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APPLICATION OF LIQUID ORGANIC FARTILIZER FROM BANANA WEEVILS ON THE GROWTH YIELD OF MUSTARD GREENS

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ABSTRACT

This research was conducted in the Courtyard of the Tebing Tinggi Pangkatan Village Post in Labuhanbatu Regency, North Sumatra Province, from November 2022 to January 2023. The study utilized a Completely Randomized Design (CRD) with 3 replications and 1 treatment factor, which was the dosage of liquid organic fertilizer. Based on the results of the 35-day study on the application of Liquid Organic Fertilizer (LOF) to sweet mustard plants (Bransisca Juncea L), it was found that the highest dosage, which was 185 ml, significantly differed from the control group where no LOF was applied. Meanwhile, the growth with dosages of 90 ml, 100 ml, and 150 ml showed significant differences compared to the control group.

KEYWORDS *How to Administration, POC Banana Weevil, Growth, Mustard (Bransisca Juncea L)*

INTRODUCTION

The Mustard Plant (Brassica Juncea L.) is a type of vegetable widely favored by the community for its numerous benefits and high economic value, ranking third after cabbage and broccoli. As a leafy vegetable, mustard plants contain a variety of nutrients that are essential for maintaining good health when consumed. These nutrients include protein, fat, carbohydrates, calcium (Cas), phosphorus (P), iron (Fe), Vitamin A, Vitamin B, and Vitamin C Fahrudin, (2009).

Given the increasing demand for mustard plants (Brassica Juncea L.), cultivation practices need to be enhanced, one of which involves the use of fertilizers. Fertilizers serve as one of the primary sources of nutrients provided to plants.

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Throughout the growth, development, and reproductive processes, plants require daily nutrition in the form of minerals and water, which are absorbed through the roots, stems, and leaves. These nutrients play various supportive roles and are crucial components for enhancing agricultural productivity Ramadani, (2020).

With the widespread consumption of mustard among the populace, its cultivation needs to be intensified among farmers. According to data from the Central Statistics Agency (BPS) in Gorontalo Province, mustard production from 2015 to 2017 reached 782 tons (Data Pusat Statistik, (2015-2017). Comparing agricultural statistics, mustard production in Central Sulawesi in 2012 amounted to 2,928 tons/ha across 744 hectares, which was lower than the production in 2011, totaling 5,492 tons/ha across 894 hectares. Meanwhile, mustard production in Palu City in 2012 was 496 tons/ha across 139 hectares (Badan Pusat Statistik., 2013).

Based on the above description, it is deemed necessary to conduct research on the effect of various doses of organic fertilizer on the growth and yield of mustard plants. The aim is to identify the optimum dosage that yields maximum plant height, leaf count, fresh weight, and dry weight of mustard plants.

Long-term use of organic fertilizers can enhance land productivity and prevent land degradation. However, common issues associated with organic fertilizers include low nutrient content, low solubility, longer time required to release available nutrients for plant uptake, and plants' less favorable response compared to inorganic fertilizers. Consequently, organic fertilizers are not widely used because they are perceived as inadequate in meeting plant nutrient requirements Mardiansyah, (2010).

All parts of the banana plant, from the roots to the leaves, have many benefits, especially its fruits, which are widely consumed by people. However, other parts of the banana plant, such as the heart, stem, peel, and rhizome, are rarely utilized and often discarded as banana waste. The rhizome of the banana plant is the swollen bottom part of the stem. According to Ahmad, Suyanti, (2008) as cited in Damiati, et.al., (2022), the banana rhizome is a type of stem tuber.

Banana rhizomes contain high nutritional value with a complete composition. According to Rukmana, (2005) as cited in Elisabeth, D.W., (2013), banana rhizomes contain high nutritional value with a complete composition. In 100 grams of fresh banana rhizome, there are 43.0 calories, 0.36 grams of protein, 11.60 grams of carbohydrates, 86.0 grams of water, several minerals such as calcium (Ca), phosphorus (P), and iron (Fe), Vitamin B1 and C, and are fat-free.

Based on the above description, the author is interested in conducting research on the use of liquid organic fertilizer derived from banana rhizomes on the growth and yield of mustard plants (Brassica Juncea L.).

RESEARCH METHOD

This research was conducted in the Yard of the Posko Village Tebing Tinggi Pangkatan, Labuhanbatu District, North Sumatra Province from November 2022 to January 2023. The study utilized a Completely Randomized Design (CRD) with three replications and one treatment factor, which was the dosage of liquid organic fertilizer. The doses of liquid organic fertilizer treatment consisted of: P0 = Without treatment (control), P1 = 90 ml/liter of water, P2 = 100 ml/liter of water, P3 = 150

ml/liter of water, P4 = 185 ml/liter of water. Therefore, there were 5 treatments with 3 replications each, resulting in a total of 15 experimental units: P0, P1, P2, P3, P4.

The experimental setup included 5 treatments, 3 replications, and 15 experimental plots. Each plot contained 2 plants, and 1 plant was sampled from each plot, resulting in a total of 30 plants. The distance between plots was 30 cm, and the distance between plants within a plot was 30 cm x 30 cm.

Four observations were conducted: Plant height (cm), measured when the plants were one month old, with measurements taken every two weeks from the base to the tip of the leaves. Leaf area (cm2), calculated as the total area of all leaves formed until the end of the observation period, measured every two weeks after the plants were one month old. Rhizome length (cm), measured after harvesting. Wet weight of roots and shoots (g), where roots were cleaned from soil and debris, then air-dried for 2 hours. The wet weight of the shoot was measured by cutting the base of the roots. Measurements of wet root and shoot weights were taken from day 10 to day 30 after sowing using an analytical balance.

RESULT AND DISCUSSION

The research method and observation data used a Completely Randomized Design (CRD) with 3 replications of treatment factors, namely the dosage of liquid organic fertilizer. The treatment doses of liquid organic fertilizer consisted of: P0 = No treatment (control), P1 = 90 ml/liter of water, P2 = 100 ml/liter of water, P3 = 150 ml/liter of water, P4 = 185 ml/liter of water. Thus, there were 5 treatments conducted, resulting in 5 x 3 = 15 experimental units, P0, P1, P2, P3, P4. With the number of treatments: 5 treatments, number of experimental plots: 15 plots, Number of plants per plot: 2 plants, number of sampled plants per plot: 1 plant, total number of plants: 30 plants, plot distance: 30 cm, and plant distance: 30 cm x 30 cm.

Table 1. Plant Height (cm)

Treatment	7 HST	14 HST	21 HST	28 HST	35 HST
$P0_1$	1,04 cm	3,04 cm	10,08 cm	16.00 cm	19,00 cm
$P1_1$	3,09 cm	5,08 cm	17,02 cm	21,05 cm	22,02 cm
$P2_1$	2,09 cm	5,00 cm	16,00 cm	21,00 cm	24.08 cm
$P3_1$	3,09 cm	6,08 cm	18,06 cm	22,03 cm	28,02 cm
$P4_1$	4,05 cm	6,07 cm	19,01 cm	26,01 cm	26,02 cm

Statistical analysis results of sawi plant height (Table 1) show that the highest average height of sawi plants was in the treatment of seed soaking. It can be seen that sawi plants treated with liquid organic fertilizer (POC) from banana rhizomes at a dosage of 120 ml by seed soaking produced taller plants, namely 24.04 cm (21 DAS) and 30.05 cm (35 DAS), and the lowest was in the root soaking treatment, which was 10.08 cm (21 DAS) and 19.00 cm (35 DAS). Therefore, it can be said that the method of applying liquid organic fertilizer (POC) from banana rhizomes influences the growth of sawi plant height. According to Ramadani, (2020), the application of liquid organic fertilizer (POC) from banana rhizomes to plants can

affect morphology, such as plant height. This is also in line with the research by Muhammad, et.al, (2021) which states that the duration of seed soaking in IAA can increase the percentage of plant height.

Table 2. Number of Leaves (strands)

Treatment	7 HST	14HST	21 HST	28 HST	35 HST
P0	1 helai	3 helai	3 helai	4 helai	6 helai
P1	2 helai	4 helai	5 helai	5 helai	6 helai
P2	2 helai	3 helai	4 helai	5 helai	7 helai
P3	1 helai	3 helai	5 helai	6 helai	7 helai
P4	2 helai	4 helai	5 helai	6 helai	8 helai

Results of statistical analysis of leaf area (table 2) number of mustard plant leaves in seed soaking treatment. It can be seen that mustard plants that are given liquid organic fertilizer (POC) banana weevil by soaking seeds give the best results on the number of mustard plant leaves, namely 5 strands (21 HST) and 8 strands (35 HST) and the lowest in root soaking treatment, namely 3 strands (21 HST) and 6 strands (35 HST), so it can be said that the method of applying liquid organic fertilizer (POC) banana weevil affects the number of mustard plant leaves. This is also in line with the research of Agus, N.S., et.al., (2021) soaking seeds in gibberellin solution produces a higher index of the number of leaf blades compared to no treatment.

Table 3.Leaf Width (cm^2)

Treatment	7 HST	14 HST	21 HST	28 HST	35 HST
P0	1,02 cm^2	3,02 cm^2	6,00 cm^2	8,05 cm^2	10,05 cm^2
P1	1,03 cm^2	3,02 cm^2	6,05 cm^2	11,05 cm^2	13,02 cm^2
P2	1,03 cm^2	2,06 cm^2	8,03 cm^2	12,07cm^2	14,07 cm^2
P3	1,04 cm^2	2,03 cm^2	7,07 cm^2	11,03 cm^2	13,03 cm^2
P4	1,03 cm^2	3,03 cm^2	9,06 cm^2	12,08 cm^2	15,03 cm^2

Results of statistical analysis of leaf area (table 3) average leaf width of the highest mustard plants in seed soaking treatment. It can be seen that mustard plants given liquid organic fertilizer (POC) banana weevil by soaking seeds give the best results on the leaf area of mustard plants which are 9.06 cm2 (21 HST) and 15.03 cm2 (35 HST) and the lowest in root soaking treatment which is 6.00 cm2 (21 HST) and 10.05 cm2 (35 HST), so it can be said that the method of giving ecoenzymes affects the leaf area of mustard plants. This is also in line with research by Agus, N.S., et.al., (2021) soaking seeds in gibberellin solution resulted in a higher leaf width index compared to no treatment.

Table 4. Wet Weight (grams)

Treatment	Wet Weight of Plants
P0	21 gram
P1	23 gram
P2	30 gram
P3	36 gram
P4	56 gram

The statistical analysis results of wet weight (Table 4) show the highest average wet weight of sawi plants in the seed soaking treatment. It can be observed that sawi plants treated with liquid organic fertilizer (POC) from banana rhizomes by soaking produced the best results in terms of the wet weight of sawi plants, which is 56 grams, and the lowest was in the root soaking treatment, which was 21 grams. Therefore, it can be said that the method of applying liquid organic fertilizer (POC) from banana rhizomes significantly influences the wet weight of sawi plants. This is also in line with the research by Muhammad, A., et.al., (2021), where the prolonged soaking of seeds in IAA can increase the percentage of wet weight of plants because the duration of seed soaking affects the plant's metabolic process. Additionally, providing liquid organic fertilizer by seed soaking increases the height of sawi plants, thus affecting the wet weight of plants.

Table 5. Wet Weight of tajuk (grams)

Treatment	Wet Weight of tajuk
P0	20 gram
P1	21 gram
P2	26 gram
P3	33 gram
P4	43 gram

The statistical analysis results of wet weight of shoots (Table 5) show the highest average wet weight of sawi plants in the seed soaking treatment. It can be observed that sawi plants treated with liquid organic fertilizer (POC) from banana rhizomes by soaking produced the best results in terms of the wet weight of sawi plant shoots, which is 43 grams, and the lowest was in the root soaking treatment, which was 20 grams. Therefore, it can be said that the method of applying liquid organic fertilizer (POC) from banana rhizomes significantly influences the wet weight of sawi plant shoots. This is also in line with the research by Muhammad, A., et al. (2021), where the prolonged soaking of seeds in IAA can increase the percentage of wet weight of plant shoots because the duration of seed soaking affects the plant's metabolic process. Additionally, providing liquid organic fertilizer by seed soaking increases the height of sawi plants, thus affecting the wet weight of plant shoots.

Table 6. Wet Weight of Roots (grams)

Treatment	Wet Weight of Roots
P0	3 gram
P1	3 gram
P2	4 gram
P3	5 gram
P4	7 gram

The statistical analysis results of wet weight of roots (Table 6) show the highest average wet weight of sawi plants in the seed soaking treatment. It can be observed that sawi plants treated with liquid organic fertilizer (POC) from banana rhizomes by soaking produced the best results in terms of the wet weight of sawi plant roots, which is 7 grams, and the lowest was in the root soaking treatment, which was 3 grams. Therefore, it can be said that the method of applying liquid organic fertilizer (POC) from banana rhizomes significantly influences the wet weight of sawi plant roots. This is also in line with the research by Agus, N.S., et.al., (2021), where soaking seeds in gibberellin solution increases the wet weight of plant roots. This is because soaking can increase nutrient absorption, especially nitrogen, which increases photosynthesis, thereby increasing the wet weight of plant roots.

CONCLUSION

From the high yield of mustard greens, there was the highest yield in the dosing treatment of 120 ml of Liquid Organic Fertilizer (P4) which was 30.05 cm (35 HST) which was significantly different, while the lowest was found in the dosing treatment (P0) which was 19.00 cm (35 HST). From the results of the highest number of leaves for mustard plants found in the dosing treatment (P4) which is 8 strands (35 HST), while the lowest results are found in the dosing treatment (P0) which is 6 strands (35 HST). From the width of the leaves, there was a dosing perlakun (P4) of 15.03 cm2 (35 HST), while the lowest results were found in the dosing treatment (P0) and 10.05 cm2 (35 HST). From the results of the wet weight of plants in mustard greens, the heaviest was obtained at the dose (P4), which was 56 grams and the lowest at the dose (P0) 21 grams. From the results of the wet weight of the crown on the heaviest mustard green plants obtained at the dose (P4) which is 43 grams and the lowest at the P0 dose which is 20 grams. And from the results of root weights in mustard green plants *(Brasisca juncea L)* where the heaviest root weight was obtained at the dose (P4) which was 7 grams and the lowest at the dose (P0) which was 3 grams. So it can be concluded that from the results of research that has been carried out for 35 days for the application of Liquid Organic Fertilizer (POC) to sweet mustard plants *(Bransisca Juncea L)* for the dose given, which is more influential with the highest dose of 185 ml, far different from plants that are not given fertilizer, the growth is slow. While growth with doses of 90 ml, 100 ml and 150 ml is better than not being fertilized at all.

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