



Effect of Giving Organic Waste-Based Poc To The Growth of Kailan Plants (*Brassica Oleracea L*)

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ABSTRACT

This study combined the use of variable doses of liquid organic fertilizers made from organic waste, with a Factorial experimental study that uses a Randomized Group Design (RAK) consisting of 2 treatment factors. Factor I treatment is a type of POC raw material consisting of 7 levels: P0= Comparison without the provision of liquid organic fertilizer, but given basic fertilizer; P1= Given POC made from a mixture of materials 2 to 7; P2=Given POC made from vegetable waste (tomatoes and mustard); P3= Given POC made from waste fruits (bananas and papaya); P4= Given POC made from germinated waste; P5= Given POC made from waste food catering; P6= Given POC made from catfish waste; P7= Given POC made from animal slaughterhouse waste (cow's blood). The treatment of Factor II is the concentration of POC giving includes 3 levels, namely: K1= POC concentration of 4%=40 ml/ liter of solution; K2= POC concentration of 8%=80 ml/liter solution; K3= POC concentration of 12%=120 ml/liter of solution. The parameters of observations made on kailan plants include: the number and length of the plant. By comparing the concentration treatment of K1, K2 and K3 mentioned above, the K2 treatment (concentration of 8% POC) exerts a better influence than the treatment of K1 and K3, although it is not real from the K3 treatment. This shows that the use of POC made from organic waste with a concentration of 8% POC provides a significant influence that can play a role in increasing soil fertility and plant productivity.

Key word: Liquid Organic Fertilizer (POC), Organic Waste, Kailan

1. INTRODUCTION

Kailan has good prospects to be developed in Indonesia because of its abundant nutritional content and has high economic value. Kailan has a lot of vitamin A, vitamin C, thiamin and lime (Annisava, 2013). In addition, as a food, Kailan can also be used for the therapy of various diseases because it contains carotenoids anti-cancer compounds (Martínez-Hernández et al., 2013). Kailan's economic value is high because of its marketing to the upper middle class, especially many presented in international restaurants such as Chinese, Japanese, American, European, and star hotels (Vidianto et al., 2013). This requires that the kailan produced must be of high quality. Cultivation systems that can produce high-quality products, one of them with the use of liquid organic fertilizers as additional nutrients. So that Kailan plants that use liquid organic fertilizer can be categorized as organic Kailan plants.

Organic waste is generally biodegradable, which can be decomposed into simpler compounds by soil microorganisms (Nisak et al., 2017). The decomposition of the organic waste by microorganisms produces macro and micro matter. Utilization of organic waste market into organic fertilizer is very important to reduce the impact of pollution by the accumulation of waste (Aziz, 2017).



Organic waste processing using anaerobic technology is a simple technology that is easy to do with equipment that is easy to get and relatively cheap. The anaerobic overhaul process of organic matter can reduce environmental pollution, because waste has been processed will produce organic fertilizer in solid or liquid form (Hariyadi et al., 2018).

This study combined the use of variable doses of liquid organic fertilizers made from organic waste such as vegetable waste, fruit waste, sprout waste, catfish waste, food waste catering, and cow's blood as animal slaughterhouse waste. The quality of liquid fertilizer organic waste will be better by adding a solution of microorganisms such as EM-4. The use of EM-4 in the manufacture of organic fertilizers can speed up the fermentation process and improve plant growth and yield (Ali et al., 2020).

Therefore, there needs to be research on the use of variations in the dose of liquid organic fertilizer made from several types of organic waste that have an influence on the growth and yield of more optimal crops. At the same time it can provide useful informais, especially for the development of liquid organic fertilizer technology as plant nutrition and can be applied at the level of farmers and the wider community.

2. RESEARCH METHODS

This study combines the use of variable doses of liquid organic fertilizers made from organic waste such as vegetable waste, fruit waste, sprout waste, catfish waste. This study is a Factorial trial conducted using a Randomized Group Design (RAK) consisting of 2 treatment factors. Factor I treatment is a type of POC raw material consisting of 7 levels: from P₀ until P₇

- P₀ = Comparison without the provision of liquid organic fertilizer, but given basic fertilizer
- P₁ = Given POC made from a mixture of ingredients, from vegetable waste (tomatoes and mustard), waste fruits (bananas and papayas), germination waste, waste leftover food catering, catfish waste, and the waste of slaughterhouses (cow's blood) 2 to 7
- P₂ = Given POC made from vegetable waste (tomatoes and mustard)
- P₃ = Given POC made from waste fruits (bananas and papayas)
- P₄ = Given POC made from germination waste
- P₅ = Given POC made from waste leftover food catering
- P₆ = Given POC made from catfish waste
- P₇ = Given POC made from the waste of slaughterhouses (cow's blood)

The treatment of Factor II is the concentration of POC giving includes 3 levels, namely:

- K₁ = POC concentration of 4% = 40 ml/liter of solution
- K₂ = POC concentration of 8% = 80 ml/liter of solution
- K₃ = POC concentration of 12% = 120 ml/liter of solution



The combination of treatments will result in 21 treatments and 1 control without the administration of POC and proposed 3 times so that a total of 66 treatments must be observed.

The parameters of observations made on the Kailan plant include:

- a. Number of Leaves, data collection activities on the number of leaves are carried out every 7 days. The leaves included in the observation count are leaves that have opened perfectly.
- b. Plant Length, data retrieval activities are carried out every 7 days. Observations are made by measuring the length of the plant starting from the base of the plant to the end of the longest leaf.

3. RESULTS AND DISCUSSIONS

Numbers of Leaves

Statistical results with regression analysis that form the relationship between variables in the number of plant leaves as free variables with wet weight variables per plant as bound variables show an insignificant influence on the observation of age 14 days after transplanting ($0.274146 > 0.05$) with a value of R Square of 0.059458 meaning 5.95% of the effect indicated by the variable number of leaves due to giving POC on all treatments. In the observation of the age of 28 days after transplanting showed an insignificant effect ($0.147328116 > 0.05$) with a value of R Square of 0.102028 meaning a number of 10.20% due to other factors beyond poc treatment. Furthermore, the observation of the age of 35 days after transplanting also showed a significant influence ($0.026695719 < 0.05$) with a square value of 0.2224 meaning a number of 22.24% due to the influence of POC treatment while a number of 77.76% was caused due to other factors outside the treatment of POC. The regression equation obtained in the observation of age 35 days after transplanting is $y = 9.3594x - 34.135$.

Next to illustrate the spread of the relationship between variables in the number of kailan plant leaves after wet weight per plant as a result of POC administration treatment, presented in graph 2 below:

Age Regression Equation 35 HST

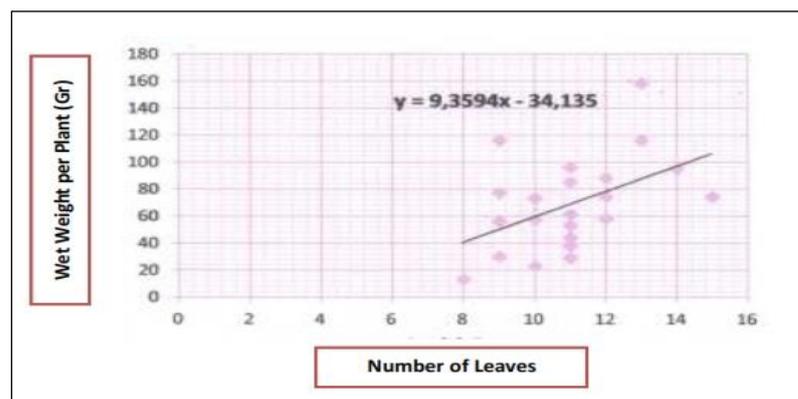


Figure 1. Graphic Variable Relationship of Number of Leaves With Wet Weight per Kailan Plant On Observation of Age 35 Days After Transplanting

The utilization of POC in this study proves that the nutritional content will increase the availability of considerable nitrogen into the soil, so that the needs of plants for growth and development can be fulfilled as well. The function of nitrogen as a fertilizer is to improve the vegetative growth of plants and help the process of protein formation (Hariyadi et al., 2018). Liquid Organic Fertilizer has a complete nutrient content, even there are other organic compounds that are beneficial for plants such as humic acid, fulvat acid and other compounds. The nutrients contained in Liquid Organic Fertilizer consist mostly of simple sugar groups and proteins with solution reactions in the form of amino acids, organic acids, vitamins and growth hormones (auxin, gibberlin) and micro-elements (Alakhyar et al., 2019). These elements are needed to encourage optimal and sustainable plant growth and health, so as to increase crop yields.

Plant Length

Statistical results with regression analysis showed that the relationship between the plant length variable as a free variable and the wet weight per plant variable as the bound variable showed a significant influence on observations 14 days after transplanting ($0.01596 < 0.05$) with a Square R value of 0.2573 meaning a sum of 25.73% was affected by poc administration; Then on observation 28 days after transplanting showed a significant effect ($0.00086 < 0.05$) with a value of R Square of 0.43326 meaning a number of 43.33% due to the influence of POC treatment while 56.67% due to factors outside the POC. Furthermore, on observation 35 days after transplanting also showed a significant influence ($2.73938 < 0.05$) with a value of R Square of 0.59346 meaning 59.35% due to the influence of POC administration..

Regression equation obtained from observation 14 days after transplanting i.e. $y = 7.2439x - 12.38$; then on observation 28 days after transplanting i.e. $y = 7.7358x - 62.409$; While the observation of the age of 35 days after transplanting is $y = 4.1815x - 56.74$. Next to illustrate the spread of the relationship between variable plant length and wet weight per plant as a result of poc administration treatment, presented in the following graph;

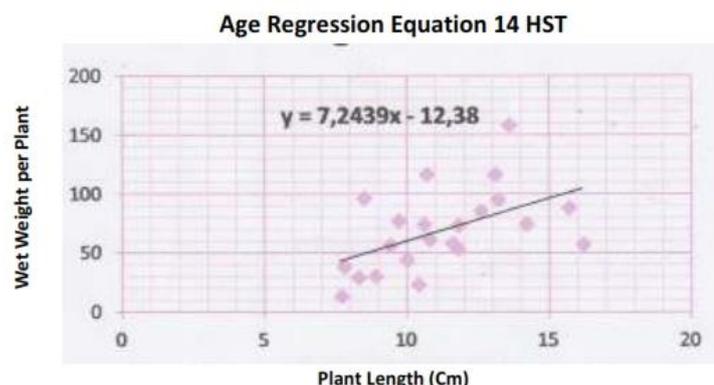


Figure 2. Graphic variable Relationship of Kailan Plant Length With Wet Weight per Plant On Observation of Age 14 Days After Transplanting

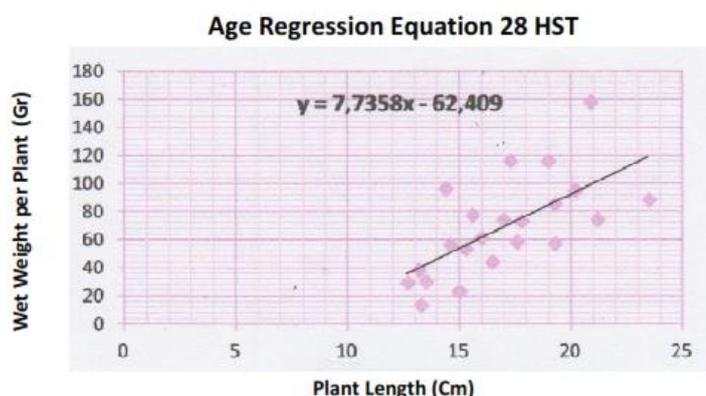


Figure 3. Graphic variable Relationship of Kailan Plant Length With Wet Weight per Plant On Observation of Age 28 Days After Transplanting

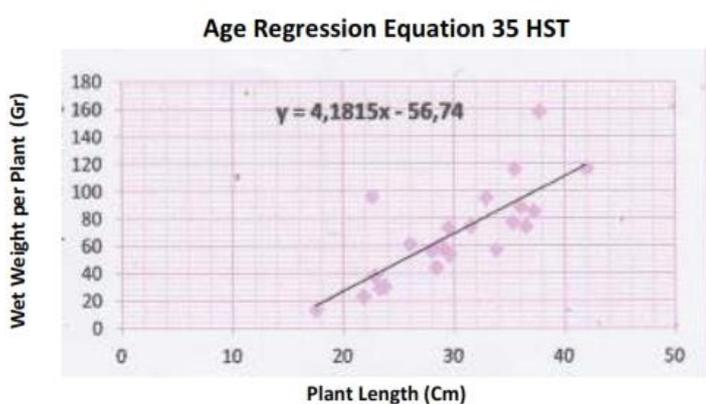


Figure 4. Graphic variable Relationship of Kailan Plant Length With Wet Weight per Plant On Observation of Age 35 Days After Transplanting

Utilization of organic fertilizers in plant media is done to reduce the negative impact caused by the use of an-organic fertilizers that are at high risk to the physical soil. The results of the above research as one form of implementation to increase the effectiveness of the use of organic fertilizers and an-organic fertilizers are shown by being able to increase the growth of Kailan plants significantly.

According to (Abror & Harjo, 2018) that plants easily regulate the absorption of the composition of fertilizer needed and in the event of excess capacity of liquid organic fertilizers given to the soil because of its liquid shape. Liquid organic fertilizer in fertilization is clearly more evenly distributed, there will be no buildup of fertilizer concentration in just one place. This is because liquid organic fertilizers are 100% soluble.



Concentration of POC

By comparing the treatment of K1, K2 and K3 mentioned above, the treatment of K2 (concentration of 8% POC) has a better influence than the treatment of K1 and K3, although it is not real from the K3 treatment. This shows that the use of Organic Waste-based POCs with a concentration of 8% POC in this study is indicated to have a significant influence that can play a role in increasing soil fertility and plant productivity (Narullova, 2021).

(Sukasih, 2016) added that liquid organic fertilizers have a maximum chemical content of 5% and contain certain materials such as microorganisms that are rarely found in solid organic fertilizers. Liquid organic fertilizers also contain amino acids and hormones namely (gibberine, cytokinin and IAA).

4. CONCLUSION

Based on the results of the study, it was concluded as follows: There was a significant influence of the treatment of POC on variable leaf count with R Square of 0.22244 (22.24%) and plant length with R Square of 0.5935 (59.35%) indicated on observation of 35 days of age after transplanting. K2 treatment is a POC concentration of 8% in all observation paramaters (number of leaves, length of plant and wet weight per plant); Giving a higher value than the treatment of K1 and K3 with Adjusted R Square of 0.72192 means a number of 72.19% due to the influence of POC treatment, while a number of 17.81% due to other factors outside the POC treatment. But statistically the best value achieved by different K3 treatment is not significant with K3 treatment which is a POC concentration of 12%.

Suggestion

The use of POCs made from organic waste needs to be done further research to test more detail the effectiveness in its effect on growth and other crop yields..

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