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The Effect of Kepok Banana Skin Liquid Organic Fertilizer (*Musa paradisiaca*) on the Growth of Mustard Plants (*Brasicca juncea* L.)

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ABSTRACT

Green mustard (*Brassica Juncea* L.) is a vegetable that contains a lot of vitamins and high nutrients, so mustard greens have high commercial value and marketing prospects. Mustard greens are also much liked by the public for consumption, therefore the level of market demand for mustard lants is very high. The production of mustard greens in Indonesia is still not optimal to meet market demand, therefore a research is being carried out on applying Liquid Organic Fertilizer (POC) t mustard greens. There were 4 different experimental treatments in this study. This study used an experimental method, namely by using a Completely Ranomized Design (CRD) using 2 treatment factors. The first treatment factor is the volume of Liquid Organic Fertilizer (POC) watering and the second treatment factor is the time of Liquid Organic Fertilizer (POC) administration. P0 = control, P1 = 10 ml POC, P2 = 15 ml POC, P3 = 20 ml POC and P4 = 25 ml POC. The results of the study stated that the best for P4 treatment.

1. INTRODUCTION

Plant growth and development is strongly influenced by various factors such as light, temperature, humidity, soil, nutrients and others. Soil conditions and nutrients that do not support plant growth can be pursued by providing fertilizer according to plant needs. Fertilizers are materials that contain one or more plant nutrients which, if given to plants, can increase plant growth and yield (Salfina, 2017).

Fertilizers consist of two types, namely inorganic fertilizers and organic fertilizers. Organic fertilizers can be solid and liquid. Liquid organic fertilizer contains micro and macro elements needed by plants for the process of plant growth and development. Organic fertilizers are fertilizers composed of animal, human and plant wastes. One of the plant wastes that can be used is banana peels. The advantages of using fertilizers that contain complete nutrients, both macro nutrients and micro nutrients. This condition is not owned by artificial fertilizers (Susetya, 2012).

Banana plants are community cultivation plants that thrive in Indonesia. Banana plants are a separate business opportunity for the community, resulting in a lot of banana peel waste being produced. The banana peel itself is about 1/3 of the banana fruit. So far the utilization of banana peel waste is still lacking, only some people use it as animal feed (Risky, 2015).

Banana peel waste can be used as fertilizer, because banana peels have a lot of ingredients such as protein and phosphorus, besides that they also contain micronutrients such as Ca, Mg, N, Na, and Zn. The application of liquid organic fertilizer from banana peel waste has a significant effect on plant growth including plant height and number of plant leaves. Banana peels have good potential to be used as organic fertilizer which is watered on the planting medium (Risky, 2015)

Increasing vegetable production needs to be supported by various efforts, one of which can be done through fertilization. So far, farmers are still using chemical fertilizers in cultivating mustard greens. This is because chemical fertilizers are easier to obtain in the market but are relatively expensive and less environmentally friendly. The use of chemical fertilizers in a relatively long period of time has proven to cause serious problems, including soil contamination and economic and social dependence on bananas (Sedayu, 2014).

One of the solutions to increase the production of mustard plants is to use liquid organic fertilizers. Liquid Organic Fertilizer is fertilizer whose basic ingredients come from animals or plants that have undergone fermentation. One of the liquid organic fertilizers that can be used to fertilize mustard plants. The large number of home industry businesses made from bananas results in a large amount of banana peel waste. One-third part of the banana is the skin so that the thickness of the banana skin can cause fertilization of banana peel waste in large quantities (Susetya, 2012).

Banana peels can be used as liquid fertilizer because banana peels contain the elements N, P, K, Ca, Mg, Na, Zn, each of which functions for plant growth and development which has an impact on increasing plant productivity. Banana peel organic fertilizer has a significant effect on plant growth parameters. The need for different nutrients according to the growth phases of the plant. During the vegetative phase, different nutrients will be needed from when the plant reaches the generative phase. Mustard plants are plants that require N, P, and K nutrients in the vegetative phase.

Indonesian people, especially the middle class now, especially vegetable farmers, are increasingly concerned about the importance of fertilizer for plants. One solution to overcome the limitations of fertilizers that are cheap and easy to obtain is to use organic fertilizers in the utilization of organic waste such as banana peels. To reduce the problem of waste that pollutes the environment, it can be overcome by utilizing banana peel organic waste as liquid organic fertilizer which can increase the availability of nutrients in plants. The advantages obtained in making liquid fertilizer are that the manufacturing process is relatively easy, it is more practical to use, and the manufacturing costs incurred are also not too large.

2. MATERIALS AND METHODS

2.1 *Tools and materials*

The tools and materials used in this study included cellphone cameras, plastic jars, knives, measuring cups, and stationery. While the materials used are banana skin waste, eggshell waste, rice washing water waste and EM4.

2.2 Procedures

Research on the growth of mustard plants with the addition of POC to be able to determine the growth rate of mustard plants was carried out in Tuko Village, Pulokulon District, Grobogan Regency. The method used in this studywas a Completely Randomized Design (CRD) with one factor, consisting of 5 treatments: P0 : Without giving POC (control) P1: Watering volume with 10 ml POC P2: Watering volume with15 ml POC P3: Watering volume with 20 ml POC P4: Watering volume with 25 ml POC. Data analysis used Completely Randomized Design (CRD), namely byusing 2 treatment factors. Formulas used in data calculations are written using an equation editor or other standard applications. Formulas cannot be in the form of images or screen capture results from other sources. Formulas are written byincluding reference sources.

3. RESULTS AND DISCUSSION

2.3 Plant height

The increase in plant height is one of the parameters that can be used to determine growth in mustard plants. Based on the results of the research that has been done, the highestplant height results were found in the treatment P4 = Watering volume with 25 ml of POC, which was 12 cm plant height.

2.4 Number of Leaves

Based on the observation data, it shows that the number of leaves on mustard plants in growing media with different fertilizer concentrations and time intervals for applying fertilizers has a varying number of leaves. The research that has been carried out obtained the results of observing the number of leaves for each treatment on mustard plants. Observation of this research takes 4 weeks. And the results obtained were that the highest number of leaves wasfound in treatment P4 = Volume of watering with POC as much as 25 ml which contained 6 leaves. In addition, the results obtained were the least number of leaves, namely in the treatment P0 = without giving POC (control) which contained 5 leaves.

Table 1. Data on Plant Growth Results

Treatment (P)	First Week (H1)		Fourth Week (H2)	
	Plant height Quantity(cm)	Leaf	Plant height Quantity(cm)	Leaf
P0 = Without Giving POC (control)	2.5	2	7	5
P1 = Watering volume with POC as much as 10 ml	3	4	8	5
P2 = Watering volume with POC as much as 15 ml	3	4	9	6
P3 = Watering volume with POC as much as 20 ml	3	4	10	6
P4 = Watering volume with POC as much as 25 ml	3.5	4	12	6

Notes:
P : The first factor is the volume of watering liquid organic fertilizer (POC)
H : Time of application of Liquid Organic Fertilizer (POC)

(A) **(B)**

Figure 1. The Best (A) and the worst (B) of the green mustard growth

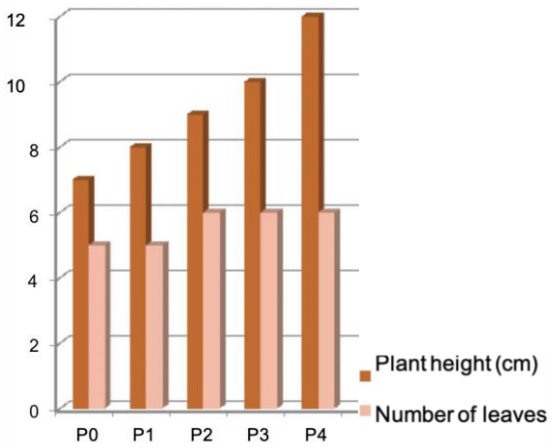

Figure 2. Mustard Plant Growth Chart

3. 3 Plant Height

Plant height growth is one of the parameters that can be used to determine plant growth. Based on the data obtained, it can be seen that the mustard plants that were given liquid organic fertilizer from kepok banana peels had the highest plant height increase in the P4 treatment (25 ml POC concentration), with a height increase of 12 cm. While the lowest plant height gain was in the P0 treatment (0 ml POC concentration), with a height value of 7 cm. This is because the P0 treatment did not use fertilizer so that plant growth was slow. Providing nutrients in the vegetative phase with sufficient concentrations can provide optimal results for plant growth.

3.4 Number of Leaves

The number of plant leaves is one of the important parameters to observe plant growth. Leaves are important organs to support plant growth because leaves are the main organ for food supply through the process of photosynthesis. To support leaf growth, it is necessary to have a supply of nutrients from fertilizer. in each treatment has a different leaf growth. The average increase in the number of leaves was highest in treatment P4 (25 ml POC concentration) with 6 leaves. The lowest average number of leaves in treatment P0 (POC concentration 0) with 5 leaves means that the higher the concentration of fertilizer, the higher the number of plant leaves. This is because the application of liquid organic fertilizer from kepok banana peels can affect the number of leaves on mustard plants.

4. CONCLUSIONS

Based on the results of the research that has been done, it can be concluded that there is an increase in the growth of mustard plants planted such as plant height and number of leaves on mustard plants and there is an increase in calcium content in mustard plants due to the treatment of banana peel Liquid Organic Fertilizer (POC). From the results of research and observations it can be concluded that the best plant growth occurred in treatment P4 = Watering volume with 25 ml of POC because at P4 mustard plants had a plant height of 12 cm and had 6 leaves. Whereas the worst or less optimal plant growth occurred in the P0 = treatment without POC(control) because at P0 the mustard plant only had a plant height of 7 cm and had 5 leaves.

5. ACKNOWLEDGMENTS

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