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The Use of Seprint Fertilizer on the Growth and Production of Mustard Green (Brassica Juncea L.)

Zulkifli Maulana

Professor in Agrotechnology Program, Faculty of Agriculture, Bosowa University, Makassar, Indonesia

Abstract

Seprint fertilizer is a complete liquid fertilizer used for leaves, flowers, and fruits, enhancing the growth and production of mustard green. This study aimed to analyze the growth and production of mustard green at various concentrations of Seprint organic liquid fertilizer. The research was conducted at the Experimental Garden of Bosowa University, located in Bontoramba Village, Pallangga District, Gowa Regency. The study was designed as an experiment arranged in a Randomized Block Design consisting of five treatments and three replications. The treatments tested were S0: control, S1: 6 ml/L water, S2: 8 ml/L water, S3: 10 ml/L water, and S4: 12 ml/L water. The results showed that the Seprint treatment at a concentration of 12 ml/L water (S4) had a positive effect on plant height at 14 days after planting (2233), 21 days after planting (2433), and harvest weight (939).

Keywords: Mustard Green, Seprint Fertilizer

1. Introduction

Agriculture is rapidly advancing, including the knowledge of vegetable crops. High-value vegetable crops continue to be favored by progressive farmers, as they are expected to provide better income. Alongside cultivating vegetables, farmers also improve practices from planting preparation to production to achieve better quality and quantity. Mustard greens are commonly cultivated in lowlands but can also be grown in highlands, and they are resilient to high temperatures. The demand for mustard greens is increasing with the growing population. This vegetable is popular due to its taste, affordability, and comprehensive nutritional value, including proteins, fats, carbohydrates, Ca, P, Fe, and various vitamins (A, B, C), minerals, and fiber, especially when consumed fresh. Mustard greens can be used in various dishes and salads and are now trendy as a source of detoxification and disease prevention. The roots are effective for treating coughs and sore throats, and the seeds are beneficial for headaches.

Mustard greens also contain sulforaphane, an anti-cancer compound. According to Walida (2020), the high sulforaphane content in the Brassica genus (mustard) effectively prevents the growth of breast cancer cells. Epidemiological studies have shown that consuming vegetables from the Brassica genus reduces the risk of several cancers, including breast, prostate, kidney, colon, bladder, and lung cancer. Mustard greens also contain glucosinolate phytochemicals, which help prevent various diseases, especially cancer.

To meet food needs in terms of quality and quantity, production must be increased. One common method used by farmers to enhance production is fertilization, which adds nutrient-containing materials to the soil and plants. Organic fertilizers consist mainly or entirely of organic materials from plants or animals that

have undergone processing and can be solid or liquid, used to supply organic matter and improve soil properties.

Activating and optimizing microorganisms in the soil, especially around the root zone, is essential in breaking down compounds in the soil for plant availability, serving as an alternative to enhance mustard green growth and production. The effectiveness of Seprint, a beneficial microorganism, needs to be determined in terms of the best concentration for promoting mustard green growth and production. Field research is necessary to identify the appropriate Seprint concentration for mustard greens.

Applying liquid organic fertilizers must consider the concentration or dosage given to plants. Research shows that applying liquid organic fertilizers through leaves results in better growth and yield compared to soil application. Leaf fertilization allows rapid nutrient absorption, while soil fertilization aims to improve the physical, chemical, and biological conditions of the soil for optimal plant growth and yield.

Using organic fertilizers is an effective solution as they can neutralize toxic chemicals, loosen, and enrich the soil. Liquid fertilizers are particularly beneficial as they are quickly absorbed by plants due to their lighter, liquid form compared to solid fertilizers. Seprint liquid fertilizer, rich in essential macro and micronutrients (such as Nitrogen, Phosphorus, Potassium, Sulfur, Mn, Zn, Bo, Mu, Cu, Co), is crucial for the early vegetative phase of mustard greens. Seprint contains amino acids, which are directly absorbable by plants without requiring decomposition. Seprint has been successfully used on various crops, including coffee, corn, rice, cabbage, potatoes, carrots, onions, tomatoes, celery, and spinach, providing optimal results. It is expected to yield similar success with mustard greens. Therefore, mustard greens should be a focus to enhance production in terms of both quantity and quality.

2. Research Method

The study was conducted at the Experimental Garden of Bosowa University, located in Bontoramba Village, Pallangga District, Gowa Regency. The primary materials used in this research included mustard green seeds, Seprint fertilizer, and manure. Additionally, a variety of tools were employed to facilitate the research process, such as hoes for soil preparation, buckets for carrying water and fertilizer, watering cans for applying liquid fertilizer, handsprayers for precise fertilizer application, meters and rulers for measuring plant growth, scales for weighing the plants, name boards for labeling the experimental units, and various sampling tools and writing instruments for data collection and recording.

The experiment was arranged in a Randomized Block Design (RBD) to ensure the reliability and validity of the results. This design was chosen because it allows for the control of variability within the experimental units, thus providing more accurate and statistically significant results. The experiment consisted of five different treatments, each replicated three times, resulting in a total of 15 experimental units.

The treatments involved the application of Seprint organic fertilizer at varying concentrations to determine its effect on the growth and production of mustard greens. The specific treatments tested were as follows: S0 = control (no Seprint fertilizer), S1 = 6 ml/L water, S2 = 8 ml/L water, S3 = 10 ml/L water, and S4 = 12 ml/L water. Each treatment was meticulously applied to the designated experimental units. The control treatment (S0) did not receive any Seprint fertilizer, serving as a baseline for comparison. The other treatments received Seprint fertilizer at increasing concentrations, allowing for the assessment of its impact on plant growth and yield at different levels.

The experimental units were carefully monitored throughout the growth period of the mustard greens. Regular measurements and observations were made to record various growth parameters, including plant

height, the number of leaves, stem diameter, and overall plant health. These data points were collected at specific intervals to track the progress and effects of the different fertilizer treatments over time.

Media Preparation

The plot was first measured and cleared of weeds and plant residues. This was done manually using tools such as machetes, hoes, and other necessary equipment. This manual clearing ensured that all unwanted vegetation was removed to provide a clean slate for planting.

Seedling Preparation

Seeds were sown in plastic bags measuring 6 x 10 cm, filled with a growing medium composed of a 2:1:1 mixture of sand, soil, and chicken manure. Prior to sowing, the seeds were soaked in warm water for about an hour to break dormancy. The seeds were then planted in an upright position in the plastic bags, with one seed per bag. The seedling stage lasted approximately two weeks, after which the seedlings were ready to be transplanted to the field by tearing the plastic bags and planting them with the medium.

Soil Preparation

The soil was tilled using hoes to loosen it, improve its structure, and enhance aeration and microbial activity. After tilling, the soil was formed into beds measuring 1x1 m with a height of 20 cm and a planting distance of 30 cm within the rows. Labels were then attached to each bed according to the randomization scheme.

Planting

When the beds were ready, the two-week-old mustard green seedlings, each with 3-4 leaves, were transplanted to the prepared beds. Healthy and uniformly growing seedlings were selected for transplanting, with a spacing of 30x30 cm. Replanting was done if any plants died or appeared unhealthy to ensure uniformity and optimal growth.

Maintenance

The mustard green plants were weeded daily to prevent weed growth and maintain loose soil. Weeding was performed every morning and evening to ensure that the plants had no competition for nutrients and to keep the soil in good condition. This regular maintenance helped ensure the healthy growth of the mustard greens.

Observations

The observations conducted in this research focused on several key growth parameters. Plant height was measured from the soil surface to the highest growth point. The number of leaves was counted and observed weekly, ensuring a comprehensive understanding of leaf development. Stem diameter was recorded at harvest time to assess the robustness of the plants. Additionally, both the gross and net weights of the plants were measured during harvest, with net weight being recorded after the roots were removed. Finally, the leaf area was observed at harvest to gauge overall plant health and growth. These observations provided a detailed insight into the effects of Seprint fertilizer on mustard green growth and production.

3. Results

Plant Height

Observations and statistical analysis of plant height indicated that the application of various Seprint treatments had a significant effect.

Table 1. Average Plant Height at 14 Days After Planting (cm)

Treatment	Average	NP. BNT. 0,05
S4	22,33*a*	
S3	22,00*b*	
S2	21,11*c*	0,07
S1	20,44*d*	
S0	19,77*e*	

Note: Numbers followed by different letters indicate significant differences at α = 0.05.

The BNT test results in Table 1 show that the S4 treatment significantly differed from the S3, S2, S1, and S0 treatments in terms of plant height.

Table 2. Average Plant Height at 21 Days After Planting (cm)

Treatment	Average	NP. BNT. 0,05
S4	24,33*a*	
S3	24,33*a*	
S2	22,67*b*	0,07
S1	22,33*c*	
S0	22,33*c*	

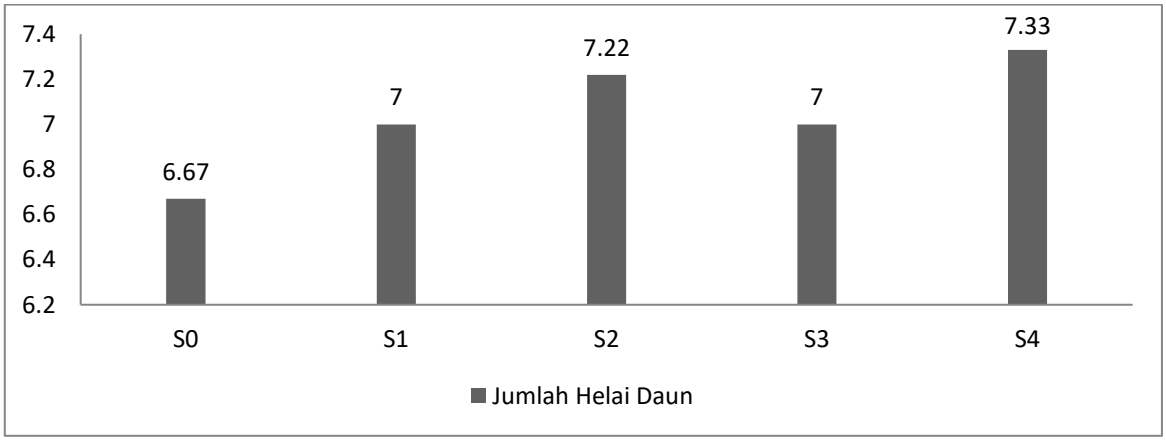
Note: Numbers followed by different letters indicate significant differences at α = 0.05.

The BNT test results in Table 2 show that the S4 treatment significantly differed from the S3, S1, and S0 treatments in terms of plant height but did not significantly differ from the S3 treatment.

Number of Leaves

The observations on the number of leaves and statistical analysis indicated that the application of various Seprint organic liquid fertilizer treatments did not have a significant effect on the number of leaves. However, the treatment with a concentration of 12 ml/L water (S4) showed a tendency for better results compared to other treatments, as seen in Figure 2.

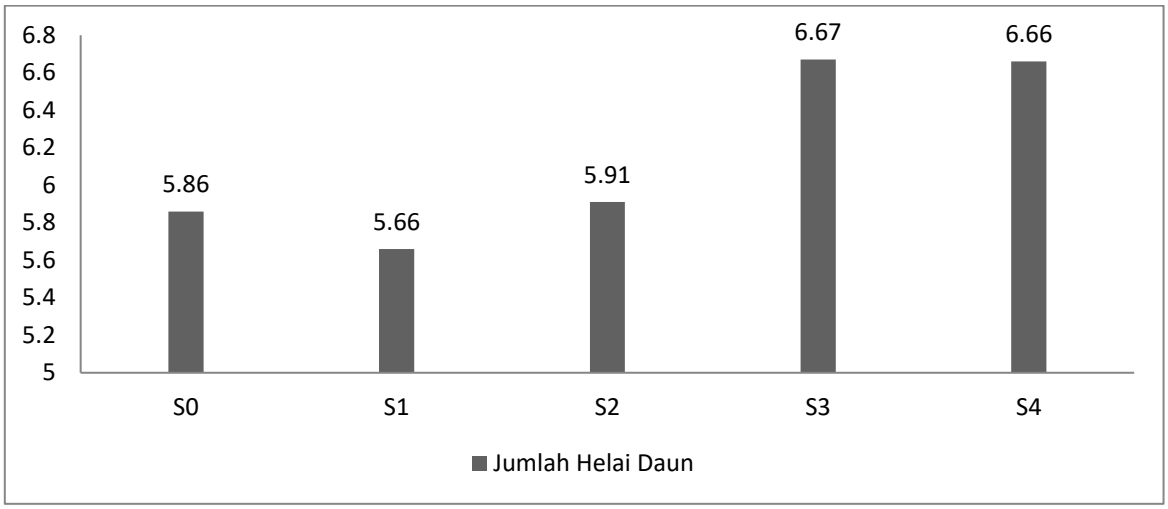
Figure 2. Histogram of Average Number of Leaves



Stem Diameter

The observations on stem diameter and statistical analysis showed that the application of various Seprint liquid fertilizer treatments did not have a significant effect on stem diameter. However, the treatment with a concentration of 10 ml/L water (S3) tended to perform better compared to other treatments, as shown in Figure 3.

Figure 3. Histogram of Average Stem Diameter



Harvest Weight

The observations on harvest weight and statistical analysis indicated that the application of various Seprint organic liquid fertilizer treatments had a significant effect on plant harvest weight.

Table 3. Average Harvest Weight (g)

Treatment	Average	NP. BNT. 0,05
S4	9,39 *a*	
S3	8,95 *a*	
S2	8,20 *a*	2,78
S1	6,82 *ab*	
S0	4,71 *b*	

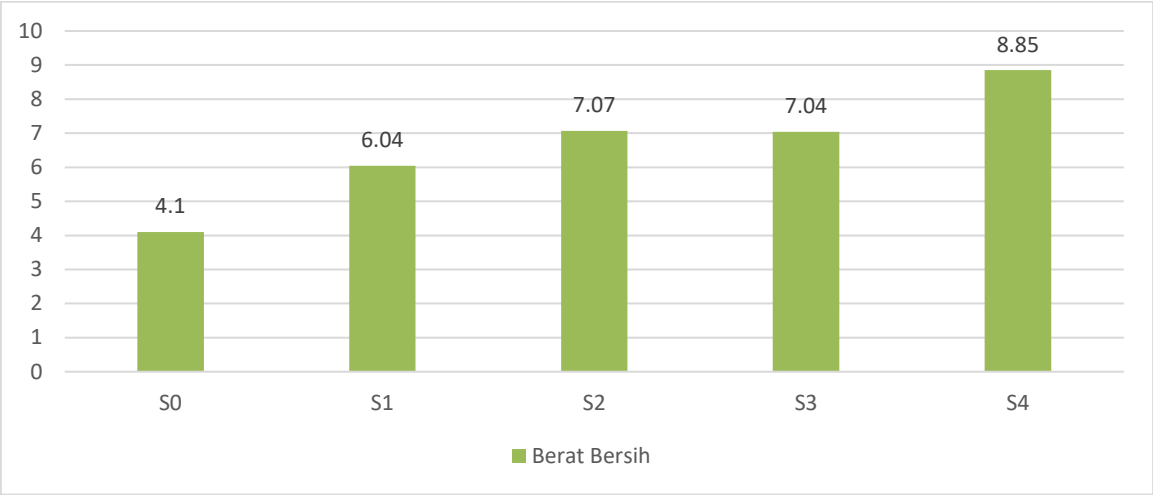
Note: Numbers followed by different letters indicate significant differences at α = 0.05.

The BNT test results in Table 3 show that the S4 treatment significantly differed from the S0 treatment in terms of harvest weight but did not significantly differ from the S3, S2, and S1 treatments.

Net Plant Weight

The observations on net plant weight and statistical analysis indicated that the application of various Seprint liquid fertilizer treatments did not have a significant effect on net plant weight. However, Figure 4 shows that the best net plant weight was achieved with the 12 ml/L water (S4) treatment.

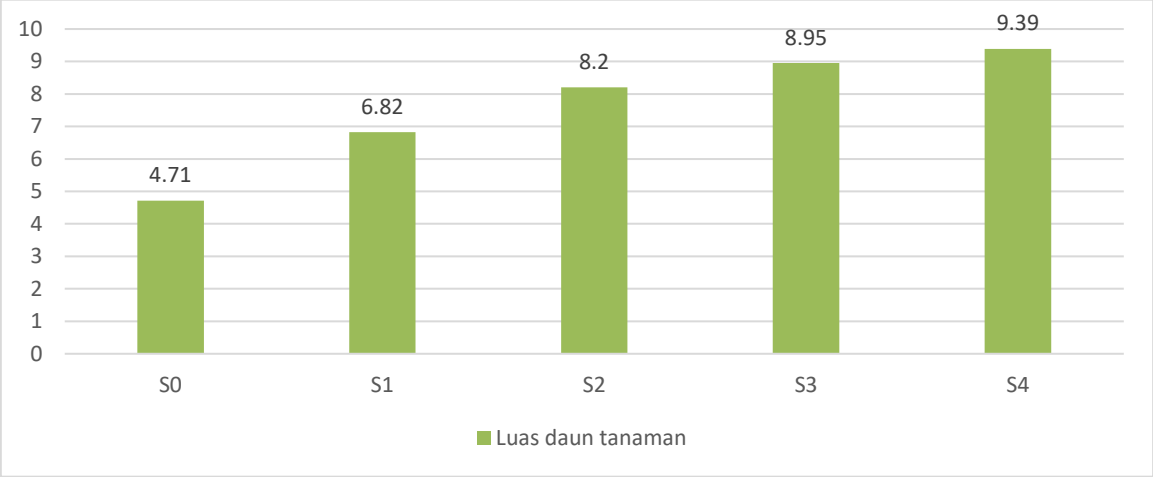
Figure 4. Histogram of Average Net Plant Weight



Leaf Area

The observations on leaf area and statistical analysis showed that the application of various Seprint liquid fertilizer treatments did not have a significant effect on leaf area. However, Figure 5 shows that the best leaf area was achieved with the 12 ml/L water (S4) treatment.

Figure 5. Histogram of Average Leaf Area



4. Discussion

For mustard greens to grow and develop well, they depend heavily on environmental conditions and the soil's ability to utilize the surrounding nutrients. Nutrients are essential for the growth and development of mustard greens, with nitrogen being the most dominant element influencing their growth compared to other nutrients. One of the efforts to achieve optimal plant yield is through fertilization, which involves adding nutrient-containing materials to the soil and plants to meet their physiological process needs (life cycle).

The experiment results showed that the application of Seprint liquid fertilizer at a concentration of 12 ml/L water provided the best effect on plant height at 14 and 21 days after planting (HST). The higher the fertilizer dose, the more the nitrogen needs of the plants were met. Nitrogen is crucial for plant growth, aiding in cell formation and division in leaves, stems, and roots. The application of Seprint fertilizer

increased nutrient availability in the soil, enhancing plant growth through improved photosynthesis due to the nutrients provided by Seprint fertilizer.

Plant height growth is not only influenced by nitrogen but also by other elements such as phosphorus (P), zinc (Zn), iron (Fe), and manganese (Mn). According to Pranata (2004), phosphorus is essential in various sugar phosphates and plays a role in the dark reactions of photosynthesis and respiration. Zinc contributes to chlorophyll formation and prevents chlorophyll molecule damage. Manganese acts as an enzyme activator and is a structural component of the chloroplast membrane system. The absorption of all these elements supports plant height growth, making the liquid organic fertilizer effective.

The experiment indicated that the application of Seprint liquid organic fertilizer at various concentrations did not significantly affect the number of leaves at 7 and 14 HST with 6 ml/L water, at 21 HST with 10 ml/L water, and at 28 HST with 12 ml/L water. The average leaf count was 4.00 at 7 HST, 5.66 at 14 HST, 6.55 at 21 HST, and 7.33 at 28 HST. However, the 12 ml/L water treatment showed a tendency for better results than other treatments, indicating that the nutrients in Seprint fertilizer at this concentration could meet the plants' needs and be well absorbed and utilized.

The experiment results also showed that the highest stem diameter was achieved with an average of 21.01 at a concentration of 10 ml/L water, though this effect was not significant. It is suspected that the different concentrations did not adequately meet the plants' nutrient needs, leading to slower growth due to insufficient nutrient intake during the critical growth phase, affecting the formation of roots, stems, leaves, and other parts.

The low mustard green production is partly due to nitrogen deficiency in the soil. Nitrogen deficiency can hinder plant growth as it is a vital nutrient during the vegetative phase, according to Sarief (1986). As plant height increases, so does the number of leaves, which subsequently affects and increases the harvest weight. The observations showed that Seprint liquid fertilizer significantly affected harvest weight at 12 ml/L water, resulting in an average harvest weight of 9.39. It is also suggested that Seprint can alter soil physical conditions, improving aeration around the roots and allowing normal respiration processes. According to Itwidjoseputro (1990), maintaining normal respiration can result in normal plant growth.

There was no significant effect of Seprint treatments on net weight and leaf area of mustard greens. This is likely due to the inherent factors within the plants themselves rather than external factors like nutrient content or additional nutrient supply from liquid fertilizer application. Plant growth and yield components are greatly influenced by management, genotype, and environmental factors. Plant growth can be seen as a function of the genotype influenced by environmental factors, such as water content and soil nutrients (Aris, 2011).

However, the application of Seprint liquid fertilizer at 12 ml/L water (S4) showed better tendencies for net weight and leaf area. This is likely due to the higher nutrient content in the soil. According to Syarif (1995), if nutrients are available in sufficient and balanced amounts, plants will grow optimally, especially during the vegetative phase, such as in plant height and leaf number.

5. Conclusion

Based on the results of the research, it can be concluded that the application of Seprint organic liquid fertilizer at a concentration of 12 ml/L water had a positive effect on plant height and harvest weight compared to other treatments. This concentration was found to be the most effective in enhancing the growth and production of mustard greens.

Additionally, while the application of Seprint fertilizer did not show a significant impact on the number of leaves, stem diameter, net plant weight, and leaf area, the treatment with 12 ml/L water still tended to perform better than other concentrations. This suggests that Seprint fertilizer can improve overall plant health and growth when applied at the optimal concentration.

The findings indicate that nitrogen and other nutrients in Seprint fertilizer, such as phosphorus, zinc, iron, and manganese, are crucial for plant development. The fertilizer's ability to increase nutrient availability in the soil enhances photosynthesis and supports robust plant growth.

Moreover, the study highlights the importance of using liquid organic fertilizers for rapid nutrient absorption and improved soil conditions, ultimately contributing to better plant growth and yield. The results support the potential of Seprint fertilizer as a valuable addition to sustainable agricultural practices, particularly for mustard greens.

In summary, Seprint organic liquid fertilizer at 12 ml/L water is recommended for maximizing the growth and production of mustard greens, offering an effective solution for enhancing both the quantity and quality of the harvest.

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