



GROWTH RESPONSE AND PRODUCTION OF KAILAN PLANT (BRASSICA OLERACEA VAR. ALBOGLABRA) ON PROVISION OF BANANA GEDEBOG POC AND COW STATE FERTILIZER

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Abstract

This study aims to determine the response of growth and production of Kailan (Brassica oleracea var. Alboglabra) to Gedebog Banana POC and cow manure with different administrations. The study was carried out, Johor Village, Medan Johor District, North Sumatra from August 2019 to November 2019. The method used in this study was a Factorial Randomized Block Design (RAK) consisting of two factors, namely: POC Gedebog Banana Dose Factor (A1 = 200ml /L; A2 = 300ml/L and A3 = 400ml/L.). Dosage Factor of Cow Manure (K1 = 5 tons/ha; K2 = 10 tons/ha and K3 = 15 tons/ha). Giving POC Gedebog bananas showed significantly different effects on plant height, wet weight per plant and dry weight of kailan plants, but did not show a significantly different effect on the number of plant leaves. The application of cow manure showed no significant effect on all variables. The interaction of Gedebog Banana POC administration with Cow Manure showed a significantly different effect on plant height and dry weight per plant, but showed no significant effect on the number of plant leaves.

Keywords : Kailan, POC Gedebog Pisang, Cow Manure

1. INTRODUCTION

Kailan is one type of vegetable plant that is in great demand by the public today, besides the fresh taste, Kailan vegetables contain adequate nutrition. Fresh kailan contains a lot of water, protein, fat, calcium, vitamins A, B and vitamin C. The high demand for your vegetables has not been matched by production that is sufficient to meet market demand. Consumer demand for organic vegetables is also increasing at this time.

One means of increasing agricultural production is the use of fertilizers, the use of organic fertilizers is a solution to get organic vegetables that people are interested in. Organic fertilizers are generally the result of waste management from agriculture in the form of crop residues and livestock manure. The stem part of the banana plant called the gedebok is a type of waste from the rest of the harvest. Composting banana stems to be used as liquid organic fertilizer (POC) can increase nutrient requirements. Because according to Ibrahim (2015), banana stems contain elements of Ca, P, K, protein, carbohydrates and water. The results of the research by Rahman & Ni Putri (2017), showed that the administration of POC banana stems at a concentration of 60 ml/200 ml of water to onion plants obtained the highest results on the variables of plant height, number of leaves, number of bulbs.

Utilization of manure from cattle around the experimental area is a solution for managing agricultural waste. Cow manure has the advantage of high fiber content such as cellulose. Cellulose plays a role in providing energy for microorganisms that are responsible for nutrient transformation. According to Hartatik and Widowati (2010), cow manure can be useful in improving soil texture and structure by increasing porosity, aeration and composition of soil

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microorganisms, and longer water absorption in the soil. The results of Safruddin's research (2016), application of cow manure at a dose of 15 tons per hectare showed a significant effect on the number of leaves and production of cauliflower.

2. IMPLEMENTATION METHOD

The research was carried out in Johor Village, Medan Johor District, North Sumatra. The research was carried out from August to October 2019. The study was conducted using a factorial randomized block design (RAK) consisting of: POC gedebog banana dose factor (A1 = 200 ml/L; A2 = 300 ml/L; A3 = 400 ml/L). Dosage Factor of Cow Manure (K1= 5 tons/ha; K2= 10 tons/ha; K3= 15 tons/ha).

The observed variables used are; Plant height, number of leaves per plant, wet weight per plant, dry weight per plant.

3. RESULTS AND DISCUSSION

3.1 Plant Height (cm)

From the results of plant height variance, the administration of POC Gedebong Banana showed a significantly different effect at the age of 1 WAP, at the age of 2 WAP, 3 WAP and 4 WAP the effect was not significantly different. The treatment of giving cow manure showed no significant effect on each plant age. The interaction of giving POC Gedebog Banana and Cow Manure showed a significantly different effect on the observation of plant height at the age of 1 WAP, but at the age of 2 WAP, 3 WAP and 4 WAT it did not show a significantly different effect on the plant height of kailan.

Table 1. Plant height (cm) Kailan on the interaction of POC Gedebog Banana and Cow Manure at the age of 1 WAP.

Treatment	K1	K2	K3	Average
A1	5.72b	5.96b	6.52c	6.07b
A2	5.52a	5.55a	5.43a	5.50a
A3	6.02b	5.72b	4.72a	5.49a
Average	5.76a	5.74a	5.56a	5.68

Note: The numbers followed by the same letter in the same row or column show significant differences at the 5% level using the DMRT Test KK = 9.13%, MST = Weeks After Planting.

3.2 Number of Leaves (Strand)

From the results of the variance of treatment with banana gedebog POC, cow manure treatment and the interaction of the two treatments, the effect was not significantly different on the number of leaves of kailan plants at the age of 1 WAP, 2 WAP, 3 WAP and 4 DAP. The results of observations of the number of leaves on the interaction of treatment with POC Gedebog banana and cow manure on kailan plants aged 1 WAP to 4 WAP are shown in Table 2. below.

Table 2. The number of leaves (strands) of Kailan plants on the interaction of giving POC Gedebog Banana and Cow Manure at the age of 1 WAP, 2 WAP, 3 WAP and 4 WAP.

Sunday	Treatment	K1	K2	K3	Average
I	A1	3.33	2.89	3.44	3.22
	A2	3.33	2.89	3.11	3.11
	A3	3.44	3.33	3.00	3.26

	Average	3.37	3.04	3.18	3.20
II	A1	4.22	4.00	4.00	4.07
	A2	4.44	4.00	4.33	4.26
	A3	4.44	4.00	4.55	4.33
	Average	4.37	4.00	4.29	4.22
III	A1	5.22	5.33	5.56	5.37
	A2	5.67	5.44	5.33	5.48
	A3	5.44	5.34	5.89	5.56
	Average	5.44	5.37	5.59	5.47
IV	A1	6.56	5.67	6.56	6.26
	A2	6.33	5.89	6.78	6.33
	A3	6.89	6.67	5.89	6.48
	Average	6.59	6.08	6.41	6.36

Note: *tn* = not real

3.3 Wet Weight per Plant (gr)

From the results of the variance, the treatment with POC Gedebug Banana showed a significantly different effect on the wet weight of the crop, while the treatment with cow manure showed an insignificant effect. to the wet weight of the crop. The interaction of the two treatments also showed no significant effect on the wet weight of the plants. The results of observations of plant wet weight on the interaction of Gedebug banana POC treatment and cow manure on kailan plants are shown in Table 3. From the table it can be seen that treatment A3 (400ml/L) obtained the highest wet weight with a weight of 24.15 gr.

Table 3. Wet Weight (gr) per Kailan Sample Plant for Gedebug Banana POC and Cow Manure

Treatment	K1	K2	K3	Average
A1	19.45	19.34	18.56	19.11a
A2	19.44	22.00	18.22	19.89a
A3	24.33	19.89	28,22	24.15b
Average	21.07	20.41	21.67	21.05

Note: The numbers followed by the same letter in the same row or column show no significant difference at the 5% level using the DMRT KK test = 18.57%

3.4. Dry Weight per Plant (gr)

From the results of the variance, it can be seen that the administration of POC Gedebug Pisang showed a significantly different effect on the dry weight of the crop, while the effect of giving cow manure showed no significant effect on the dry weight of the kailan plant. The interaction of the two treatments showed a significantly different effect on dry weight per plant. The results of observations of dry weight per plant on the interaction of POC Gedebug bananas and cow manure on kailan plants are shown in Table 4. Below.

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Table 4. Dry Weight (gr) per Kailan Plant on the application of POC Gedebog Banana and Cow Manure.

Treatment	K1	K2	K3	Average
A1	2.31a	2.42a	2.59a	2.44a
A2	2.91a	2.40a	2.55a	2.62a
A3	2.59a	3.44c	3.21b	3.08ab
Average	2.60a	2.75a	2.78a	2.71

Note: The numbers followed by the same letter in the same row or column show no significant difference at the 5% level using the DMRT KK test = 12.95%

4. DISCUSSION

4.1 Response of Gedebog Banana POC on Growth and Production of Kailan Plants.

The results of the study of giving POC Gedebog Banana showed a significantly different effect on plant height at the age of 1 WAP, wet weight of planting, dry weight of planting while for the number of leaves at the age of 1 WAP to 4 WAT showed no significant effect. This shows that the application of basic fertilizer before planting the kailan plant, the fertilizer that has been given to the soil has decomposed so that the nutrients in the soil are available and at the age of 2 mst the nutrients needed do not show a significant effect due to soil erosion by rain. Apart from the relatively small and less available nutrients for plants, the supply of nutrients was also delayed from the roots to the plant body due to the humid environmental conditions during the study caused by high rainfall. where the second to fourth application is washed off once the fertilizer application is finished, causing the nitrogen elements present in the liquid organic fertilizer to be washed out because the nitrogen itself is very mobile. This can be seen from the results of soil analysis before giving POC where the total N content is 0.485% and after administration there is only 0.17% this indicates leaching because only a few nutrients are left after POC administration. This is in accordance with the statement of Damanik et al (2011), which states that plant growth is influenced by two factors, namely; genetics and environment. Environmental factors are defined as a combination of all external conditions and influences that affect the life and development of an organism. This causes the nitrogen element in liquid organic fertilizer to be leached because the nitrogen itself is very mobile. This can be seen from the results of soil analysis before giving POC where the total N content is 0.485% and after administration there is only 0.17% this indicates leaching because only a few nutrients are left after POC administration. This is in accordance with the statement of Damanik et al (2011), which states that plant growth is influenced by two factors, namely; genetics and environment.

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Among the many environmental factors that affect the life and development of plants, among others: 1) temperature, 2) humidity, 3) radiation energy (light and sun), 4) the composition of the atmosphere. 5) soil structure and soil air composition, 6) soil reaction (Ph), 7) biotic factors, 8) nutrient supply and 9) absence of plant growth limiting materials. This is also supported by the statement of Apricio et al (2008), which states that irrigation application and rainfall are factors that accelerate the occurrence of N loss in the root zone in the soil through the leaching process that moves through the unsaturated zone. The level of nitrate loss is significantly related to the amount of nitrogen fertilizer application and the process of water infiltration in the soil and the lost nitrate is produced by the mineralization of organic matter. The factor of excess water from rainfall or irrigation applications acts as a carrier medium, so that the nitrate leaching process is faster towards deeper zones. Research Alam et al (2012), which states that irregular (erratic) weather changes have a negative impact on plant growth and development. According to Rahman (2014), a lack of nitrogen (N) causes plant growth to slow down, become stunted and weak. If the availability of nitrogen nutrients is insufficient or limited, the plant stem height growth will not be optimal. This is due to the process of cell division,

Giving POC Gedebog Banana to kailan plants showed no significant effect from the age of 1 WAP to 4 WAP on the number of leaves, this was due to the lack of leaf-forming nutrients such as elements of N, Fe and Mg according to the results of the analysis of POC Gedebog bananas whose N value was 0.485.

According to Wahyudi (2004), that nutrients, especially nitrogen, play a very important role in plant vegetative growth, the nitrogen content absorbed by plant roots will mostly go up to the leaves to combine with carbohydrates to form protein for leaf formation. The amount of nutrients absorbed by the roots will affect the amount of organic matter and the amount of minerals that will be translocated, including for leaf formation which will eventually increase the number of leaves and plant weight.

Giving POC Gedebog Bananas plays an important role in the photosynthetic activity of kailan plants. Because POC Gedebog Banana contains elements of sulfur (S) which play a role in stabilizing nitrogen (N) and helping the process of chlorophyll synthesis (Rizkika, 2015). Increased photosynthetic activity will produce sufficient energy and nutrients for kailan plants, so that it will affect the growth in height and number of leaves of kailan plants. In addition, the lack of element K (potassium) also causes the plant to become not sturdy so it cannot maintain the number of leaves so as not to fall (Suprihatin, 2011).

The administration of POC Gedebog bananas showed a significant effect on the wet weight of the plant and the dry weight of the plant. The response to Gedebog Banana POC treatment was because if the nutrient needs were met, especially N, which played a role in vegetative growth. According to Rosmini (2013), leaf formation by plants is strongly influenced by the availability of nitrogen and phosphorus nutrients in the medium and those available to plants. These two elements play a role in the formation of new cells and are the main components of organic compounds in plants such as amino acids, nucleic acids, chlorophyll, ADP and ATP which will be used in the formation of fruit in plants. Pranata (2006), stated that phosphorus is useful as a protein base, accelerates fruit aging and increases seed yield. Potassium functions to form the formation of

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proteins and carbohydrates. Elemental P is useful for adding nutrients to plant growth and production. Then K plays a role in the process of starch formation, namely as an activator of synthetic starch enzymes and regulating cell turgor (Lakitan, 2011).

According to Lakitan (2002), that the high or low dry matter of plants depends on the amount or at least the absorption of nutrients by the roots that takes place during the growth process. According to Sugeng (2005), if photosynthesis goes well, the plant will grow well and the roots will develop well, the plant will grow well and the roots will develop well, followed by an increase in the dry weight of the plant.

4.2 The Response of Cattle Manure to the Growth and Production of Kailan Plants.

The results of the study on the application of cow manure showed no significant effect on the variables of plant height and number of leaves from the age of 1 WAP to 4 WAP, wet weight per plant and dry weight per plant. This is because the nutrient content in cow manure is not sufficiently available so that the nutrients provided by the fertilizer are relatively slow. Such reasons are in accordance with the opinion of Sutanto (2002), the availability of nutrients from the use of cow dung manure is slow, nutrients derived from organic matter are required for soil microbial activity to be converted from complex organic bonds that cannot be utilized by plants into organic compounds and compounds. simple inorganic compounds that can be absorbed by plants. This was also conveyed by Soedardjo and Mashuri (2000), that organic matter cannot replace the role of inorganic fertilizer as a nutrient supplier, because the nutrient content in organic matter is relatively low, however, organic matter can increase the efficiency of organic fertilizer use. Besides the relatively small difference in nutrients, the presence of sufficient nutrients in the soil is thought to be able to neutralize the nutrients contributed by cow manure given to stimulate the formation of kailan plant leaves. This is supported by the condition of the soil where the research is classified as acidity (Ph) neutral, namely 5.51 (results of soil pH analysis before treatment). At this acidity, nutrients in the soil are available in large and sufficient quantities for plants and vice versa with toxic metals. This adequacy condition is thought to be able to neutralize the nutrients donated from the various doses tested. Soil pH conditions affect nutrient uptake and plant growth through its influence on nutrient availability and the presence of toxic elements (Hanafiah, 1990). Plant roots will easily absorb the nutrients or fertilizers that we provide if the pH in the soil is moderate and tends to be neutral (Tan, 1990). Sarief (1986), stated that the availability of sufficient nutrients at the time of growth of plant metabolic activity will be more active so that the process of cell elongation and differentiation will be better which can ultimately encourage an increase in plant wet weight. Hardjowigeno (2003), explained that the leaf surface area affects the production of crop yields. The wider the leaf surface area, the higher the productivity of the plant yields obtained. This happens because the photosynthesis process will run well on the number of leaves and leaf area. Next, Djunaedi (2009), explains that plant weight is usually influenced by vegetative growth. If the vegetative growth is good in this case the number of leaves, then there is a possibility that the weight will increase as well.

4.3 Interaction of POC Gedebog Banana and Cow Manure on Growth and Production of Kailan Plants.

From the research and analysis that the interaction of giving POC Gedebog Banana and Cow Manure showed no significant effect on plant height at the age of 2 WAP to 4 WAP, number of leaves aged 1 MST to 4 WAP and wet weight per plant but showed a significantly different effect on height. plants aged 1 MST and dry weight per plant. It can be explained that if the concentration of fertilizer given is less than the plant nutrient needs, the results obtained are not optimal because the number of nutrients needed by plants is not met properly so that the metabolism in the plant body does not go well (Manullang, 2014).

Another factor that affects plant growth is rain, which falls almost every day so that nutrient leaching occurs. nutrients by plants. Meanwhile, the number of leaves and wet weight showed that the effect was not significantly different. According to Hanafiah (2010), that if there is no interaction of the two factors the same for other factors and the same influence or position of the two factors are equally supportive of plant growth, but do not support if one factor covers the other factors.

5. CONCLUSION

1. Giving POC Gedebog bananas gave an optimal effect on the growth and production of kailan plants in treatment A3 (400 ml/L),
2. The application of cow manure has an effect on the growth of kailan plants at a dose of K1 (5 tons/ha). And production per plant at a dose of K3 (15 tons/ha).
3. The interaction of Gedebog Banana POC and cow manure gave an optimal effect on the growth of kailan plants in the A3K1 treatment combination (400 ml/l POC and 5 tons/ha cow manure). As for the production of kailan plants in the combination of A3K2 treatment (400 ml/l POC and 10 tons/ha cow manure).

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