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THE EFFECT OF KEPOK BANANA (MUSA BALBISIANA L.) PEEL LIQUID FERTILIZER ON THE GROWTH OF MUSTARD PAKCOY PLANT (BRASSICA RAPA SUBSP. CHINENSIS L.)

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ABSTRACT

Banana is a fruit consumed all over the world including Indonesia. However, the banana peel is still rarely utilized by the public, banana peel is usually only used for animal feed by the community. Without realizing it, banana peel contains nutrients that can be used as fertilizer for plants. Pakcoy mustard plant is a plant that is widely cultivated by the community, this is because one of them is the relatively short age of the plant so that it is in great demand by the community for cultivation. Therefore, the researchers wanted to conduct the research on the effect of kepok banana (Musa Balbisiana L.) Peel liquid fertilizer on the growth of mustard pakcoy plant (Brassica Rapa Subsp. Chinensis L.). This study aimed to: 1) determine the phosphate and total nitrogen nutrients in the liquid organic fertilizer of Kepok banana peel (Musa balbisiana L.). 2) determine the effect of giving Kepok banana peel liquid fertilizer (Musa balbisiana L) on the growth of mustard pakcoy (Brassica rapa subsp. Chinensis L.). This research method used a randomized block design (RBD) consisting of 5 treatments and 4 replications. The treatments given in this study were control P0 (0 ml of kepok banana peel liquid fertilizer), P1 (20 ml of kepok banana peel liquid fertilizer), P2 (40 ml of kepok banana peel liquid fertilizer), P3 (60 ml of liquid fertilizer of kepok banana peel)., and P3 (80 ml of kepok banana peel liquid fertilizer). The parameters observed in this study were plant height, number of leaves, and leaf width. Then, performing the ANOVA test (F test) with the applicable test criteria was that Ha was accepted if the value of Fh> Ft. From the results of this study, it was found that liquid organic fertilizer had a significant effect on the number of leaves, namely the value of Ft was 0.05 (3.26) <Fh treatment 3.384473 <Ft 0.01 (5.41) meaning that Ha was accepted. Therefore, there was also a significant effect on leaf width where Ft 0.05 (3.26) <Fh treatment 3.612245 <Ft 0.01 (5.41) means that Ha was accepted. Meanwhile, the plant height Fh treatment 2.222438 <Ft 0.05 (3.26) <Ft 0.01 (5.41) has no significant effect, meaning that Ha was rejected. From the results of the Least Significant Difference (LSD) the number of leaves P4 when compared to P0 was very significantly different, but when compared to P2 and P1, it was significantly different, but at P4 it was not significantly different when compared to P3. Then, for the LSD test results on leaf width, namely P4 when compared with P2, P0, P1 and P3, which are significantly different.

Keywords: Liquid Organic Fertilizer, Kepok Banana Peels, Pakcoy Mustard.

INTRODUCTION

Banana is a fruit consumed all over the world, there is a part of banana that is not usually used or consumed namely banana peel (Ibrahim, 2015). According to Nasution et al, (2014) so far the utilization of banana peel waste is still lacking, only as people use it as animal feed. The content in banana peel is protein, calcium, phosphorus, magnesium, sodium and sulfur. Therefore, banana peel has good potential to be utilized as organic fertilizer. In his research Ji

The Seybold Report
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Gopal, (2015) stated that natural products such as plants, fruits and their peel are a good source of organic compounds and cheaper than other synthesis chemicals. Moreover, the use of natural bioactive compound sources can not only effectively cost expenditures but also can make it environmentally friendly.

Banana peel contains nutrients that many plants need, one of which is the nitrogen element. Nitrogen is an important constituent element in protein synthesis. The role of nitrogen for plants is to stimulate overall growth, especially stems, branches, and leaves, in addition to it is also has an important role in the formation of green leaves that are very useful in other processes, other functions namely forming fat proteins, and various other organic compounds (Manis et al, 2017). According to Machrodania et al, (2015) banana peel contains protein, potassium, phosphorus, magnesium, sodium and sulfur, and shows that banana peel contains 1,137% potassium element, while element P contained in banana peel is 63 mg/100 grams. The many elements contained in banana peel make banana peel potentially to be utilized as organic fertilizer.

The use of organic fertilizer would be better for the long term than the use of inorganic fertilizers to the contrary. According to Parman, (2007) the impact of the use of inorganic fertilizers resulted in a considerable increase in plant productivity. Meanwhile, the use of inorganic fertilizers over a relatively long period generally results in poor soil conditions. The soil becomes rapidly hardened, less able to store water and quickly becomes acidic which would ultimately decrease crop productivity. According to Dewanto et al, (2013) stated that the giving of organic fertilizers can improve soil structure, increase soil absorption material from water, improve living conditions in the soil, and as a source of food for plants.

In order to increase vegetable production, several efforts were needed including improving farming techniques, the use of suitable varieties, intensive crop di sharing and efforts in the fertility rate of the soil (Yuliani, 2015). One of the effective solutions in overcoming soil fertility improvement was by switching to using organic fertilizer, because organic fertilizer can improve soil quality (Fitriani et al, 2019).

In general vegetables, especially leaf vegetables and short-lived (season) the main nutrient needed was element N, element N was needed in large quantities. Therefore, N fertilization was one of the important things in vegetable cultivation (Efendi et al, 2017). Mustard leaves were an economically valuable part so efforts to increase production were attempted on improving vegetative products, to support such efforts were made fertilization. Mustard plants needed enough nutrients for their growth and development in order to produce maximum production. The nutrient needed by mustard plants was nitrogen (N). The N element in mustard plants serves to increase vegetative growth, so that the leaves become wider, greener, and more quality (Supriyani et al, 2017).

Mustard pakcoy plant (Brissicarapavar. chinensis L.) dimming one of the plants that is easy to obtain and economical enough of the pakcoy plant was one of the plants that was widely cultivated in the community. It was quite short for the planting period so that it can be

The Seybold Report
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harvested. In addition, to grow maximum pakcoy plants, this plant needs enough nitrogen (N) elements to produce good growth and quality of results (Dominiko et al, 2018).

From the description above, researchers wanted to research the waste of kepok banana peel with the title Influence of Giving Liquid Fertilizer Kepok Banana Peel (MusaBalbisiana L.) on the Growth of Sawi Pakcoy Plant (Brassica rapa subsp. chinensis L.). The background in this study was to obtain information about the influence of banana peel liquid fertilizer on the growth and yield of mustard pakcoy plants. It was hoped that this research would be able to tackle the banana peel waste used for organic fertilizers, and also to add insight into knowledge for agriculture and society.

RESEARCH METHODS

Time and Place of Research

The manufacture of banana peel waste liquid fertilizer was carried out on October 13, 2019 until November 16, 2019. Poc manufacturing was carried out in the House located in Lr. Banten II. Palembang. Sawi pakcoy planting was carried out at UM Palmbang Biology FKIP Garden, the first process starting from seed seeding was carried out on January 26, 2020 to February 06, 2020. Then, move planting on February 06, 2020 to March 5, 2020.

Research Design

This type of research was pure experiment research using Randomized Group Design (RAK) consisting of 5 treatments and 4 repetitions, namely:

1. P0 : Without using POC kepok banana peel waste / 5 kg garden soil.
2. Q1 : Using 20 ml POC kepok banana peel waste / 5 kg garden soil
3. Q2 : Using 40ml POC kepok banana peel waste / 5 kg garden soil
4. Q3 : Using 60ml POC kepok banana peel waste / 5 kg garden soil
5. Q4 : Using 80ml POC kepok banana peel waste / 5 kg garden soil.

Treatments were arranged with complete randomity so that each test unit has the same opportunity to get each treatment, randomized is done by voting where at first determine the number of trial plots (n) by means of the number of treatments (t) multiplied by the number of repetitions (r) or u = (t), (r) with four treatments and six repetitions then the number of trial plots there were twenty-four pieces (Sari, 2016). In this study researchers used 5 treatments and 4 repetitions.

Data Collection

The data collection in this study consisted of how fertilizer making works, how seeding, planting, and measurement treatments work. For the way data was collected from each stage was presented below:

ISSN 1533-9211

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1. How liquid fertilizer manufacturing works:

Banana peel waste was as 5 kg, then banana peel was cut into small pieces and blended until smooth. Prepare 125 ml of EM-4 bacteria and 125 g of granulated sugar dissolved into a plastic jar containing 5 liters of water then stirred well. The fine banana peel was mixed in a plastic jar containing EM-4 bacterial liquid and sugar, then stirred again until well mixed and tightly closed. Fermentation was carried out for 8 days (Manis et al, 2017).

2. Seeding

Before the mustard pakcoy plant was transferred to polybag it was necessary to do seeding for up to 14 days until ready to be transferred to polybag. This was done so that tomato plants grow well and reduce the risk of death.

3. Ground media setup

Research procedures were:

a. Preparation of the test site, the test site was cleaned of dirt and weeds then made a roof of leaves. Around the experiment site was a 1m high mesh well with one door at the front.

b. Soil preparation, the soil used as a medium was the soil of the upper layer that has been cleaned from dangulma impurities, dried to kill microorganisms in it. Then the soil weighed 5 kg for each polybag.

4. How Planting Works

Planting sample was carried out by preparing 20 poly bags that contained 5 kg of soil each, at ground level in polybags hollowed out as deep as 3 cm. Then plant mustard pakcoy seedlings at the age of 14 days after seeding. Fertilizer administration was done 1 week after planting, then the next week of fertilizer administration once every 2 weeks during the study.

5. Plant Maintenance

Plant maintenance was done by watering, watering plants was done 2 times / day i.e. morning and evening by watering water using suprayer. It was then weeded by removing weed plants if one grows around them, and picking up pests that were in the area of the plant.

6. Research parameters

The parameters of this study were

a. The height of the plant

Measurement of plant height was done by measuring from the ground floor to the highest part of the plant. The data was then disputed about the highest of plants at the end of the study and at the beginning of the study (measurement of nursery results), measurements were taken every 1 week.

ISSN 1533-9211

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b. Number of leaves

Calculation of the number of leaves by calculating the number of leaves from the planting results in each treatment. The number of leaves was calculated from the beginning of the study to the end of the study and the data was calculated using a unit of strands. Then the data was calculated by the number of leaf differences that grow at the beginning and at the end of the study based on the many leaves that grow on tomato plants, and the number of leaves carried out every 1 week.

c. Leaf width

Calculation of the width of the leaves of the plant was done by measuring the widest part of the leaf of the plant, the middle part of the leaf strand, measured by cm units.

7. How measurement works

The way the measurement of the observation results was as follows:

a. Provided an observation sheet for each treatment.

b. Observed soil pH, humidity, and light intensity.

c. Measured the height of the plant, the number of leaves, and the width of the leaves of each treatment.

d. Recorded the measurement results on the observation sheet (the results of the study) that has been provided.

RESEARCH DATA ANALYSIS

The observed changes were changes in the height of the plant, the number of leaves, and the width of the leaves. If the F test results were at a rate of 5% and 1% showed a real or very real influence were continued the Smallest Real Difference test with BNT test at 5% (Tuapattinaya & Tutupoly, 2014).

RESULTS AND DISCUSSIONS

Plant Height

Based on the analysis of high variants of plants in week 1, week 2, week 3, and week 4 of the giving of kepok banana peel liquid organic fertilizer showed that there was no noticeable effect on the height of mustard pakcoy plant (Brassica rapa subsp. chinensis L.) This was compounded by several factors. Whereas, in the first week was the initial data, which was only done fertilization on each treatment. Therefore, the plant has not responded to the height of the plant.

ISSN 1533-9211

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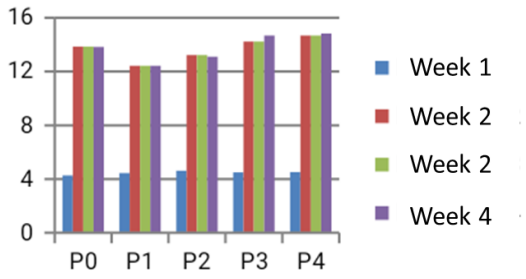

Figure 1: Chart of Average Height of Sawi Pakcoy Plants Week 1 to Week 4

In week 2, week 3, and week 4 of the analysis, the liquid fertilizer of banana peel kepok did not have a real effect on the height of the mustard pakcoy plant. This was due to several factors, namely the lack of nutrients needed by mustard pakcoy plants. The nutrients needed in mustard pakcoy plants in high growth plants, one of them was phosphorus element. Phosphorus is an element that helps the high growth of mustard pakcoy plants which was the element of phosphorus that would help the root growing in plants, so that the roots could absorb the nutrients needed by the plant. In addition, fertile roots would help the establishment of plants. In the research, Baker et al, (2015) explained that Phosphorus is a nutrient of plants that cannot be replaced, and is so important for global agriculture. Nutrient phosphorus contained in liquid fertilizer banana peel kepok had a very low content of 0.0107% while the minimum nutrient was 0.035%. Therefore, if it was associated with liquid organic fertilizers that have been made, the nutrients of belom plants were fulfilled for the high growth of plants, because the phosphorus element contained in the liquid fertilizer of kepok banana peel was still very little. As mentioned in Laginda et al, (2017) phosphorus element plays a role in helping the development of young roots, where the roots of fertile plants can strengthen the establishment of plants and can increase the absorption of nutrients needed by plants. If the plant is malnourished it will also affect the growth of the plant. In addition, pH was a factor that affected the growth of plants. The soil pH used in this study was acidic which was 5, 12. Whichever, low pH will affect the availability of nutrients in the soil, this corresponded to the analysis of nitrogen (N) elements in the soil which had a very low N element as 0.03%. Therefore the growth of plants in the first week was less well grown. This was because the nutrients needed by plants were still not fulfilled. In safitri M research, (2015) explained that the pH in the soil was very influential on the availability of nutrients in the soil, the life activities of soil renic bodies and fertilizer reactions given into the soil. According to Mahyuddin et al, (2019) low soil pH causes the unavailability of nutrients in the soil.

NUMBER OF LEAVES

After analysis of variants week 1, week 2 and week 3 the giving of kepok banana peel liquid fertilizer has no real effect on the number of leaves of mustard pakcoy plant (Brassica rapa subsp. Chinensis L.) This was because in the 1st week there has not been fertilization done, so the plant has not responded to the number of leaves.

ISSN 1533-9211

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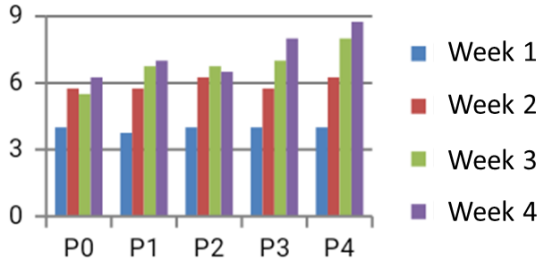

Figure 2: Chart of Average Number of Sawi Pakcoy Leaves Week 1 to Week 4

However, from the analysis of data in week 2 and week 3 it turned out that the results of liquid fertilizer banana peel kepok have no significant effect on the number of leaves. In this case, many factors affect the growth of the number of leaves, one of the factors that affects them is nutrients. Nutrients were needed by plants as nutrients for their growth. The nutrient needed to multiply the number of leaves was one of the nitrogen (N) elements. In his research, Ciampiti et al, (2013) said that good nutrition was indispensable and should be achieved to optimize crop productivity. Nutrients needed to multiply the number of leaves one of them was nitrogen element (N), in his research, Santi et al, (2013) stated that Nitrogen is an important element in plant development. Plants absorb nitrogen available in the soil through their roots in the form of ammonium and a nitrate where the nitrogen element contained in the soil was very little was only 0.03%. Although, nutrient N in kepok banana peel liquid organic fertilizer was very high which was 8.95% but element N in fertilizer could not be directly absorbed by plants, this was due to acidic pH in the soil and low phosphorus element which causes infertile plant roots and root difficulty to absorb nutrients in the soil. According to Tuapattinaya & Tutupoly, (2014) the growth and development of planting was also influenced by external factors (nutrients, temperature, humidity, light, water pH) and internal factors (genetics, enzymes and hormones). The role of each nutrient in plant growth was also in the process of cell division and enlargement.

The results of the analysis in the 4th week of the administration of kepok banana peel liquid fertilizer provided significant value. This was because the nutrients that plants needed for the growth of the number of leaves have been met. From the results that have been done in the field pH greatly affected the growth of plants, where the initial pH on acidic soil was 5.12 then after the 4th week was re-checked which recorded pH close to neutral which was 6.40. In this case, the pH on the soil also affected plant growth. Then, in addition to the pH factor that affected the growth of the number of leaves that were nitrogen nutrients. Nitrogen would aid in the formation of chlorophyll, of which chlorophyll was essential for the process of photosynthesis. In this study nitrogen in the soil was very low which 0.03% was. However, the nitrogen element in the liquid fertilizer of banana peel kepok the content of nitrogen element was very high which was 8.95% so that the nutrients needed by plants for the growth of the number of leaves have been fulfilled from the kepok banana peel liquid fertilizer. In nasution et al research, (2014) stated that nitrogen was one of the main chemical elements needed for plant growth and production. Nitrogen is a component of chlorophyll and is therefore

The Seybold Report
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important for photosynthesis. Plants use nitrogen by absorbing either nitrate or ammonium ions through the roots. According to Safitri, (2015) nitrogen nutrient absorption (N) will be able to increase the formation and growth of leaves in plants. The availability of sufficient amounts of nitrogen (N) will facilitate the metabolism of plants and eventually affect the growth of organs such as stems, leaves and roots to be good. In addition, nitrogen elements that affect the number of leaves could be affected by other external factors.

To find out which treatment was very influential, the Smallest Real Difference (BNT) test analysis was conducted. In the treatment of P4 when compared to P0 liquid fertilizer banana peel kepok had a very real effect on the growth of the number of leaves. Then P4 when compared to P2 and P1 has real effect. But P4 when compared to P3 has shown a significant effect. Furthermore, P3 when compared to P0 liquid fertilizer banana peel kepok gave a noticeable effect on the growth of the number of leaves. But P3 when compared to P2 and P1 has no significant effect. Similarly P2 and P0 when compared to P0 and P2 have no real effect.

LEAF WIDTH

Based on the analysis of variants in the 1st week of the giving of kepok banana peel (Musa Balbisiana L) liquid fertilizer has no real effect on the width of the leaves of the mustard pakcoy plant. Because the first week is the initial data, which has not been fertilized, so in this case I have never seen the influence of liquid fertilizer banana peel kepok.

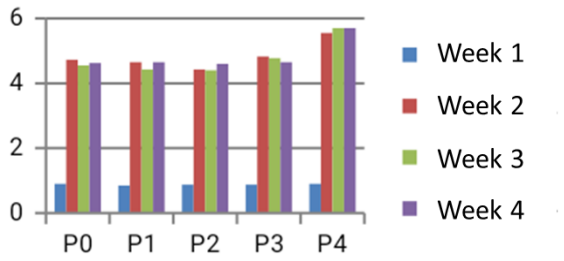

Figure 3: Average Width leaves week 1 to week 4

From the results of the analysis of week 2 the administration of liquid fertilizer banana peel kepok has no significant effect on the width of the leaves. This was caused by several factors, one of which was a pest that damages the growing parts of the leaves. One of the pests that disturbs plants was caterpillars, caterpillars were the most common pests found in plants. Caterpillars were very detrimental, because caterpillars feed directly on fresh parts of the leaves of the plant. In addition to caterpillars that were peach aphids, which this tick would make the leaves yellow and die as cited by Sudarjat, (2008) peach aphids (myzus persicae) are pests found on the bottom of the leaves and suck the liquid of leaf cells so that the leaves are yellowish, plant growth is inhibited, leaves wrinkle, wither, then die. The youngness of the factors that affect it are environmental factors, which are pH and plant nutrition is very influential to plants.

However, the results of the analysis of week 3 and week 4 of the giving of liquid fertilizer

The Seybold Report
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banana peel has a noticeable effect on the width of the leaves. This was because the kepok nitrogen nutrients contained in the liquid fertilizer of banana peel kepok was very high at 8.95% so that it can meet the nutrients needed by the mustard pakcoy plant. In this case nitrogen played a role in forming chlorophyll which chlorophyll would aid the process of photosynthesis, in addition nitrogen was used to form cells in plants. According to Safitri, (2015) that N is indispensable for the production of proteins used to form cells as well as chlorophyll. Chlorophyll helps the photosynthesis process which then results in being overhauled through the respiration process and generates the energy needed by the cell for cell division so that the leaves could grow to be longer and wider.

To find out which treatment has a significant effect was done the smallest Real Difference (BNT) leaf width test in week 3 on p4 treatment when compared to P2, P1, and P0 liquid fertilizer banana peel kepok had a very real effect on the growth of leaf width. Then P4 when compared to P3 has a real effect. But P3 when compared to P2, P1, and P3 has no real effect. Similarly P0 and P1 when compared to P2 and P1 liquid fertilizer kepok banana peel has no noticeable effect on the width of the leaves of mustard pakcoy plants.

The results of the analysis of the Smallest Real Difference (BNT) leaf width test in week 4 on p4 treatment when compared to P2, P0, P1, and P3 liquid fertilizer kepok banana peel had a noticeable effect on the growth of the number of leaves in the mustard pakcoy plant. But P3 when compared to P2, P0, and P1 has no significant effect. Similarly P1, P0 and P2 liquid fertilizer banana peel kepok has no noticeable effect on the width of the leaves of mustard pakcoy plants.

CONCLUSION

Based on the results of the research that has been done, it can be concluded that:

1. Fosfat content (P) in kepok banana peel liquid organic fertilizer has content <0.107 mg/l. whereas on total nitrogen (N) indicates that the content in liquid organic fertilizer has a yield of 89,100 mg /l.
2. The use of liquid organic fertilizer banana peel kepok had a real effect on the growth of mustard pakcoy plant (Brassica rapa subsp. Chinensis L.) And it also has a noticeable effect on the width of the leaves. But the opposite on plant height has no real effect.

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