



# THE EFFECT OF COW MANURE FERTILIZER AND COCONUT WATER POC ON THE GROWTH AND PRODUCTION OF KAILAN PLANTS (*Brassica oleracea Alboglabra*)

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ARTICLE INFO	ABSTRACT
Date received : 28 Oct 2022 Revision date : 11 Nov 2022 Date received : 25 Nov 2022	<i>Effect of applying cow manure and coconut water liquid organic fertilizer on the growth and production of kailan plants (<i>Brassica oleracea Alboglabra</i>). The aim was to determine the effect of cow manure and coconut water liquid organic fertilizer on the growth and production of kailan plants (<i>Brassica oleracea Alboglabra</i>) and their interactions. This experiment used a factorial Randomized Block Design (RBD) consisting of 2 factors with 16 treatment combinations and 2 blocks so that there were 32 research plots. The factors studied were the first factors in the treatment of cow manure (A) consisting of 4 levels, namely: A0 = 0 kg / plot (Control), A1 = 1 kg / plot, A2 = 2 kg / plot, A3 = 3 kg / Plots. The second factor of giving POC coconut water (K) consisted of 4 levels namely: K0 = 0 ML / L / Plot (Control), K1 = 300 ml / L / Plot, K2 = 600 ml / L / Plot, K3 = 900 ml / L / Plot. The results showed that the effect of cow manure and coconut water liquid organic fertilizer had no significant effect on plant height (cm), number of leaves (strands), production per sample (g), and production per plot (g). The interaction between the administration of cow manure and liquid organic coconut fertilizer had no effect on plant height (cm), number of leaves (strands), production per sample (g), and production per plot (g).</i>
<b>Keywords:</b> Cow Manure Fertilizer, Coconut Water Liquid Organic Fertilizer, Kailan	

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## INTRODUCTION

Kailan (*Brassica oleracea Alboglabra*) comes from China. In Indonesia, you are a new type of vegetable, but it has become a fan. At a glance, the shape of your plant is similar to caisim or cauliflower. The leaves are long and wide like caisim, while the color of the stem leaves is like cauliflower. The stems are rather sweet and soft on the tongue. While the leaves are rather tasty and legit. Based on data from the Central Statistics Agency (BPS) in 2018, mustard greens production in Indonesia in 2015 reached 600,200 tons with a harvested area of 58,652 ha, in 2016 it reached 601,204 tons with a harvested area of 60,600 ha and in 2017 it reached 627,598 tons with harvested area of 61,133 ha. The data shows that the addition of harvested area has an impact on increasing the production of mustard greens. However this, Increase the growth and production of your plants by improving cultivation techniques by applying cow manure and coconut water liquid organic fertilizer. Manure is a soil organic matter which plays an important role in improving the physical, chemical and biological properties of the soil. Manure can increase pH, C-organic levels and increase the availability of nitrogen, phosphorus, potassium and microelements for plants (Sompotan, 2013).

Manure can increase soil fertility, increase soil nutrient content, provide micro-nutrients, improve soil structure and increase the content of microorganisms that play a role in the nutrient cycle in the soil (Suwahyono, 2012).

Syekhfani (2011) states that the nutrient content contained in cow manure is 2.33% N, 0.61% P<sub>2</sub>O<sub>5</sub>, 1.58% K<sub>2</sub>O. According to Winarso (2011) stated the role of the nutrient N to function for plant growth from



stunting then P functions to be needed in the early stages of growth to increase root development, tiller formation and accelerate flowering plants while K itself functions to strengthen plant cell walls and plays a role expanding the leaf canopy for the process of photosynthesis in plants.

One liquid organic fertilizer that can increase plant growth is young coconut water. Young coconut water is the endosperm liquid of coconut fruit which contains active biological compounds. According to Winarto (2015) coconut water contains a unique chemical composition consisting of minerals, vitamins, sugars, amino acids and phytohormones which have a significant effect on plant growth. Coconut water contains ZPT which is used in tissue culture to increase callus initiation and root development. The use of young coconut water can increase the vegetative growth of mustard plants, the endosperm fluid in coconut fruit contains active biological compounds.

Kristina and Syahid (2012) stated that coconut water contains potassium levels of 14.11 Mg/100 MI, calcium of 24.67 Mg/100 MI and nitrogen of 43.00 Mg/100 MI of young coconut water. Coconut water can increase plant growth. Coconut water also contains vitamins and minerals. The results of the analysis show that young and old coconut water have different compositions of vitamins and minerals. This is in accordance with the statement of Lawalata and Imelda (2011) that coconut water contains the hormones auxin and cytokinins. Both of these hormones are used to support cell division so as to help the formation of shoots and stem elongation in plants.

Based on the description above, the authors are interested in conducting research entitled "The Effect of Cow Manure and Coconut Water Liquid Organic Fertilizer (POC) on the Growth and Production of Cayenne Plant (*Brassica oleracea Alboglabra*)". The aims of this research are: 1) To find out the effect of giving cow manure on the growth and production of your plants; 2) To find out the effect of giving coconut water liquid organic fertilizer (POC) on the growth and production of your plants; 3) To determine the effect of the interaction between the administration of cow manure and coconut water liquid organic fertilizer (POC) on the growth and production of your plants.

## LITERATURE REVIEW

### 1. Terms of Growing Kailan Plants

Kailan is a type of vegetable that can be produced throughout the year. This vegetable can be planted during the rainy or cold season and also during the short-term dry season. Kailan can be cultivated in medium plains and highlands with an altitude of 300-1900m above sea level. The desired rainfall for this plant is 100-1500 mm/year with good air humidity of around 60 to 90% (Samadi 2013). Kailan can grow optimally if the climate is suitable, you like a cold climate during its growth. A good temperature ranges between 15-25 °C and gets enough sunlight. Planting kailan that receives less sunlight can cause poor growth so that it is susceptible to disease, and when the plants are young they often stagnate or stop growing.

Just like other vegetables, kailan has a certain pH level and humidity so that this plant can grow well. Kailan requires loose and fertile soil with a pH between 5.5-6.5. In fact, kailan can grow and adapt to all types of soil, both light textured soil and heavy textured soil (Sinaga, et al. 2014). The best type of soil for kailan plants is sandy loam. In acidic soil (Ph less than 5.5), kailan growth often experiences obstacles, such as being susceptible to swollen roots or "Club root" caused by the fungus *Plasmodiophora brassicae* Wor. On alkaline soils (pH more than 6.5) plants can be attacked (blackleg) due to the fungus *Phoma lingam*.

### 2. Cow Manure Fertilizer

According to Hermawansyah (2013), cow dung manure is an organic fertilizer that contains nutrients that can support soil fertility and the growth of microorganisms in the soil. In addition to increasing the availability of nutrients, adding cow dung manure can also support the growth of microorganisms and improve soil structure.

Manure can increase soil fertility, increase soil nutrient content, provide micronutrients, improve soil structure and increase the content of microorganisms that play a role in the nutrient cycle in the soil (Suwahyono, 2012).

Syekhfani (2011) states that the nutrient content contained in cow manure is 2.33% N, 0.61% P<sub>2</sub>O<sub>5</sub>, 1.58% K<sub>2</sub>O. Winarso (2011) states the role of N elements to function for plant growth from stunting then P functions to be needed in the early stages of growth to increase root development, tiller formation and accelerate flowering plants while K itself functions to strengthen plant cell walls and plays a role in expanding the leaf canopy for photosynthesis in plants.

### 3. Coconut Water Liquid Organic Fertilizer



Liquid organic fertilizer (POC) can help increase crop production, improve the quality of plant products, reduce the use of inorganic fertilizers and as an alternative to manure and inorganic fertilizers is a type of fertilizer made in factories by mixing various chemicals so that it has a relatively high percentage of nutrient content (Susetya, 2016).

One liquid organic fertilizer that can increase plant growth is young coconut water. Coconut water is the liquid endperm of coconut fruit which contains active biological compounds.

According to Winarto (2015) coconut water contains a unique chemical composition consisting of minerals, vitamins, sugars, amino acids and phytohormones which have a significant effect on plant growth. Coconut water contains ZPT which is used in tissue culture to increase callus initiation and root development.

Kristina and Syahid (2012) stated that every 100 ml of coconut water contains minerals which include nitrate 43.00 mg, phosphorus 13.17 mg, potassium 14.11 mg, magnesium 9.11 mg, iron, 0.25 mg, sodium 21, 17 mg, zinc 1.05 mg, and calcium 24.67 mg. Besides containing vitamins and minerals, coconut water contains hormones that play a role in plant growth.

According to Lawalata and Imelda (2011) that coconut water contains the hormones auxin and cytokinins. Both of these hormones are used to support cell division thereby helping the formation of shoots and stem elongation in plants.

## METHOD

This research was conducted on Jl. Eka Rasmi Gg Eka Rosa II, Medan Johor, North Sumatra. This research was carried out from October 2021 to December 2021.

This study used a factorial randomized block design (rack) consisting of 2 factors with 16 treatment combinations and 2 blocks so that there were 32 research plots, namely:

a. The first factor is the provision of cow manure (A), which consists of 4 levels of application, namely:

A0 = 0 kg/plot

A1 = 1 kg/plot

A2 = 2 kg/plot

A3 = 3 kg/plot

b. Factor II is the provision of POC Coconut Water (K) which consists of 4 levels of administration, namely:

K0 = 0 ml/plot

K1 = 300 ml/plot

K2 = 600 ml/plot

K3 = 900 ml/plot

## RESULT AND DISCUSSION

### 1. Plant Height (cm)

Statistical analysis showed that the application of cow manure and liquid organic fertilizer (POC) coconut water and their interaction had no effect on plant height (cm) of kailan aged 2.3 and 4 weeks after planting (Table 1).

**Table 1.** Average Plant Height (cm) of Kailan Due to Administration of Cow Manure and Coconut Water Liquid Organic Fertilizer at 2, 3 and 4 Weeks After Planting (MST)

Treatment	Plant Height (cm)		
	2MST	3 MST	4 MST
<b>Cow Manure Fertilizer (A)</b>			
A0 = 0 kg/plot	3.54 aA	5.49 aA	8.30 aA
A1 = 1 kg/plot	3.63 aA	5.61 aA	8.38 aA
A2 = 2 kg/plot	3.74 aA	6.56 aA	9.43 aA
A3 = 3 kg/plot	4.41 aA	7.43 aA	9.87 aA
<b>POC Coconut Water (K)</b>			
K0 = 0 ml/plot	3.50 aA	5.70 aA	8.18 aA
K1 = 300 ml/plot	3.60 aA	5.79 aA	8.42 aA
K2 = 600 ml/plot	3.86 aA	6.50 aA	9.32 aA
K3 = 900 ml/plot	4.35 aA	7.12 aA	10.07 aA

Note: Numbers in the same column followed by the same letter mean that they are not significantly different at the 5% level (lowercase letters) and at the 1% level (uppercase letters)



Applying coconut water liquid organic fertilizer at 4 weeks after planting for the coconut water liquid organic fertilizer treatment showed that the highest plants were in the K3 treatment = 900 ml/plot with an average plant height of 10.7 cm and the lowest was in the K0 = 0 ml treatment / plot with an average plant height of 8.18 cm.

This is because the nutrients contained in cow dung fertilizer have not been fulfilled so that the plant's metabolism is not good. In accordance with the statement of Tuapattinaya and Tuapattinaya and Tutupoly (2014) that plant height is influenced by metabolic processes in which plant metabolic activity requires nutrients from fertilization. Plant height is influenced by the availability of nitrogen and phosphate nutrients absorbed by plants.

Based on the research conducted, there are so many weeds that grow around the plants that the kailan plants have to fight for nutrients and make the nutrients absorbed by the kailan less than optimal so that the weeds are more fertile than the kailan plants. In accordance with the statement of Widaryanto (2010) that the presence of weeds causes competition between the main crops and weeds. Weeds that grow with cultivated plants can reduce yields, both in quality and quantity.

## 2. Number of Leaves (strands)

Statistical analysis showed that the application of cow manure and coconut water liquid organic fertilizer and the interaction between the two had no effect on the number of leaves (strands) of kailan aged 2, 3 and 4 weeks after planting. (Table 2).

**Table 2.** Average Number of Kailan Leaves (strands) Due to Administration of Cow Manure and Coconut Water Liquid Organic Fertilizer at 2, 3 and 4 Weeks After Planting (MST)

Treatment	Number of Leaves (strands)		
	2MST	3 MST	4 MST
<b>Cow Manure Fertilizer (A)</b>			
A0 = 0 kg/plot	3.13 aA	3.73 aA	4.55 aA
A1 = 1 kg/plot	3.23 aA	3.93 aA	4.68 aA
A2 = 2 kg/plot	3.30 aA	4.13 aA	4.98 aA
A3 = 3 kg/plot	3.33 aA	4.33 aA	5.05 aA
<b>POC Coconut Water (K)</b>			
K0 = 0 ml/plot	3.03 aA	3.93 aA	4.78 aA
K1 = 300 ml/plot	3.23 aA	3.95 aA	4.73 aA
K2 = 600 ml/plot	3.33 aA	4.05 aA	4.80 aA
K3 = 900 ml/plot	3.40 aA	4.18 aA	4.95 aA

Note: Numbers in the same column followed by letters that are not the same mean significantly different at the 5% level (lowercase letters) and very significantly different at the 1% level (uppercase letters)

In Table 2 it can be explained for the treatment of cow dung aged 4 weeks after planting that the highest number of leaves was found in treatment A3 = 3 kg/plot with an average number of leaves of 5.05 and the lowest was found in the application of cow dung fertilizer in treatment A0 = 0 kg/plot with an average number of leaves of 4.55. For the organic fertilizer treatment of coconut water 4 weeks after planting, the highest number of leaves was found in treatment K3 = 900 kg/plot with an average number of leaves of 4.95 and the lowest was in treatment K0 = 0 kg/plot with an average number of leaves. i.e. 4.78 strands.

The application of cow dung fertilizer did not significantly affect plant height and number of leaves due to the lack of nitrogen contained in the fertilizer. This relates to the statement of Hidayat et al. (2013) that nitrogen available to plants in sufficient quantities can expedite plant metabolism so that stem growth is higher and affects the number of leaves. Nitrogen and phosphorus that are available are large enough for plants to support plant height growth, but if their availability is low, they can cause stunted plants to grow (Nabilah et al., 2018).

The nutrients contained in the cow dung manure are insufficient and the roots need time to absorb the nutrients available in the fertilizer. In line with the statement (Tufaila, et al, 2014) stating that the nutrients contained in organic fertilizers cannot be directly absorbed by plants, organic fertilizers require complete decomposition time so that they can be absorbed by plants.

According to Haryadi et al. (2015) plants can grow and develop properly if the nutrients needed are in sufficient quantities and in a form that is readily absorbed by plant roots. According to Satriyo and Aini (2018) plants will grow and produce well depending on the fertilizer given to the plants, if the fertilizer given is in



accordance with the needs of the plants, the plants can produce well.

### 3. Production per Plot (grams)

The results of the statistical analysis showed that the application of cow manure and coconut water liquid organic fertilizer and the interaction between the two had no effect on production per plot (g). The average yield per plot (g) of kailan (*Brassica oleracea Alboglabra*) as a result of cow manure and coconut water liquid organic fertilizer on production per plot (g) can (Table 3).

**Table 3.** Average Production per Plot (g) Kailan Due to Cow Manure and Coconut Water Liquid Organic Fertilizer

Treatment	Production Per Plot
Cow Manure Fertilizer (A)	
A0 = 0 kg/plot	131.25 aA
A1 = 1 kg/plot	144.50 aA
A2 = 2 kg/plot	150.00 aA
A3 = 3 kg/plot	155.13 aA
POC Coconut Water (K)	
K0 = 0 ml/plot	128.75 aA
K1 = 300 ml/plot	138.25 aA
K2 = 600 ml/plot	156.25 aA
K3 = 900 ml/plot	157.63 aA

Note: Numbers in the same column followed by letters that are not the same mean significantly different at the 5% level (lowercase letters) and very significantly different at the 1% level (uppercase letters)

In Table 3 it can be explained that the heaviest production per plot of cow dung fertilizer was in treatment A3 = 3 kg/plot with an average production per plot of 155.13 g, and the lowest was in treatment A0 = 0 kg/plot with an average production per plot is 131.25 g. For the treatment of coconut water liquid organic fertilizer, the heaviest production was in treatment K3 = 900 ml/plot with an average production per plot of 157.63 g and the lowest was in treatment K0 = 0 kg/plot with an average production per plot of 128.75 g.

This is because the coconut water liquid organic fertilizer given has not been able to provide good effectiveness for plant growth. According to Fauzia's explanation (2010) that coconut water organic fertilizer is an organic fertilizer that has nitrogen nutrients needed by plants. But coconut water liquid organic fertilizer does not contain much nitrogen nutrients, therefore plants are given coconut water liquid organic fertilizer very much, otherwise plant growth will not be optimal.

Based on the research conducted, coconut water liquid organic fertilizer has not been able to provide suitable nitrogen nutrients to plants. According to Kelvin and Nurika (2017), liquid organic fertilizer will accelerate leaf formation if applied in low concentrations but with regular administration.

## CONCLUSION

From the results of the research and discussion conducted, it can be concluded as follows:

1. Application of cow dung fertilizer on the growth and production of kailan plants (*Brassica oleracea Alboglabra*) had no significant effect on all parameters, namely plant height (cm), number of leaves (strands), production per sample (g)
2. Provision of coconut water liquid organic fertilizer on growth and production kailan plant (*Brassica oleracea Alboglabra*) had no significant effect on all parameters, namely plant height (cm), number of leaves (strands), production per sample (g)
3. The interaction of cow manure and coconut water liquid organic fertilizer on the growth and production of cayenne (*Brassica oleracea Alboglabra*) had no significant effect on all parameters, namely plant height (cm), number of leaves (strands), production per sample (g)

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