development of sclerenchyma cells in the root can be increased, leading to a faster and thicker growth of the plant.

c. Quantity of leaf

Histogram 3. Influence of chicken manure on the growth of leaf in the observations of 2 weeks and 4 weeks after planting



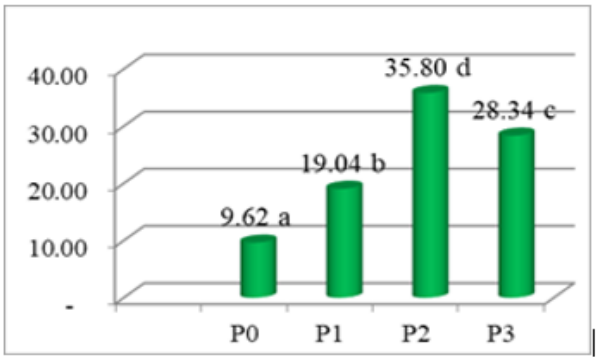
Justification: The numbers that follow the small letters that aren't in the histogram above indicate a significant difference in HSD test of 5% level = 0.27 and 0.36.

Histogram 3 above shows that there is a significant difference in the restrained amount in weeks 2 and 4 after feeding. In week 2 after feeding, treatment with a dosage of 200 grams of manure (P2) for planting resulted in a higher growth rate of vegetables with a value of 9.86, while restrained growth occurred in the control treatment (P0) with a value of 5.82. Similarly, in week 4, the growth rate of vegetables treated with a dosage of 200 grams of manure (P2) remained significantly higher at 15.75 compared to the control treatment (P0) with a value of 10.5. The restrained growth of vegetables in the control treatment (P0) occurred because organic manure and the area used for research were not utilized and the land that year after year people used for planting vegetables with nutrients became less significant. Therefore, the results of the restrained performance of morphology and physiology were not the same as the results of other treatments. According to Gardner et al. (1991) cited in Wahida et al. (2011), the quantity of restraint affects the reserve of food for plants (photosynthesis). The lesser

amount of restraint causes the plants to reduce their photosynthetic process, because restraint is the main organ in plants that effectively and quickly absorbs CO2. Novizan (2003), as cited in Dongoran (2009), states that plants need nitrogen to form important compounds such as chlorophyll, nucleic acid, and enzymes. While all nutrient elements play a special role in micro nutrition, their particular importance lies in restraining form and chlorophyll for the plant. When the formation of the restraint is impeded, it negatively affects the process of photosynthesis, resulting in stunted growth and abnormal development. When there is a deficiency of the nutrient element nitrogen in the soil, the plant's growth may be delayed, and it may become smaller in size.

D. Leaf area (cm2)

Histogram 4. Influence of manure dosage on the growth of the leaf area in the observation of the last week (4 weeks) after planting (cm2)



Justification: The number that corresponds to the small letter that is not the same on top of the histogram means that there is a significant difference occurring in the HSD test of 5% level

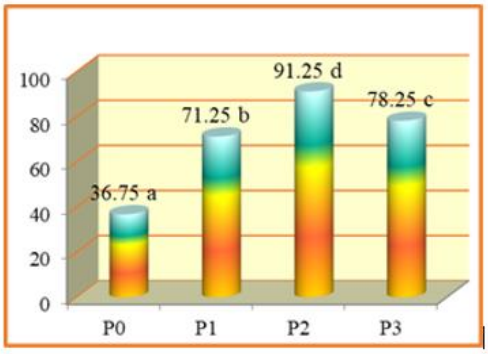
The result of the variation analysis shows that there is a significant difference in the observation from the last week to protecting the leaf area. Histogram 4 above shows that the organic fertilizer treatment with the amount of 200 grams (P2) providing broad and broad growth with walue of 35.80 cm2 compared to the control treatment (P0) with a value of 9.62 cm2. This happened because the growth of the plants was influenced by the nutrients and water conteied in he soil. In relation to this, Harjadi (1989) said that the process of leaf growth is related to the process of cell division and water in the soil. When there is enough water in the soil for plants, the process of cell division is also faster, so the growth and of leaf area can increase a lot. Fitter and Fisher (1996) stated that leaves are the important site for the process of photosynthesis, board and numerous leafes depend on the water and nutrients conteined in the soil. Afrista (2012) mentioned that the photosynthesis process, the intensity of light, affects the speed of photosynthesis during the light reaction period. The process of growth and

development of plants is directly controlled by the amount of photosynthesis, which yields carbohydrates that are used to form the plant organs.

2. Results Parameters

a. Fresh weight of land kale plants/sample plant

Histogram 4. Influence of fertilizer organic chicken manure dosage of fresh weight land kale plants (grams)

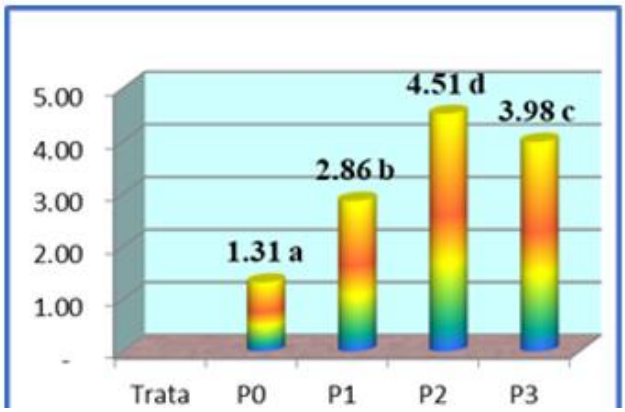


Justification: The number that follows the small letters that are not the same in the histogram above means that there is a significant difference in the HSD test of 5% level = 3.57.

Histogram 5 above indicates that the dosage of organic fertilizer given to land kale plant has a significant difference in the weight of plant compared to the weight of the soil that is dry, as seen in the observation results. The treatment of 200 grams of organic fertilizer for land kale plants (P2) resulted in a significantly heavier plant weight with an average value of 91.25 grams. Meanwhile, the weight of had a significantly lesser value with an average weight of 36.75 grams, which occurred in the control treatment (P0). Treatment (P2) that resulted in good growth of water spinach in dry land is due to the use of 200 grams of organic fertilizer given by hand. This contributes to the good growth and development of the water spinach, which in turn has a positive impact on the production yield. According to Muhsin (2003), organic fertilizer given by hand has great potential due to its ability to improve the physical, chemical, and biological characteristics of the soil. Compared to other organic fertilizers, it also has a higher content of nutrients such as N, P, and K. Damanik et.al. (2011) suggest that for horticultural plants that use organic fertilizer given by hand, a dosage of between 150-250 grams is recommended, as using less than this or relying on other fertilizers may not yield good results.

b. Fresh weight of plants/plot (Kg)

Histogram 6. Influence of fertilizer organic chicken manure dosage, on the result of fresh weight of plants/plot (Kg).



Justification: The small numbers that do not match in the histogram above indicate significant differences in the HSD test of 5% level

The variation analysis shows that there is a significant difference in the occurrence of treatments in terms of heavy growth of the plants. The reality of this is shown in the histogram, where treatment with 200 grams of organic fertilizer per plant resulted in a significantly higher yield of 4.51 kg per garden bed (23 tons/acre). In contrast, the control treatment (P0) resulted in a yield of only 1.31 kg per garden bed (6.68 tons/acre). This significant difference occurs because according to Damanik et.al, (2011), chicken manure contains many more nutrients such as "N", "P" and "K" compared to other organic animal fertilizers. This nutrient content enhances the quality of growth and development of plants, such as water spinach, swamp cabbage and other vegetables that are grown and consumed by locals. According to Goldsworthy and Fisher (1992), it is said that the availability of nitrogen has an important influence on the quantity and the quality of branch growth. A reduced quantity of nitrogen negatively affects the growth, especially in small and poorly developed branches, where they may appear less and smaller.

CONCLUSION

From the results and discussion above, the writer has concluded that: “The research results show that a dose of 200 grams of organic fertilizer given by hand for water spinach plants promotes growth in various observation parameters such as plant height, low incidence of pests, stem diameter, breadth of leaves, and yield per plot of about 4.51 kg/plot or 23.00 ton/ha. The best result was obtained from a dose of 100 grams of organic fertilizer per plot,

with a yield of 2.86 kg/plot or 12.55 ton/ha. In contrast, the treatment without organic fertilizer (control plot) resulted in a lower yield of 1.31 kg/plot or 6.68 ton/ha."

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